The Dell EMC Journey in the Age of Smart Assistants

Presented by:

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Geoff Meyer

A Test Architect at Dell EMC, Geoff Meyer directs the Test Strategy and Architecture for 400+ Test Engineers across India, Taiwan, and the United States. He leads initiatives in Agile testing, Test Automation, DevOps, Continuous Testing, Infrastructure as a Service (IaaS), Predictive Analytics and Machine Learning. In addition to his day job, Geoff is a member of the Agile Austin community and is a speaker at Agile, STAR, QAI and software testing conferences across the globe. He is an active mentor to Veterans participating in the www.Veterans4Quality.Org program, which provides Veterans with an on-ramp to a career in software quality assurance. You can connect with Geoff at Geoff.meyer@dell.com, LinkedIn or Twitter.
A testing journey in the age of smart assistants
Agenda

- Context of Dell EMC Server
- The Evolution of Automation
- The Dell EMC Journey
- Re-imagine Your Future of Testing
Context at DellEMC Servers

Server Configuration Elements

- Chassis
- Processor
- Memory DIMM
- Memory Configuration
- Hard Disk Drive (HDD)
- Non-Volatile Memory (NVM)
- Embedded Systems Management
- Power Management BIOS
- Power Supply
- Bezel
- Network Daughter Card
- RAID Controller
- Network Interface Card (NIC)
- Host Bus Adapter (HBA)
- Additional PCIe Cards
- Cooling

465 Trillion Test Configurations!!
The Analytics Continuum

- **What Happened?**
- **Why did it Happen?**
- **What will Happen?**
- **How can we make it Happen?**

**Source:** Gartner

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**Business Value**

- Descriptive
- Diagnostic
- Predictive
- Prescriptive
- Self-Learning

**Data Analytics Sophistication**

- Report
- Correlate
- Predict
- Recommend
- Autonomous

**Source:** Gartner
Data Analytics Modeling

Data Sources → Data Cleanse → Analytics Engine → Insights, Predictions, Recommendations → Feedback

- Data Sources
- Domain Knowledge (i.e. Rules)
- Analytics Engine
- Insights, Predictions, Recommendations
- Feedback
What goes into the Model?

Rules and heuristics

Domain Knowledge
(i.e. Rules)

Analytics Engine

Rules of Thumb

Best-practices

Positive/Negative Patterns

“Risk-based Testing”

“Prior Failed Test Cases”

Rules

Tribal Knowledge

Common Sense

“Related historical test failures”

“Test the defect that got fixed”

“Only deploy BVT-verified builds”
It’s all about the data

“Nobody really goes out of their way to point out the importance of data…”
~ Brian Sletten, Bosatsu Consulting
Data Sources - Product Engineering

- App. Logs and traces
- Support engr call notes
- Usage patterns
- RTM Systems

Operations Repositories

Structured Data

Data Rules

Grouper

Software lifecycle artifact quality

Test & Dev Repositories

Test Mgmt System
Defect Mgmt System
Mgmt System
Project Mgmt System
Code Coverage DB
SCA & DCA results
Req. Mgmt system

Test list

Feedback

Test Engine

Optimized Test list based on real time data
What if we had a Smart Assistant?
What are the high-value SUT configurations?

What test scripts should be retired rather than be re-factored?

What tests can detect the maximum number of defects given the changes in the current build?

What’s the optimal coverage for this build/test cycle?

What is the release risk given the testing that’s been completed?

What automated test failures appear to be duplicates?
Selecting our Technology Partners

DELL EMC

PAG | Performance Analytics Group

sogeti
Part of Capgemini
SUT Configuration Model
“Q” - System Under Test

Current Testing Scenario

Challenges
➢ 465 Trillion possible server configs!!!
➢ Which are the High Value Configs?
➢ How to ensure Optimal Configs Coverage?

Objectives
➢ Quickly predict “best-available” SUT configurations during planning and test execution
➢ Ensure Optimal Configs Coverage
➢ Prioritizes High-Value Configs

Data Sources

Technology Partner: Dell Performance Analytics Group
Test Planning Model

“JARVIS”

Objectives

• Use historical test data and defects as predictors and to expose patterns
• Automate deep-think testing tasks
• Codify Subject-Matter Expertise
• Real-time access to active repositories

Which manual tests are most effective, and should be automated?

How can I accelerate discovery of break/fix?

Which of my test cases appear to be obsolete?

Am I over-testing or under-testing?

Technology Partner: sogeti
Testbots are here
AI-assisted UI Automation

Meet your newest testers.

- Increases UI test coverage
- At substantially less cost of creation and maintenance
Duplicate Defect Prediction

DellEMC XtremIO
Re-imagine Your Future of Testing
Value Creation vs. Sustainment

Testing ~ Value Creation
- Establishes Expected Behavior
- Collaborative
- Curious
- Exploratory
- Cognitive
- Analyze Potential Risks
- Requires Thinking

Checking ~ Value Sustainment
- Confirms Expected Behavior
- Robotic
- Tedious
- Scripted
- Vigilance for deviations
- Monitor Known Risks
- Requires Processing

Sprints
1 2 3 4 5 6

Legacy test automation & maintenance

New Feature Development/Test

Legacy Regression Checking
1 1 1 1 1
2 2 2 2
3 3 3
4 4
New Feature Regression Checking 5

New feature test automation development & maintenance
Humans are Better at

• Creative, Collaborative, Problem Solving

• Contextualized Intelligence

• Empathy

• Storytelling
Envisioning the Future of Testing

Collaborative Resources

Value Creation

Value Sustainment

Requirements

Technologies

Dependencies

Product roadmap

Technical Debt

Value

Creation

Sustainment
Envisioning the Future of Testing

Automation
- Unit tests
- Code Complexity
- Build Verification Testing
- Regression Testing
- Non-Functional Testing
- Simulation/Emulation
- DevOps
  - Continuous Integration
  - Environment Provisioning
  - Continuous Deployment
  - Continuous Testing
- Cognitive Tasks (AI/ML)
- Process Orchestration
- Autonomous “Self-driving”
- Continuous Monitoring

Collaborative Resources

Value Creation

Value Sustainment

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• Unit tests
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• Continuous Monitoring
Autonomous Regression Testing
“Self-driving” enabled by AI & Analytics

Leverage Machine Insights to Improve Feature Teams (Out-of-band)

Autonomous, “Self-Driving”, Regression Testing (In-band)

Inputs
• New Features
• Test Cases/Scripts
• Test Configurations
• New Builds
• Program Priorities

- Test Planning
- Environment Provisioning
- Test Execution
- Test Execution & Analysis
- Monitoring & Reporting
Assessing Your AI Opportunities

- Field Issues
- Customer logs
- Customer Sentiment Analysis
- Coverage Optimization
- Changed-based Regression
- Test Failure Diagnostics
- Predicted Defect Root-cause
- SUT Configuration Re-planning
- AI-Assisted UI Automation

- Test Case Planning/Analysis
- Development patterns
- SUT Configuration Planning
- Test Data Planning
- Automation Planning
Framework for Applying AI within the SDLC

Assessing
Proving
Enabling
Realizing

Start with Why
Demonstrate Feasibility
Value, People, Process & Technology
Feedback & Business Value
Assessing & Proving

1) Evaluate your SDLC landscape
2) Pinpoint your Painpoints
3) Select the right Data Science Partner
4) Collect and Visualize Data
5) Select the right model
6) Build the prototype
Enabling

Value, People, Process & Technology

- Reduced Risk, Reduced Time, Increased Resource Availability
- Stakeholder buy-in, feedback, and validation
- Data cleansing/curation, process and organizational change management
- Implement your Analytic Models, Algorithms and Data Marts
Realizing

Collecting Business Dividends

• Stakeholder Validation & Feedback Loop
• Dividend collection and reporting
  • Risk Reduction
  • Increased Capacity
  • Reduced Cycle Time
• Continuous Improvement & Future Delivery
Start Your Smart Assistants Journey

Capture your data

Start with Why

Establish deep stakeholder engagement

Re-imagine Testing
Questions?
Thank you
Resources

Books
- Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die: [https://www.amazon.com/dp/B019HR9X4U/ref=dp-kindle-redir?_encoding=UTF8&btkr=1](https://www.amazon.com/dp/B019HR9X4U/ref=dp-kindle-redir?_encoding=UTF8&btkr=1)
- Weapons of Math Destruction: [https://weaponsofmathdestructionbook.com/](https://weaponsofmathdestructionbook.com/)
- Race against the Machine: [https://books.google.com/books/about/Race_Against_the_Machine.html?id=IhArMwEACAAJ](https://books.google.com/books/about/Race_Against_the_Machine.html?id=IhArMwEACAAJ)
- Humans are underrated: [http://geoffcolvin.com/books/humans-are-underrated/](http://geoffcolvin.com/books/humans-are-underrated/)
- Life 3.0: Being Human in the Age of Artificial Intelligence: [https://www.amazon.com/Life-3-0-Being-Artificial-Intelligence/dp/1101946598](https://www.amazon.com/Life-3-0-Being-Artificial-Intelligence/dp/1101946598)

Research
- How AL will Change Software Development: [https://www.slideshare.net/WillyDevNET/how-ai-will-change-software-development-and-applications](https://www.slideshare.net/WillyDevNET/how-ai-will-change-software-development-and-applications)
- What's Next | Artificial Intelligence Part 1: [https://www.youtube.com/watch?v=2br8yji-rcM](https://www.youtube.com/watch?v=2br8yji-rcM)
- What’s Next | Artificial Intelligence Part 2: [https://www.youtube.com/watch?v=_WKyiGBYFrU](https://www.youtube.com/watch?v=_WKyiGBYFrU)
- TensorFlow by Brian Sletten: [https://www.youtube.com/watch?v=RlrBKYehcNg](https://www.youtube.com/watch?v=RlrBKYehcNg)
- Wolfram Alpha: [www.wolframalpha.com](http://www.wolframalpha.com)
Resources

**Articles**

- **This Technology Will Upend the Entire Automotive Industry**: [https://moneywise411.com/new-automotive-technology/?ppc=743242](https://moneywise411.com/new-automotive-technology/?ppc=743242)
- **5 ways AI will change software testing**: [https://techbeacon.com/5-ways-ai-will-change-software-testing](https://techbeacon.com/5-ways-ai-will-change-software-testing)
- **Technology has created more jobs than it has destroyed**: [https://www.theguardian.com/business/2015/aug/17/technology-created-more-jobs-than-destroyed-140-years-data-census](https://www.theguardian.com/business/2015/aug/17/technology-created-more-jobs-than-destroyed-140-years-data-census)
- **Only 4% of CIOs have deployed AI**: [https://cio.economictimes.indiatimes.com/news/business-analytics/only-4-pc-of-cios-have-deployed-ai-despite-huge-interest-levels-in-ai-technologies/62900459](https://cio.economictimes.indiatimes.com/news/business-analytics/only-4-pc-of-cios-have-deployed-ai-despite-huge-interest-levels-in-ai-technologies/62900459)
- **Top 5: Things to know about AI**: [https://www.techrepublic.com/article/top-5-things-to-know-about-ai](https://www.techrepublic.com/article/top-5-things-to-know-about-ai)
- **AI in software testing has arrived. Here’s why robots rule**: [https://searchsoftwarequality.techtarget.com/feature/AI-in-software-testing-has-arrived-Here-s-why-robots-rule](https://searchsoftwarequality.techtarget.com/feature/AI-in-software-testing-has-arrived-Here-s-why-robots-rule)
- **5-second test for AI fever**: [https://www.linkedin.com/pulse/5-second-test-ai-fever-g-%C3%B8stby-sol%C3%A5s/](https://www.linkedin.com/pulse/5-second-test-ai-fever-g-%C3%B8stby-sol%C3%A5s/)
- **Turning Testers into Machine Learning Engineers**: [https://www.linkedin.com/pulse/turning-testers-machine-learning-engineers-jasonarbon/](https://www.linkedin.com/pulse/turning-testers-machine-learning-engineers-jasonarbon/)
Title: A testing journey in the age of Smart Assistants

Description:
In this latest hype cycle surrounding Artificial Intelligence (AI), new products and consultants are everywhere and inundating us with solutions that may or may not be applicable to our organizational testing context. We find ourselves having to sort out fact from fiction and due to our own cognitive biases towards "the next big thing", often underestimate the effort in assessing the viability of these new practices. And while it’s up to each of us to establish our own relevant reality, shared insight from a fellow practitioner who’s been down this road could be a most welcome assist.

Geoff shares the in-progress journey at Dell EMC as they drive to optimize and re-invent their testing practices with the application of data-driven smart assistants, powered by Analytics and Machine Learning. At a macro level, Geoff identifies opportunities across the Product Engineering and Test landscape for the application of Analytics and AI. Key ingredients in moving toward solutions that matter is the identification of organization-specific pain points, their prioritization, and the availability and cleanliness of essential data. Geoff shares the process of experimentation, staffing and implementation that his team approached these new opportunities with and then delves into the Smart Assistants that they’ve created to automate deep-think, cognitive-based testing tasks. “Q” and "JARVIS" automate many of the time-consuming and deeply analytical tasks such as determining high-value test configurations, defining high-value/maximum coverage regression test suites, and identifying market-demanding solution workloads when time is not an ally. Most importantly, Geoff shares insights on the activities that should get the highest levels of attention and those that you might want to de-prioritize to later phases of your own Analytics and AI journey.

Abstract
A Test Architect in the Dell EMC Infrastructure Solutions Group, Geoff has 30+ years of industry experience as a software developer, manager, program manager, and director. He drives the Test Strategy and Architecture for 400+ SW and HW Testers across India, Taiwan, and the United States. His initiatives include Agile Testing, Continuous Testing, Infrastructure as a Service(IaaS), Predictive Analytics and Test.AI.

Geoff is a member of the Agile Austin community and frequent speaker at international Agile and Testing conferences. He is an active mentor to Military Veterans participating in the Vets4Quality.Org program, which provides them an on-ramp to a career in software quality assurance.