STAR CANADA

A TECHWELL EVENT

W2

AI and Data Analytics
Wednesday, October 17th, 2018 10:15 AM

What's Our Job When the Machines Do Testing?

Presented by:

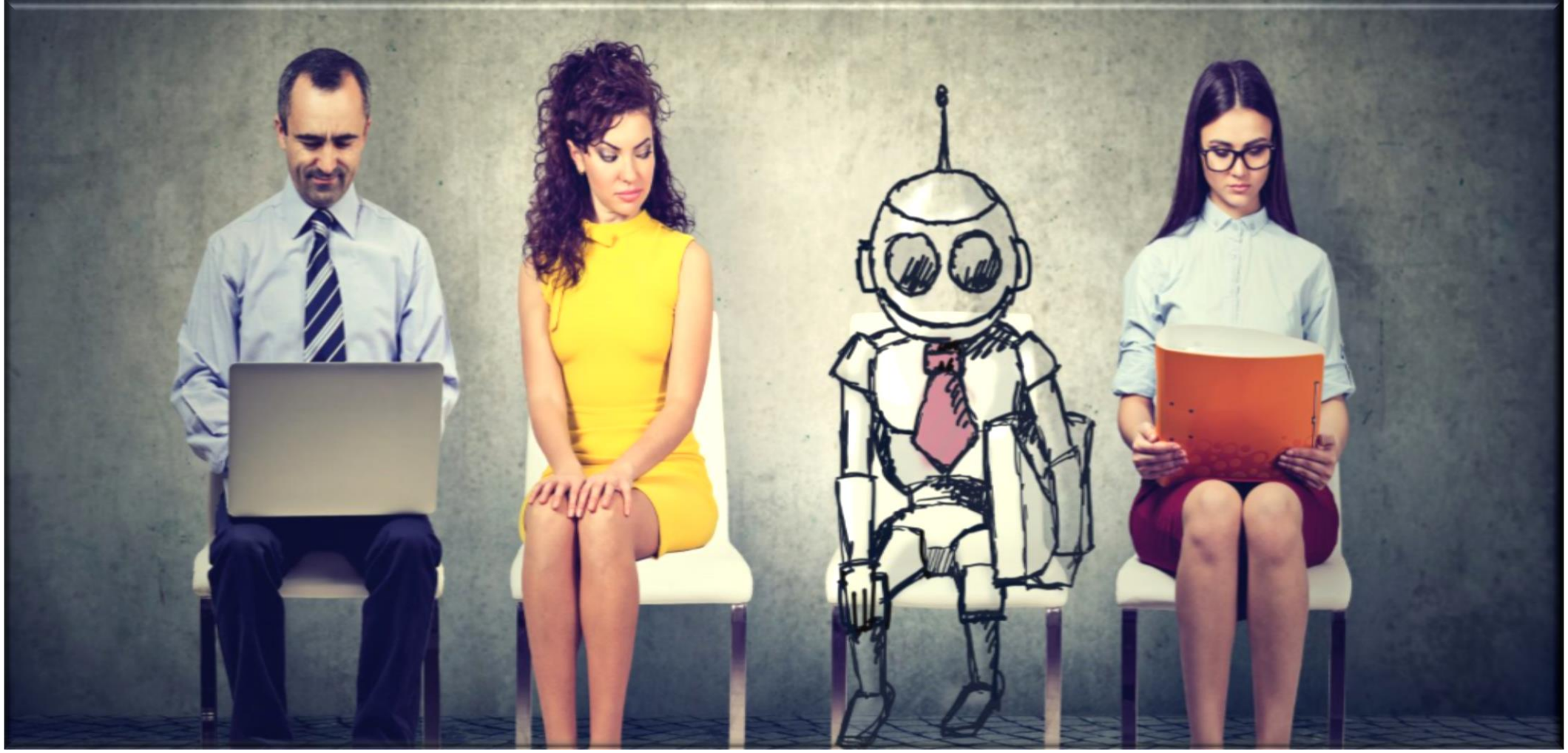
Geoff Meyer

Brought to you by:

350 Corporate Way, Suite 400, Orange Park, FL 32073
888-268-8770 · 904-278-0524 - info@techwell.com - http://www.starwest.techwell.com/

Geoff Meyer

A test architect in the Dell EMC infrastructure solutions group, Geoff Meyer has more than thirty years of industry experience as a software developer, manager, program manager, and director. Geoff oversees the test strategy and architecture for more than four hundred software and hardware testers across India, Taiwan, and the United States. He leads initiatives in continuous testing, predictive analytics, and infrastructure as a service (IaaS). Outside of work, Geoff is a member of the Agile Austin community, contributor to the Agile and STAR conferences, and an active mentor to veterans participating in the Vets4Quality.org program, which provides an on-ramp to a career in software quality assurance.



What's Our Job When The Machines Do Testing?

17 Oct 2018

Geoff Meyer, Test Architect

geoff_meyer@dell.com

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TMMi CERTIFIED LEVEL 3

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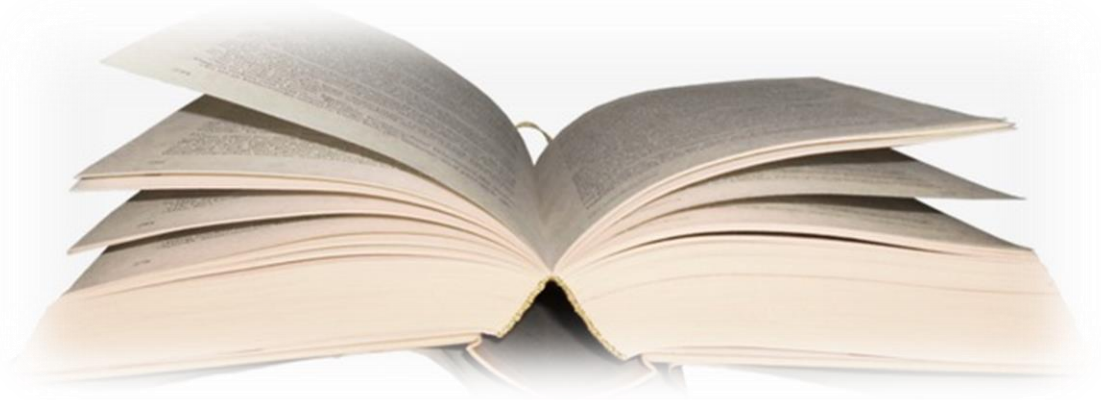
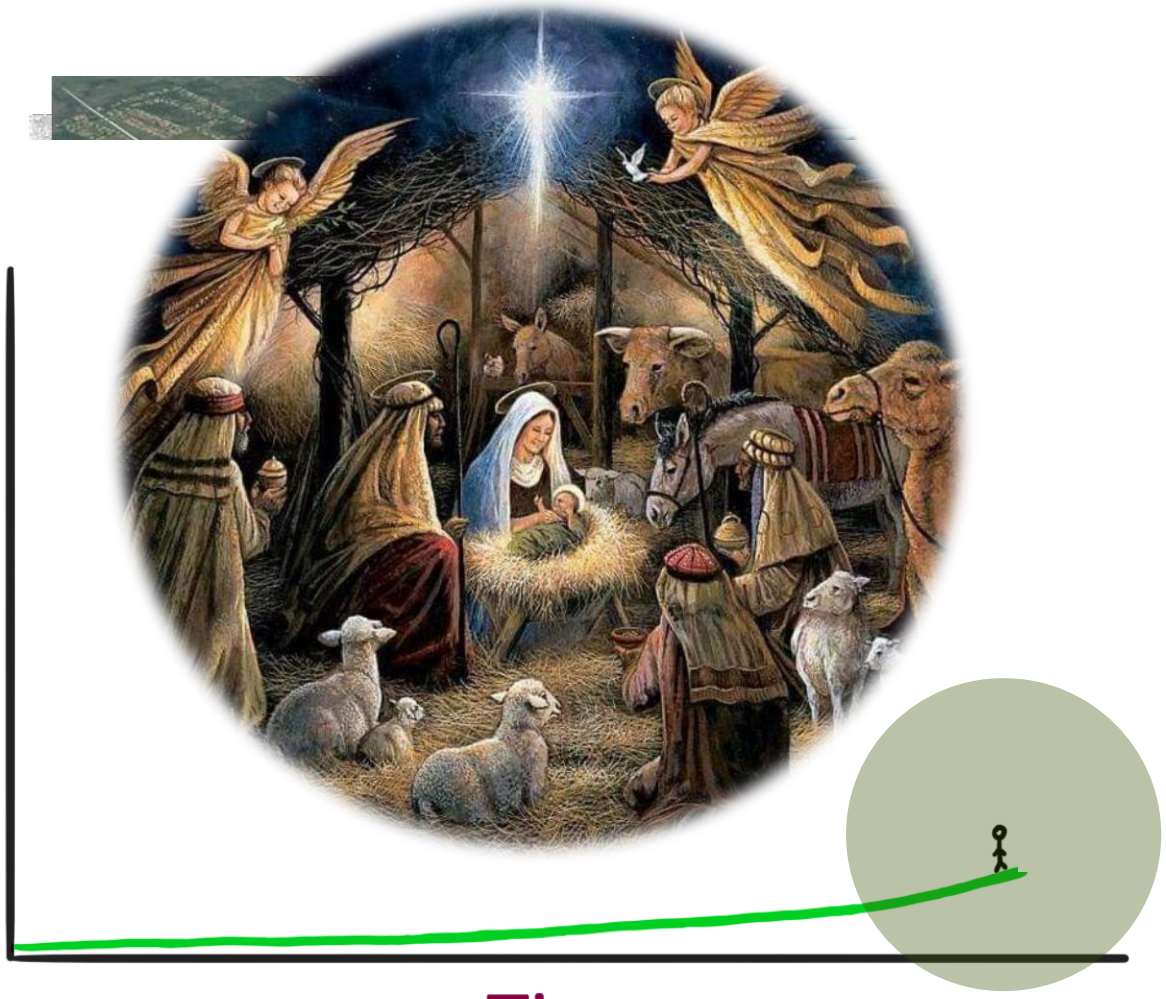
A TECHWELL EVENT

WAIT BUT WHY

new post every sometimes





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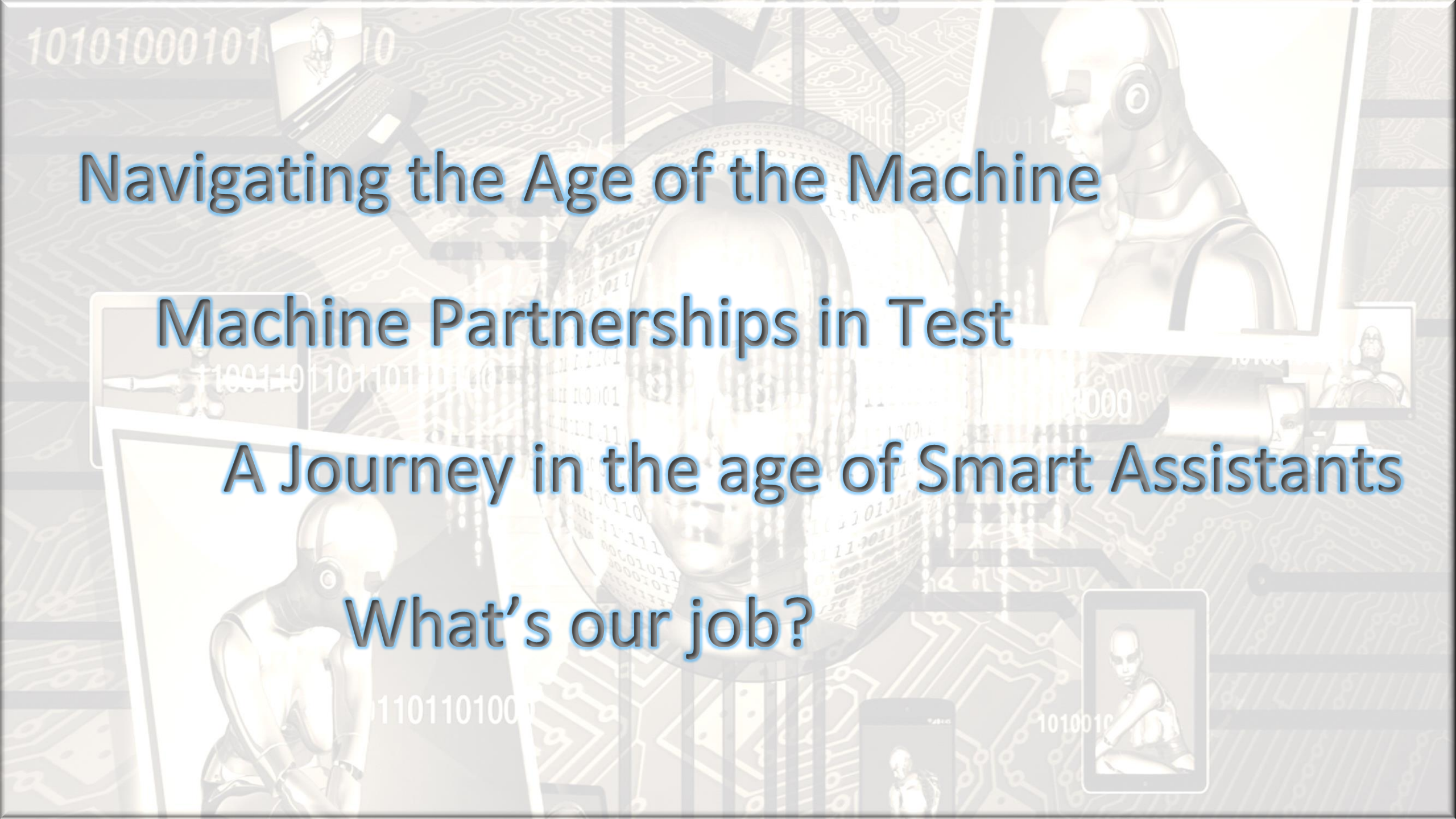
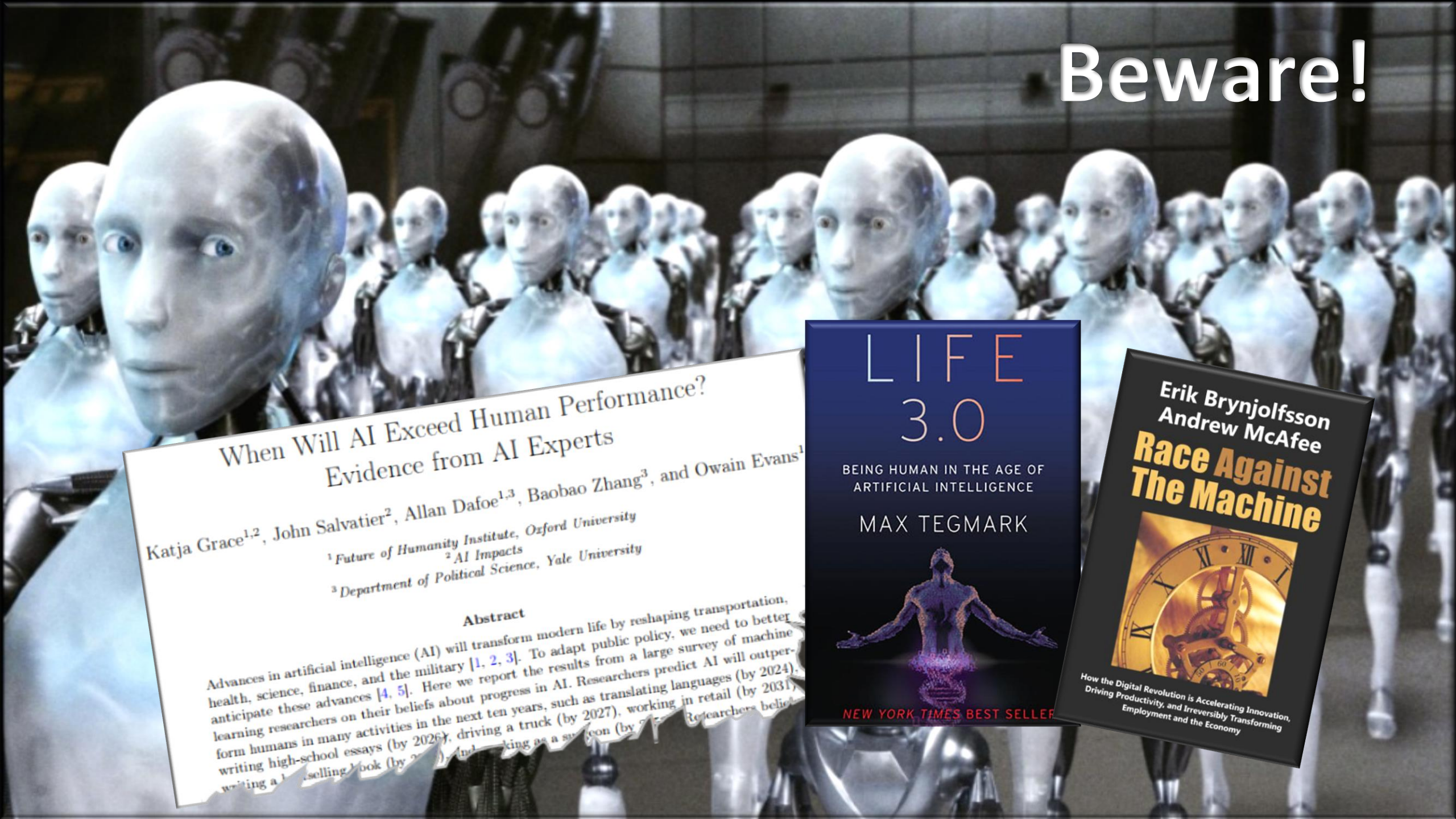

Navigating the Age of the Machine
Machine Partnerships in Test
A Journey in the age of Smart Assistants
What's our job?

Beware!



When Will AI Exceed Human Performance?
Evidence from AI Experts

Katja Grace[1,2], John Salvatier[2], Allan Dafoe[1,3], Baobao Zhang[3], and Owain Evans[1]

[1] Future of Humanity Institute, Oxford University
[2] AI Impacts
[3] Department of Political Science, Yale University

Abstract

Advances in artificial intelligence (AI) will transform modern life by reshaping transportation, health, science, finance, and the military [1, 2, 3]. To adapt public policy, we need to better anticipate these advances [4, 5]. Here we report the results from a large survey of machine learning researchers on their beliefs about progress in AI. Researchers predict AI will outperform humans in many activities in the next ten years, such as translating languages (by 2024), writing high-school essays (by 2026), driving a truck (by 2027), working in retail (by 2031), writing a best-selling book (by [illegible]), working as a surgeon (by [illegible]). Researchers belie[illegible]

LIFE 3.0

BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE

MAX TEGMARK

NEW YORK TIMES BEST SELLER

Erik Brynjolfsson
Andrew McAfee

Race Against The Machine

How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy

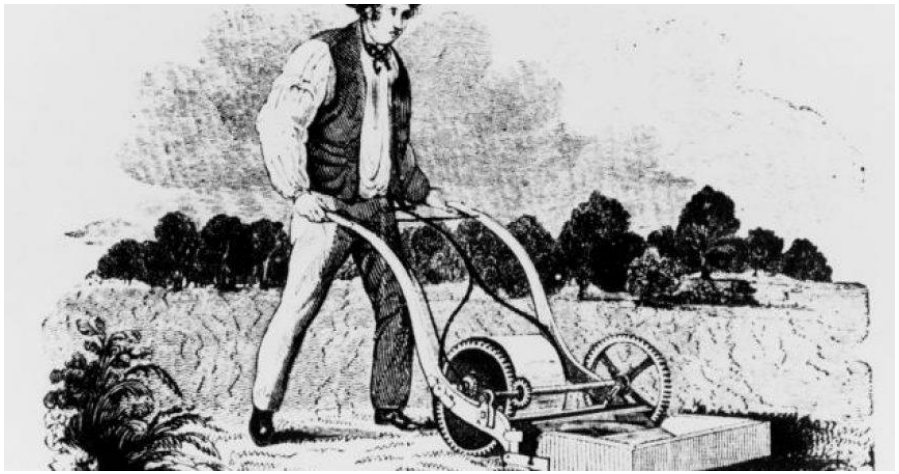
Abundance

NEWS
№ 34747/53
MONDAY
march, 11 2015
founded 1953
www.news.com
Only fresh news
NUMBER OF PEOPLE IN EXTREME POVERTY FELL BY 135,000 SINCE YESTERDAY
Every Day, for the last 25 years!
of People living
reme Poverty
Number of people not living in extreme poverty
Number of people living in extreme poverty
1900
1920
1940
1960
1980
2000
2020

A NEW DAY

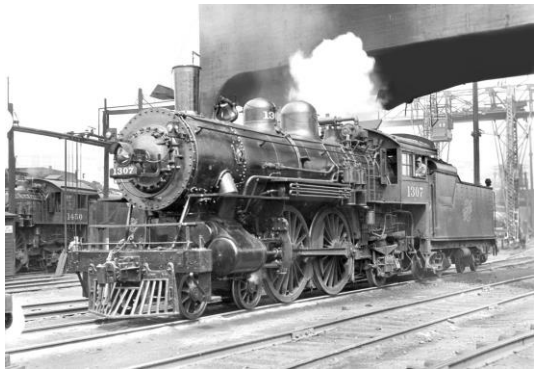
WHAT TO DO
WHEN MACHINES DO EVERYTHING
HOW TO GET AHEAD IN A WORLD OF AI, ALGORITHMS, BOTS, AND BIG DATA
MALCOLM FRANK, PAUL ROEHRIG, AND BEN PRING
WILEY
HUMANS ARE UNDERRATED
WHAT HIGH ACHIEVERS KNOW THAT BRILLIANT MACHINES NEVER WILL
GEOFF COLVIN
Bestselling Author of TALENT IS OVERRATED
Cognizant
21
HELP WANTED
JOBS OF THE FUTURE
A GUIDE TO GETTING - AND STAYING - EMPLOYED OVER THE NEXT 10 YEARS

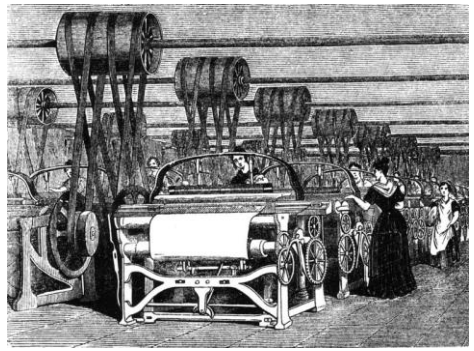
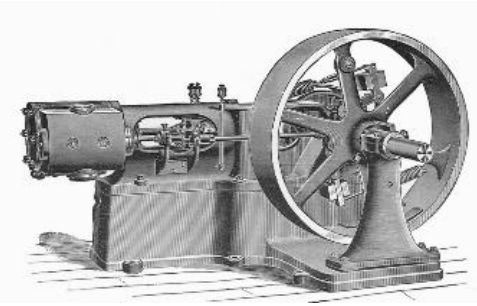
Budding Effect



Convenience

Industrial Revolutions are not new



1st Industrial Revolution → 2nd IR → 3rd IR → 4th IR →

1800 1900 2000 2018

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Analytics and AI in Business

Human Resources

Legal Discovery

Global Audit

Global Services & Support

Financial Services

Sales & Pricing

Marketing Analytics

Operations

…Identify what doesn't work well in a process, service or product and make it go away ~ *Malcolm Frank, Cognizant Future of Work*

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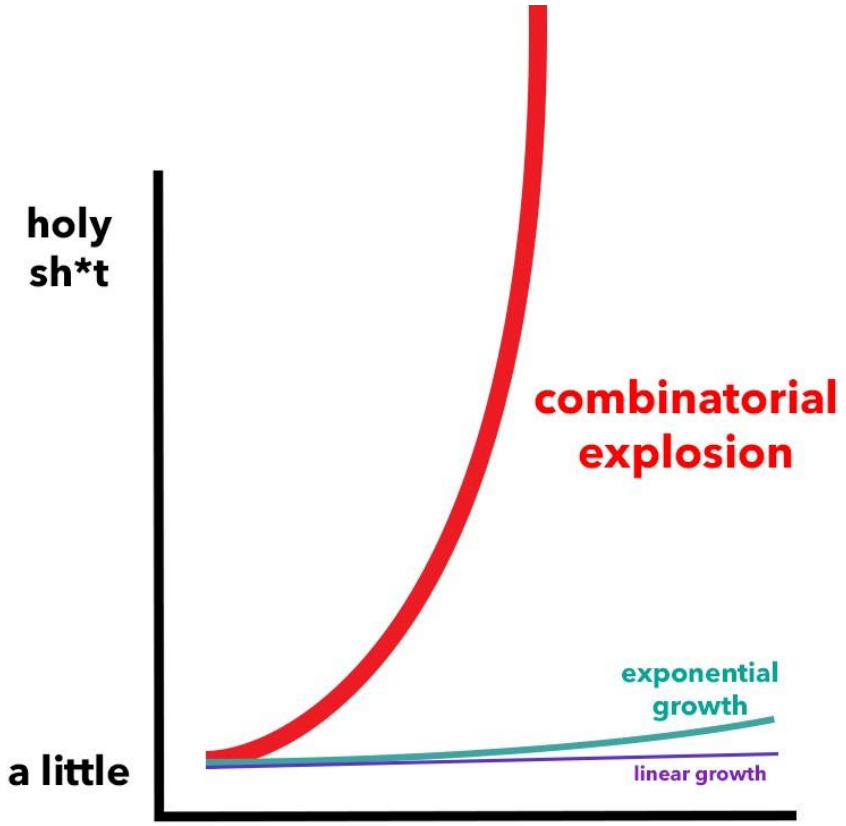
But it's OK

"Think about a job as the sum of it's tasks."
~ *What to do when Machines do everything*

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!!



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DellEMC Server: Evolution of Testing

Waterfall

Agile

1997

Shift-left testing

Automated UI Testing

2010

Scripted Automation

Axon

Workflow Automation

Deployment

Portability

Reuse Marketplace

2013

DevOps

Continuous Integration

Continuous Test (Zeno)

Continuous Deployment

SDETs

TMMi

2015

Cognitive Automation

Configuration Assistant

Test Suite Assistant

AI-Assisted UI Automation

Lab-as-a-Service

2017

Non-Stop Test Ops

Reactor

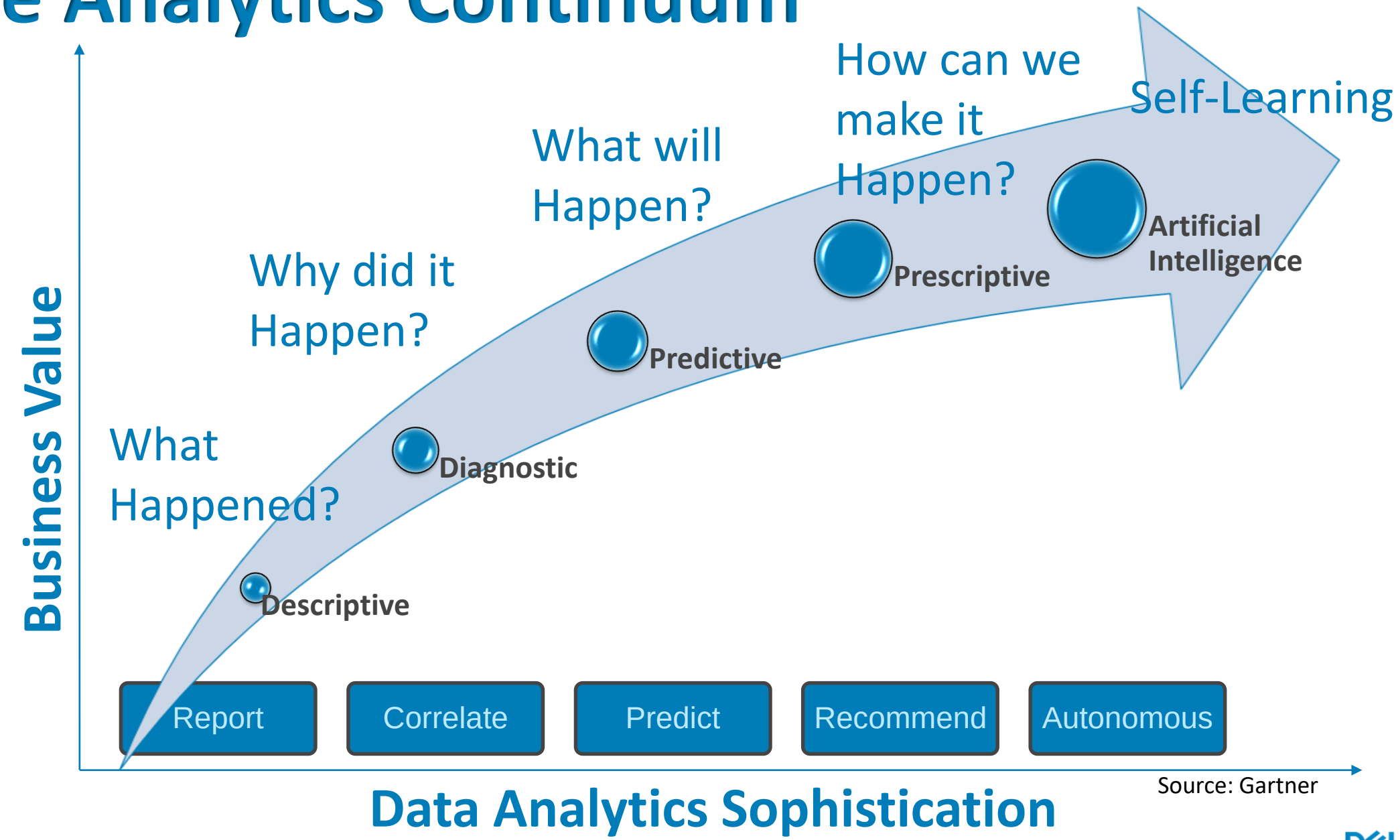
HW-Aware Testing

Priority-driven testing

Continuous Monitoring

2019

The Analytics Continuum



Source: Gartner

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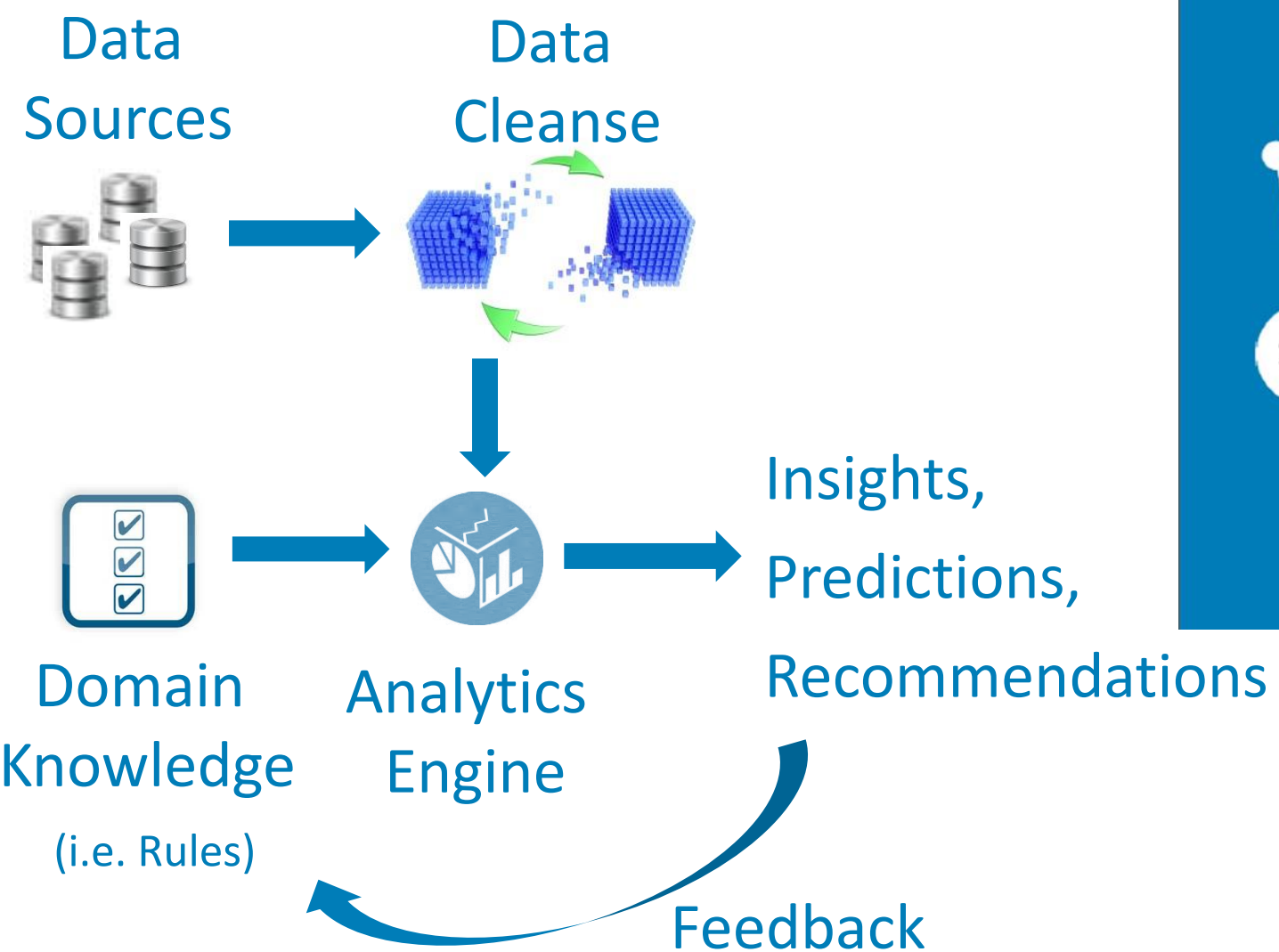
Data Analytics Modeling



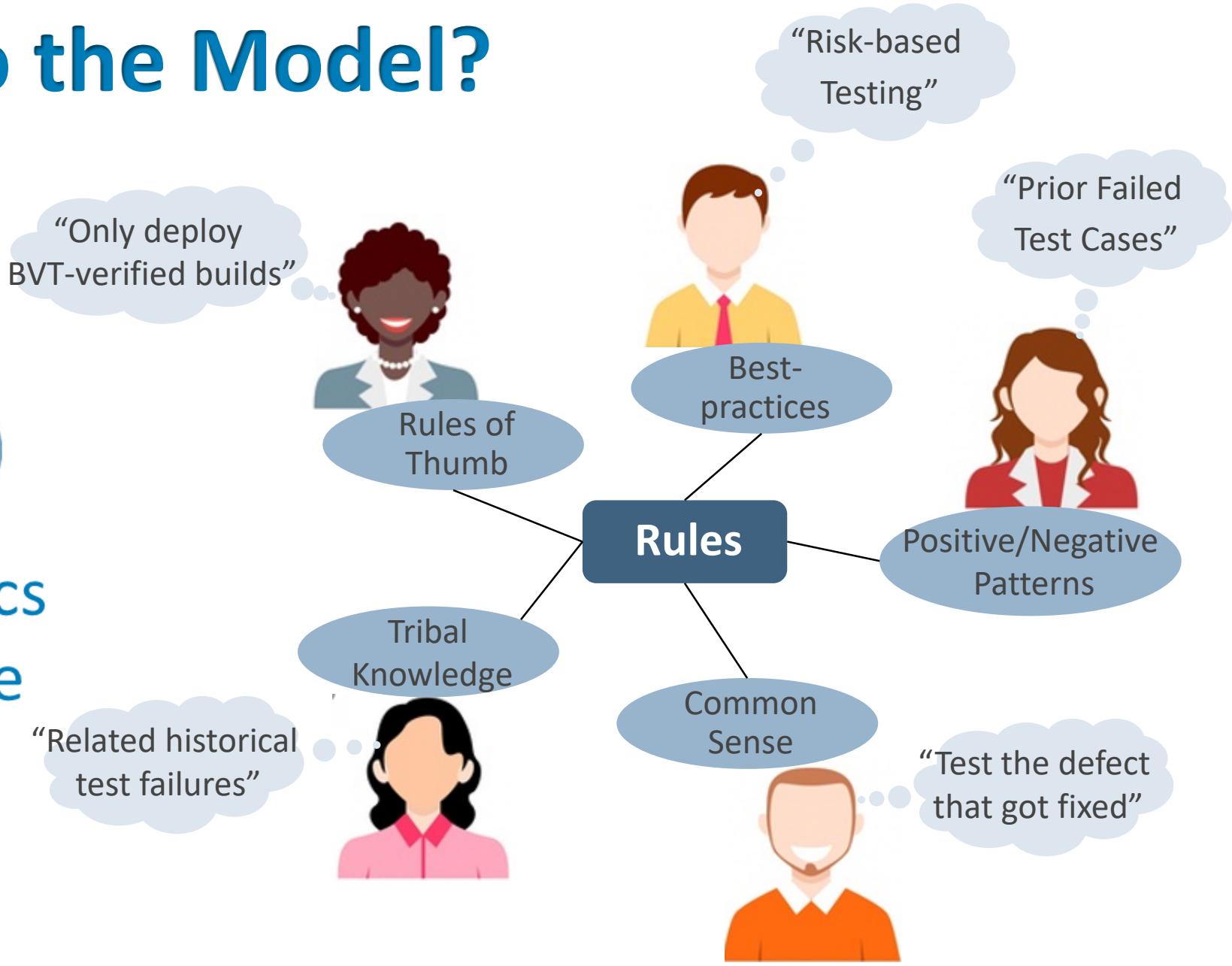
What goes into the Model?

Rules and heuristics

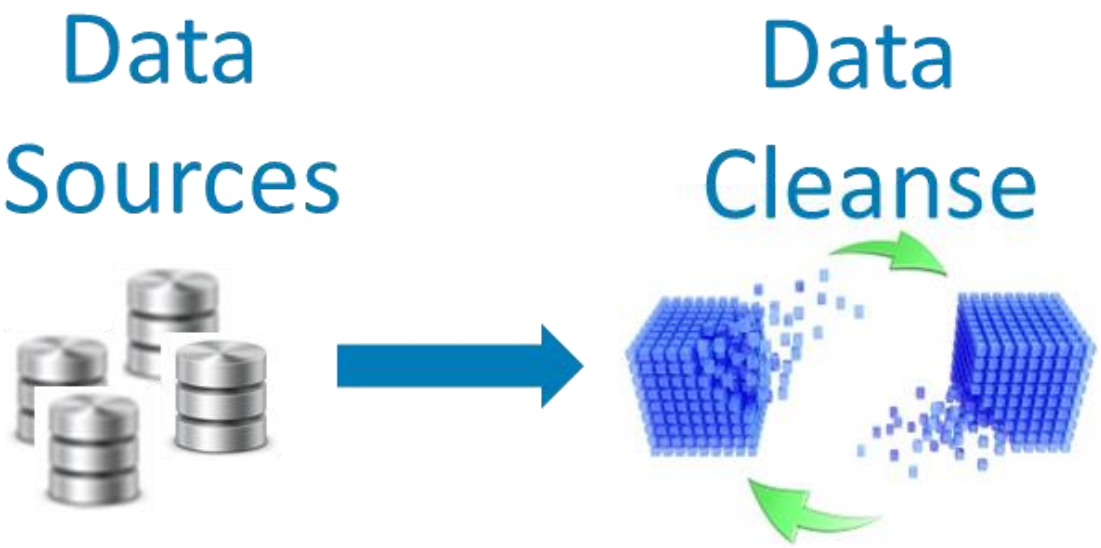
Domain Knowledge

(i.e. Rules)

Analytics Engine



It's all about the data



"Nobody really goes out of their way to point out the importance of data…"

~ Brian Sletten, Bosatsu Consulting

What if we had a Smart Assistant?

The Smart Assistant

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

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 automated test failures appear to be duplicates?

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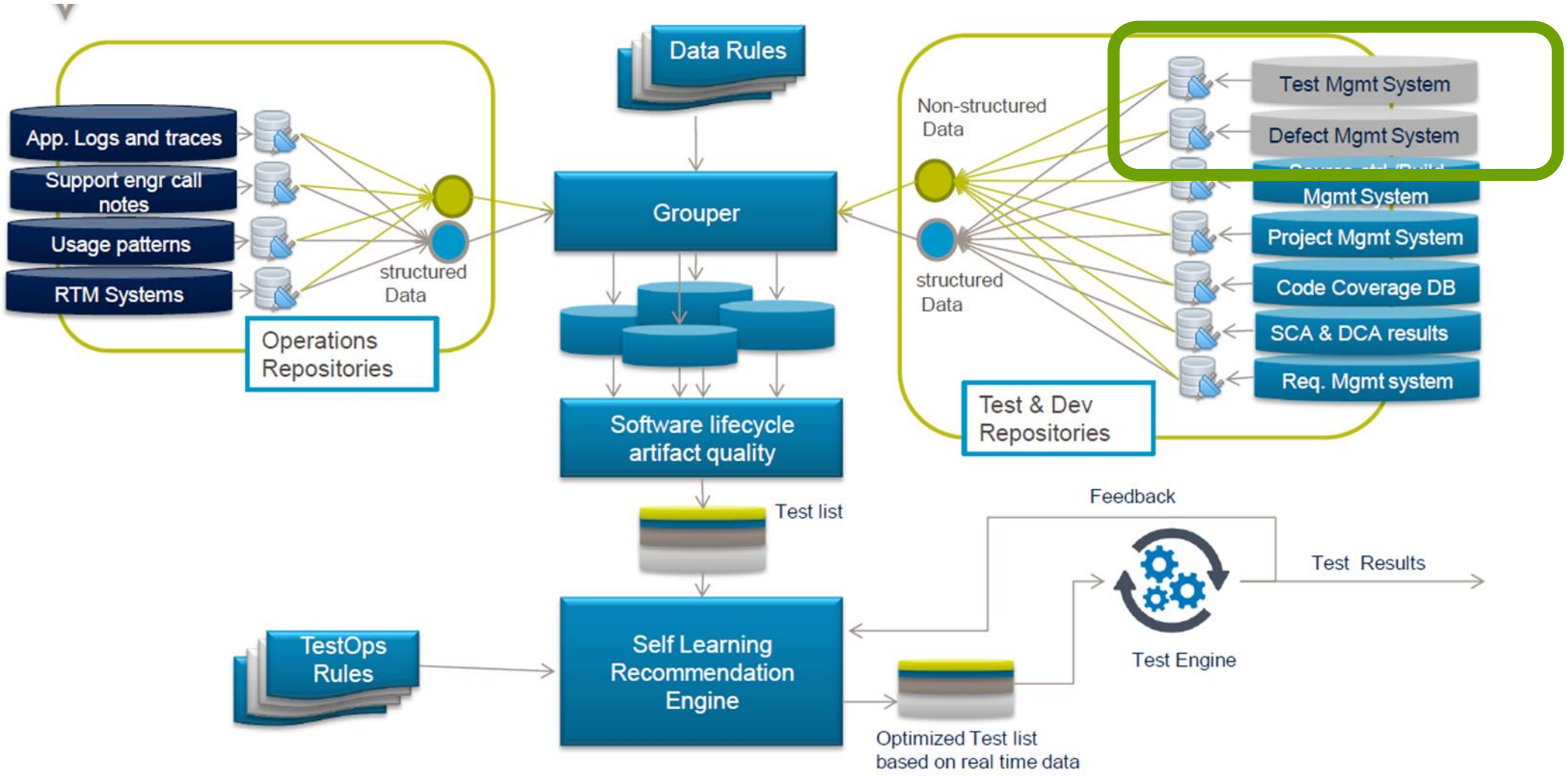
Data Sources - Product Engineering



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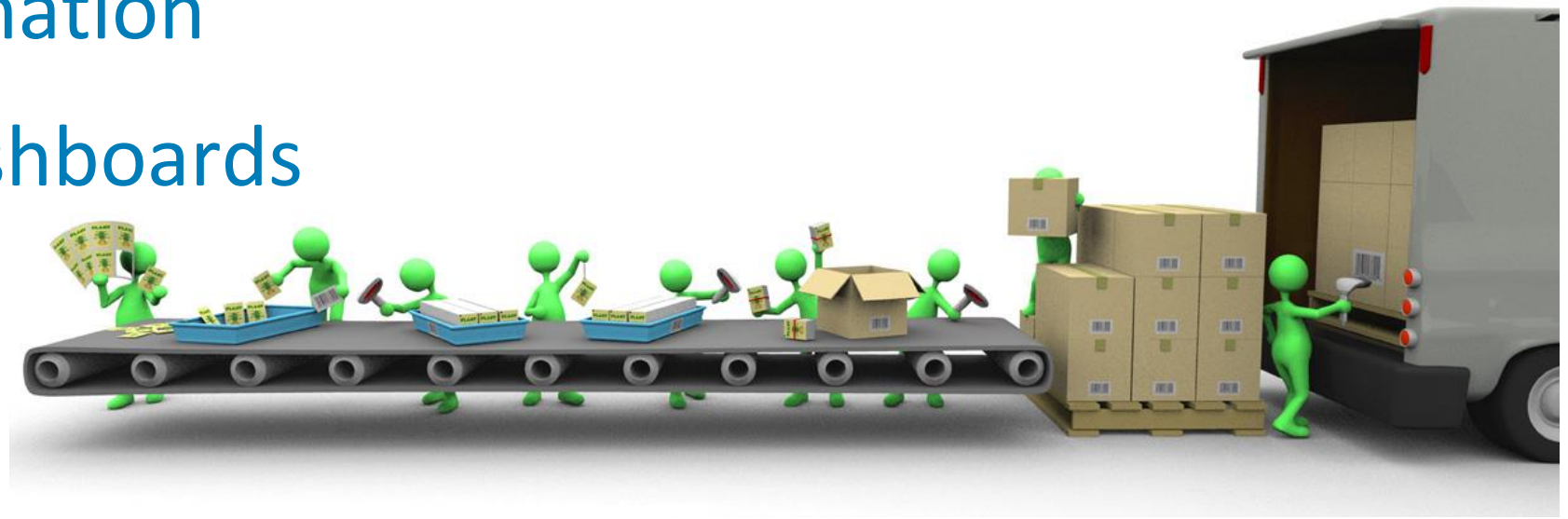
Selecting our Technology Partners

PAG | Performance Analytics Group

Operationalizing

- Standardize your Data Sources
- Develop Connectors to extract data
- Design/Develop your data lake
- Workflow Automation
- Visualization Dashboards



SUT Configuration Model

"Q" - System Under Test

Current Testing Scenario

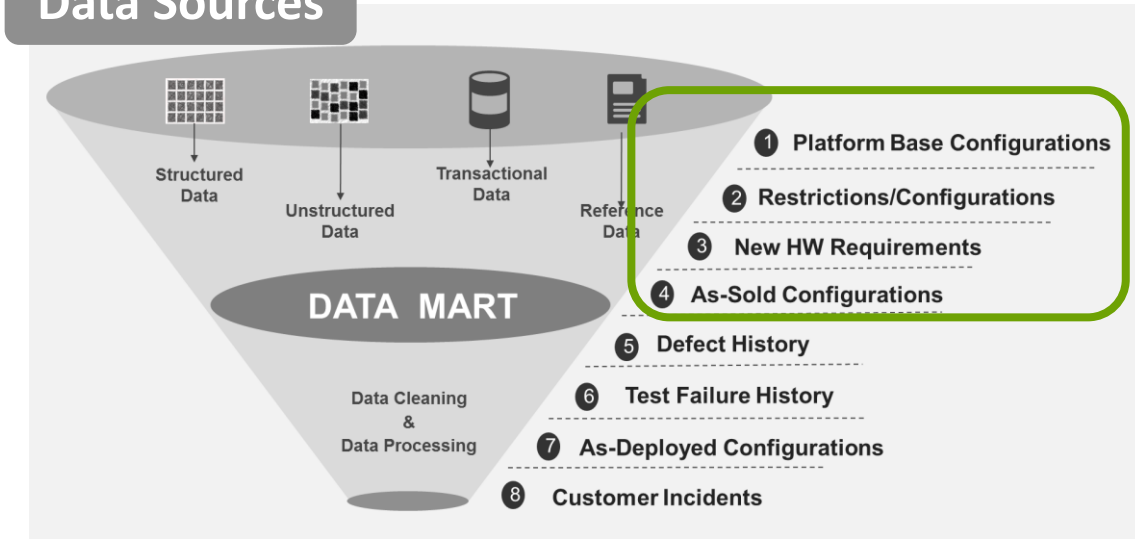
Challenges

- ***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

DELL EMC

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

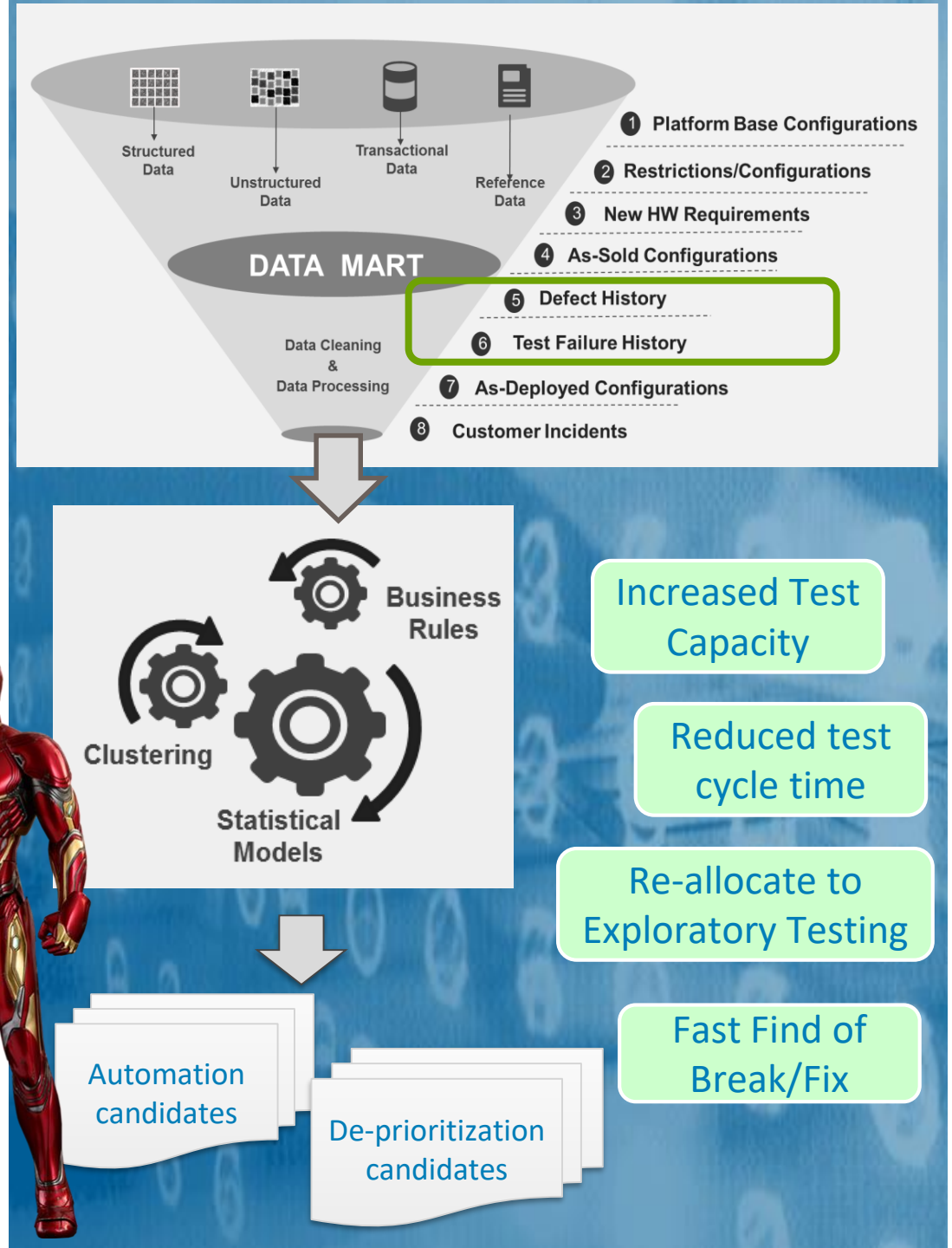
Which manual tests are most effective, and should be automated?

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 Part of Capgemini



Increased Test Capacity

Reduced test cycle time

Re-allocate to Exploratory Testing

Fast Find of Break/Fix

Testbots are here

AI-assisted UI Automation

appvance IQ

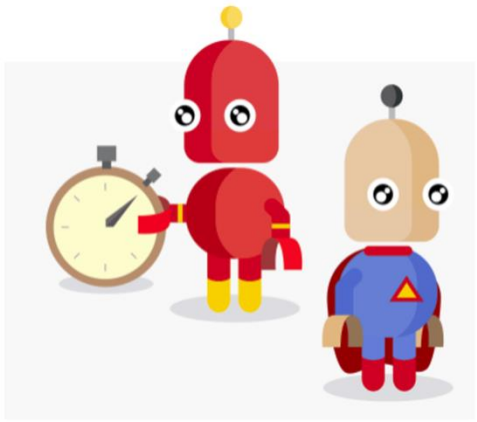
retest

functionize

mabl

test.ai

Meet your
newest testers.

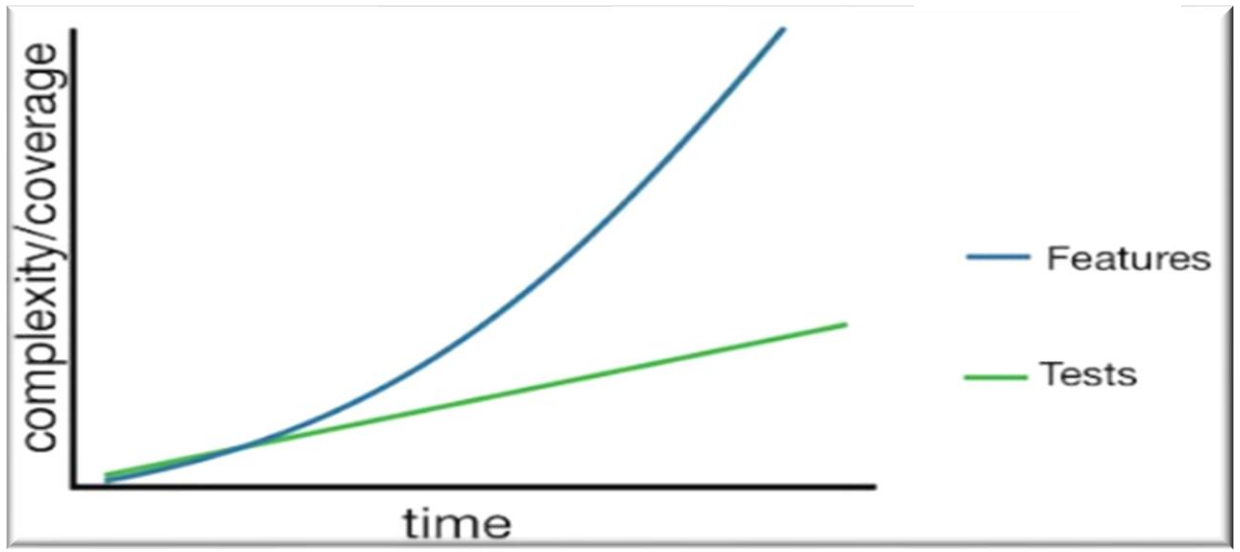


applitools
Automated Visual Testing

Apptest.ai
Don't burn yourself out.
Test's on me.

testim

- Increases UI test coverage
- At substantially less cost of creation ***and*** maintenance



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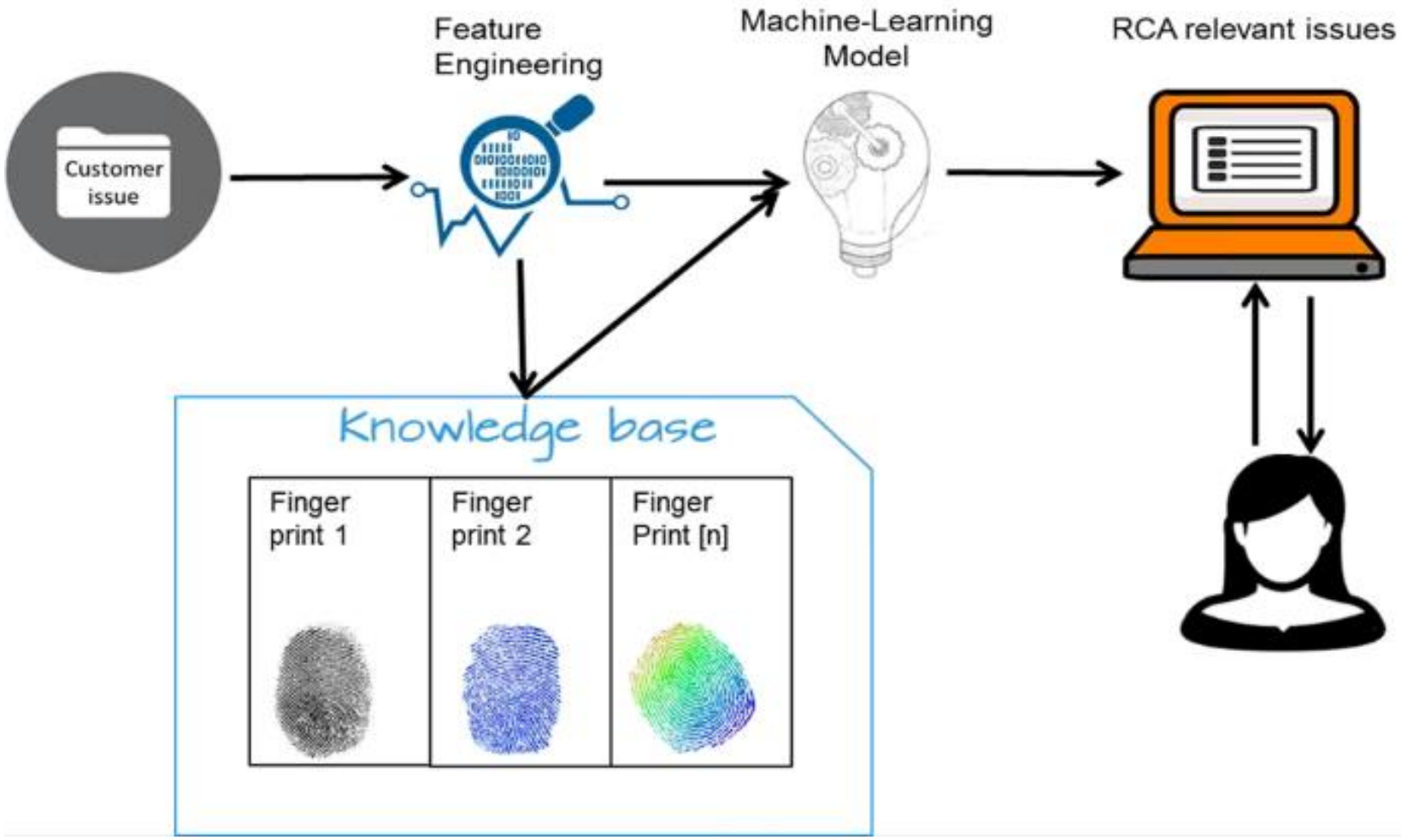
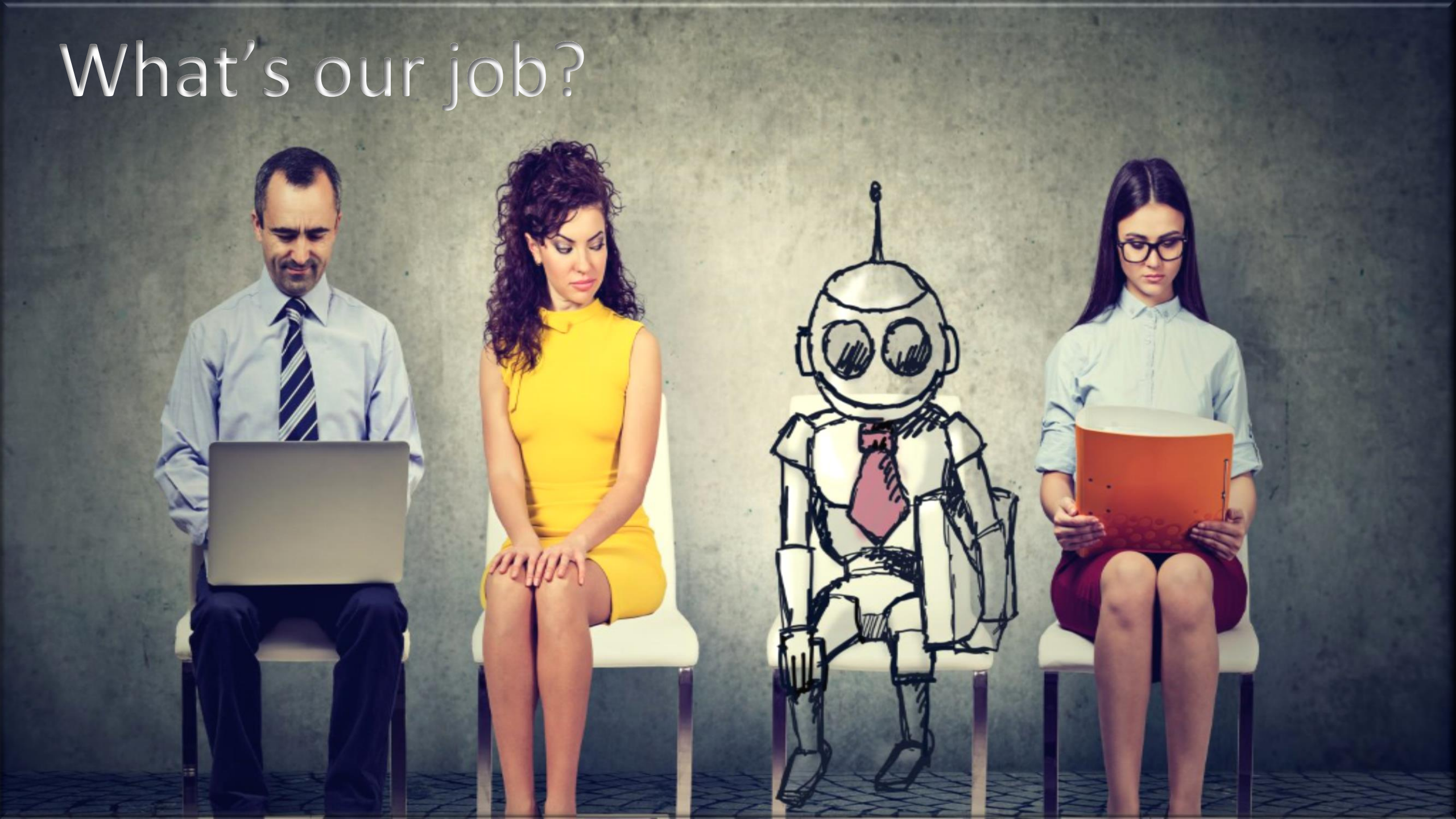
Duplicate Defect Prediction

DellEMC XtremIO



What's our job?



What can Humans do Better?

- Creative, Collaborative, Problem Solving
- Contextualized Intelligence
- Empathy
- Storytelling

Key Skills/Attributes of a Tester

Janet Gregory

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A TECHWELL EVENT

Skills

1. Communication
2. Technical
3. Domain knowledge
4. Programming
5. Be aware of good tools
6. Ask questions
7. Give feedback
8. Problem solving
9. Test design

Attributes

1. Structured thinker
2. Detail oriented
3. Curious
4. Collaborative / team player
5. Critical thinking/ analytical
6. Creative / out of the box
7. Open-minded
8. Fast learner
9. Extravert
10. Self-confident
11. Patience
12. Self-organizer
13. Flexible
14. Big-picture view
15. Proactive
16. Assertive
17. Responsible
18. Versatile
19. Positive
20. Polite
21. Mean
22. Stubborn
23. Honest
24. Helpful
25. Logical

@janetgregoryca

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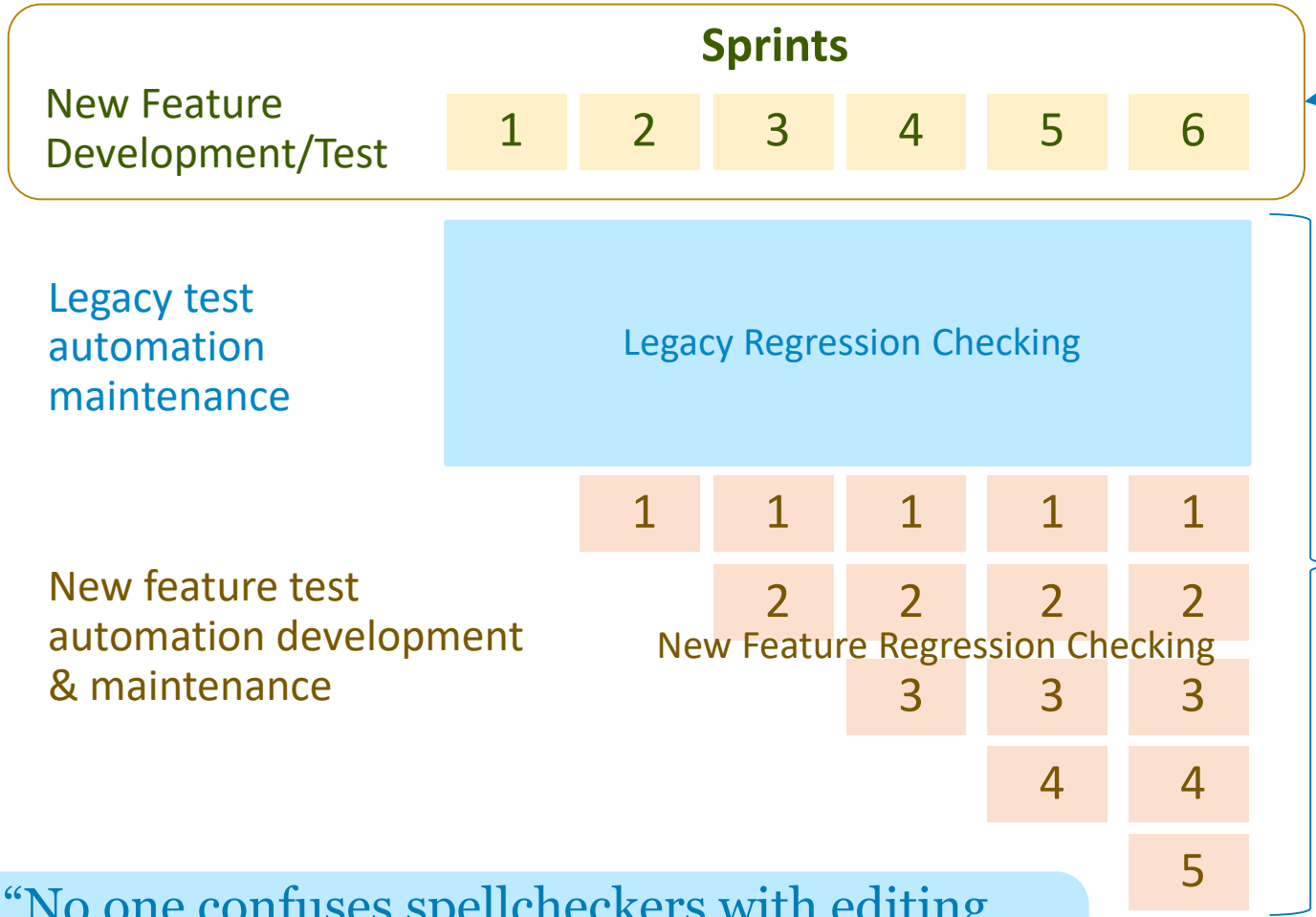
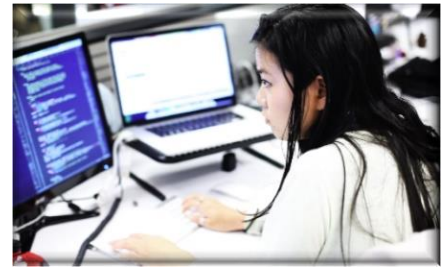
Testing vs. Checking



Testing ~ Value Creation

- Establishes Expected Behavior
- Collaborative
- Curious
- Exploratory
- Cognitive
- Analyze Potential Risks
- *Requires **Thinking***

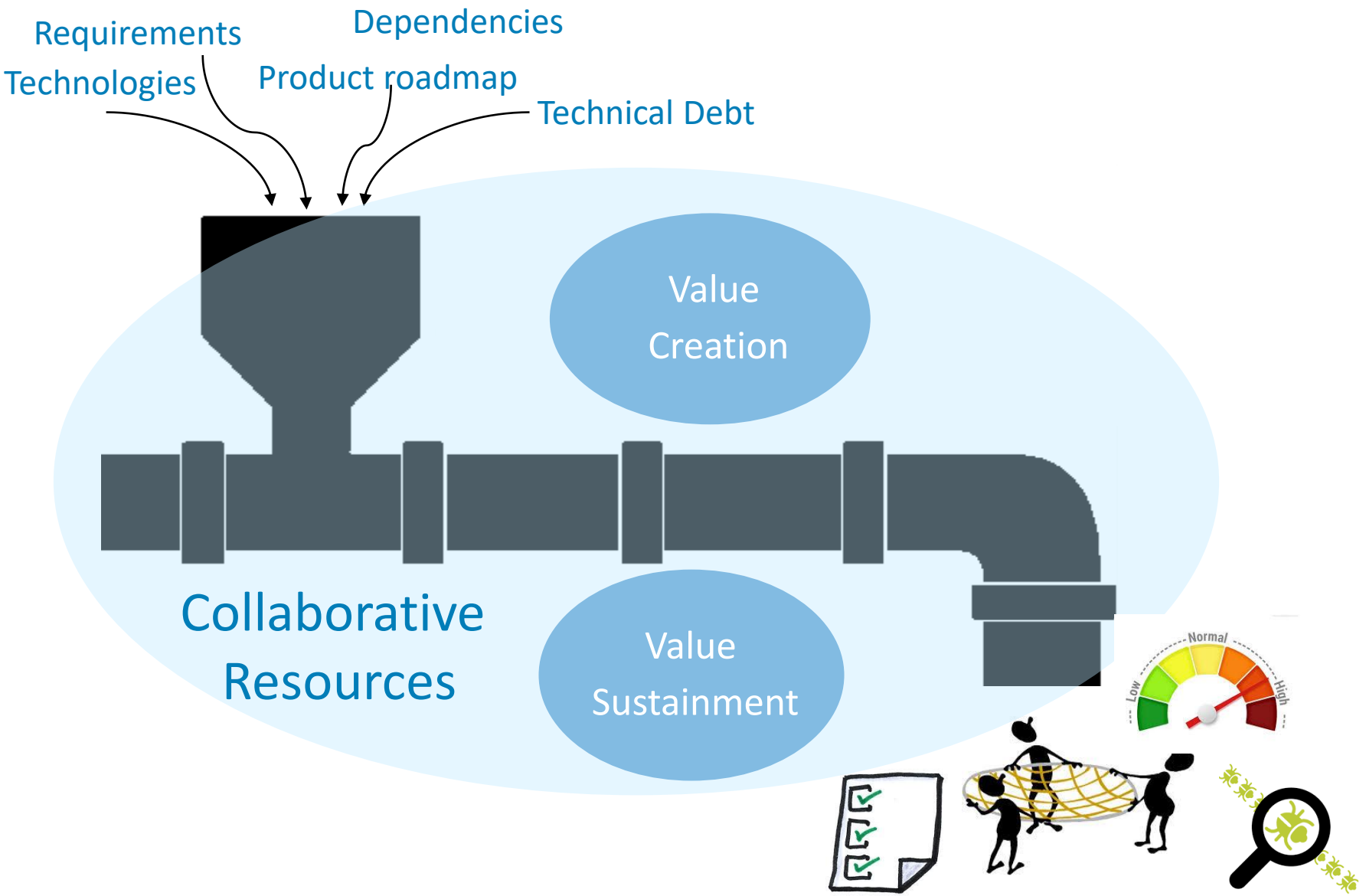


Checking ~ Value Sustainment

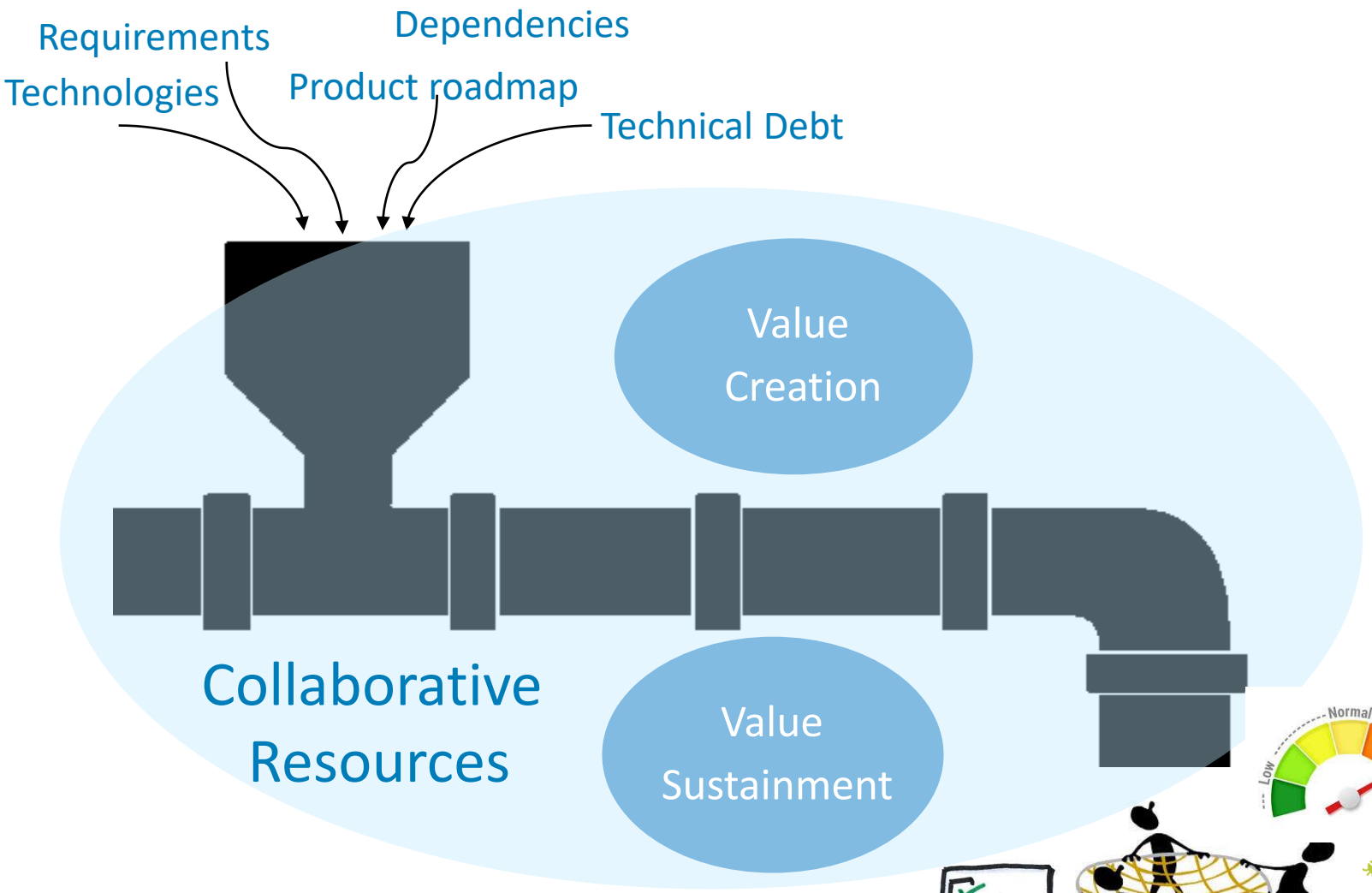
- Confirms Expected Behavior
- Robotic
- Tedious
- Scripted
- Vigilance for deviations
- Monitor Known Risks
- *Requires **Processing***

"No one confuses spellcheckers with editing, so why confuse automated checks as testing?"
~ Michael Bolton

Envisioning the Future of Testing

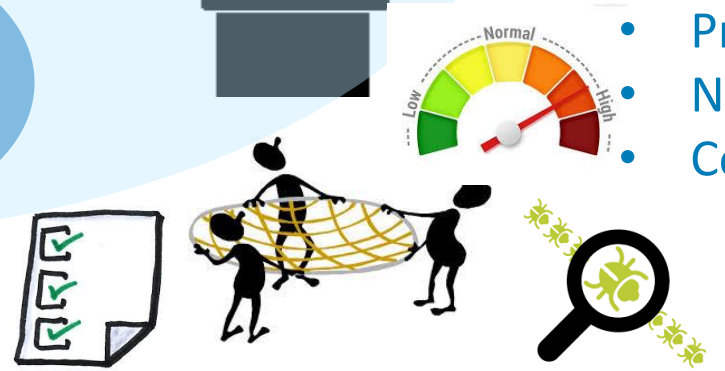


Envisioning the Future of Testing

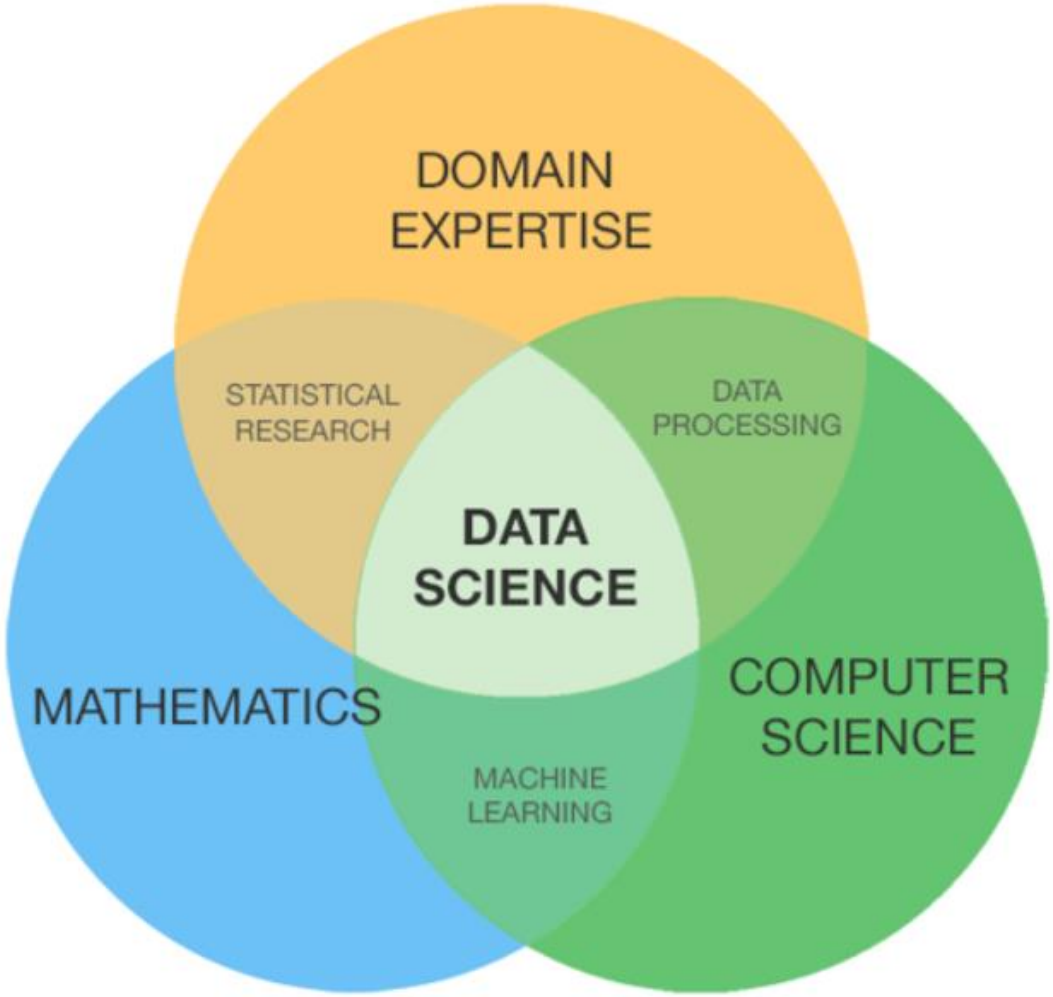


Automation

- 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
- Non-Step Test Operations
- Continuous Monitoring



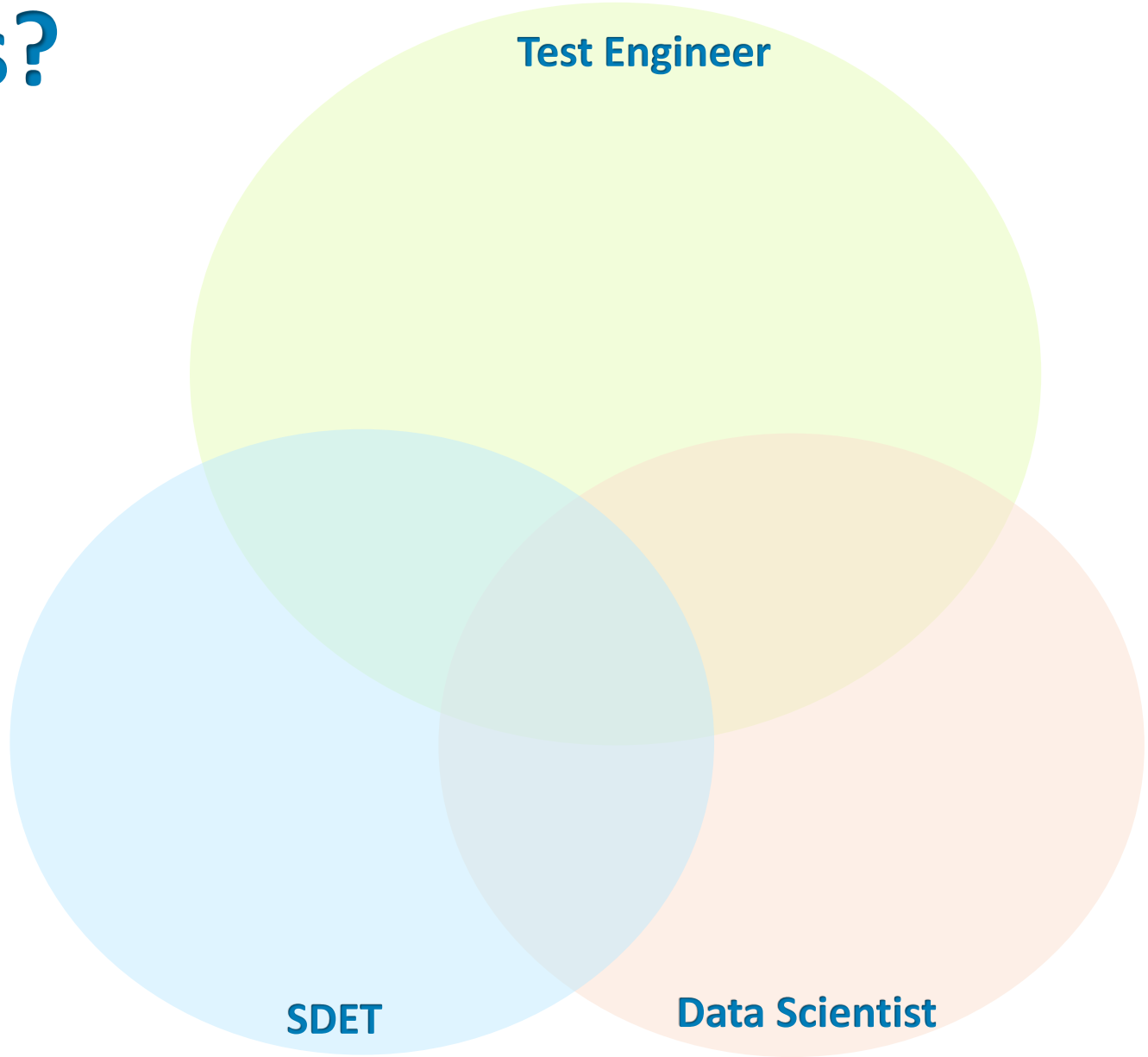
What about Data Science skills?



Source: Palmer, Shelly. Data Science for the C-Suite. New York: Digital Living Press, 2015. Print.

What are our roles?

Strategy	Test Strategy Predictive Modeling
Planning	Requirements Elaboration Test Case Analysis Test Case Development Test Suite Planning AI Trainer
Provisioning	Test Environment Mgmt Test Configuration Planning SW/FW Provisioning(DevOps) Test Data Mgmt
Dev/Testing	Test Case Execution Test Automation Development Exploratory Testing AI Maker Data Connectors
Tracking	Test Failure Triage Defect Tracking



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Testers of the Future

Man-Machine Teaming Manager

POSITION SUMMARY

The key task for this role is developing an interaction system through which humans and machines mutually communicate their capabilities, goals and intentions, and devising a task planning system for human-machine collaboration

Expertise	Domain	Exploratory	Triage	People skills	Dev skills	Data Science
Test Engineer *(Exploratory/AI User)*						
SDET *(Scripter/DevOps)*						
Data Scientist *(AI Maker)*						

Key: None | Novice | Intermediate | Advanced | Expert

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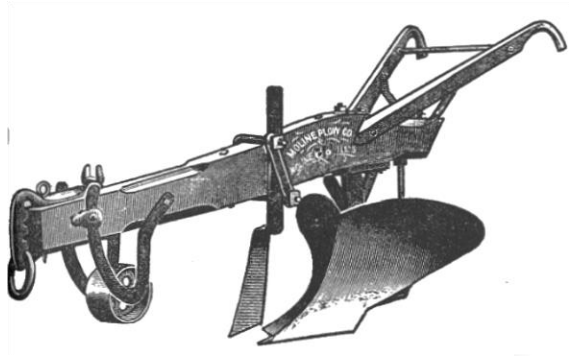
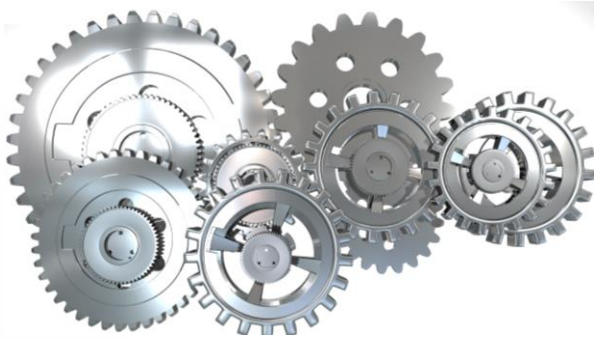
Our Job

Capture your data



Pinpoint **your** pain points

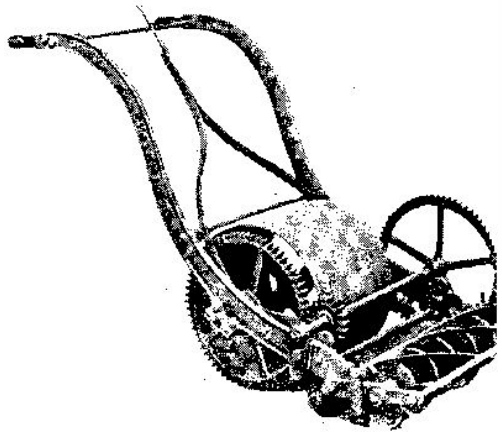


Partner with the Machine

Re-imagine your testing tasks

Thank you

And the other thing that Budding started…



Resources

Books

- **Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die**: https://www.amazon.com/dp/B019HR9X4U/ref=dp-kindle-redirect?_encoding=UTF8&btkr=1
- **What To Do When Machines Do Everything:** http://www.whenmachinesdoeverything.com/
- **Weapons of Math Destruction:** https://weaponsofmathdestructionbook.com/
- **Race against the Machine:** https://books.google.com/books/about/Race_Against_the_Machine.html?id=IhArMwEACAAJ
- **Super Freakonomics:** http://freakonomics.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
- **The Four:** http://www.thefourbook.com/
- **Enlightenment Now!**: http://enlightenmentnow.com

Research

- **When will AI Exceed Human Performance:** https://arxiv.org/pdf/1705.08807.pdf
- **World Quality Report 2016-17** (Capgemini)**:** https://www.capgemini.com/thought-leadership/world-quality-report-2016-17
- **World Quality Report 2017-18** (Capgemini)**:** https://www.capgemini.com/thought-leadership/world-quality-report-2017-18
- **World Quality Report 2018-2019 (Capgemini):** https://www.capgemini.com/service/world-quality-report-2018-19/
- **The next era of Human|Machine Partnerships:** https://www.delltechnologies.com/en-us/perspectives/realizing-2030.htm
- **Towards a Reskilling Revolution: A Future of Jobs for All:** http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdf
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Resources

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Geoff Meyer

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), and Predictive Analytics

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

DELL EMC geoff_meyer@dell.com

https://www.linkedin.com/in/geoff-meyer-02b1aa3/

https://twitter.com/geoffrey_meyer

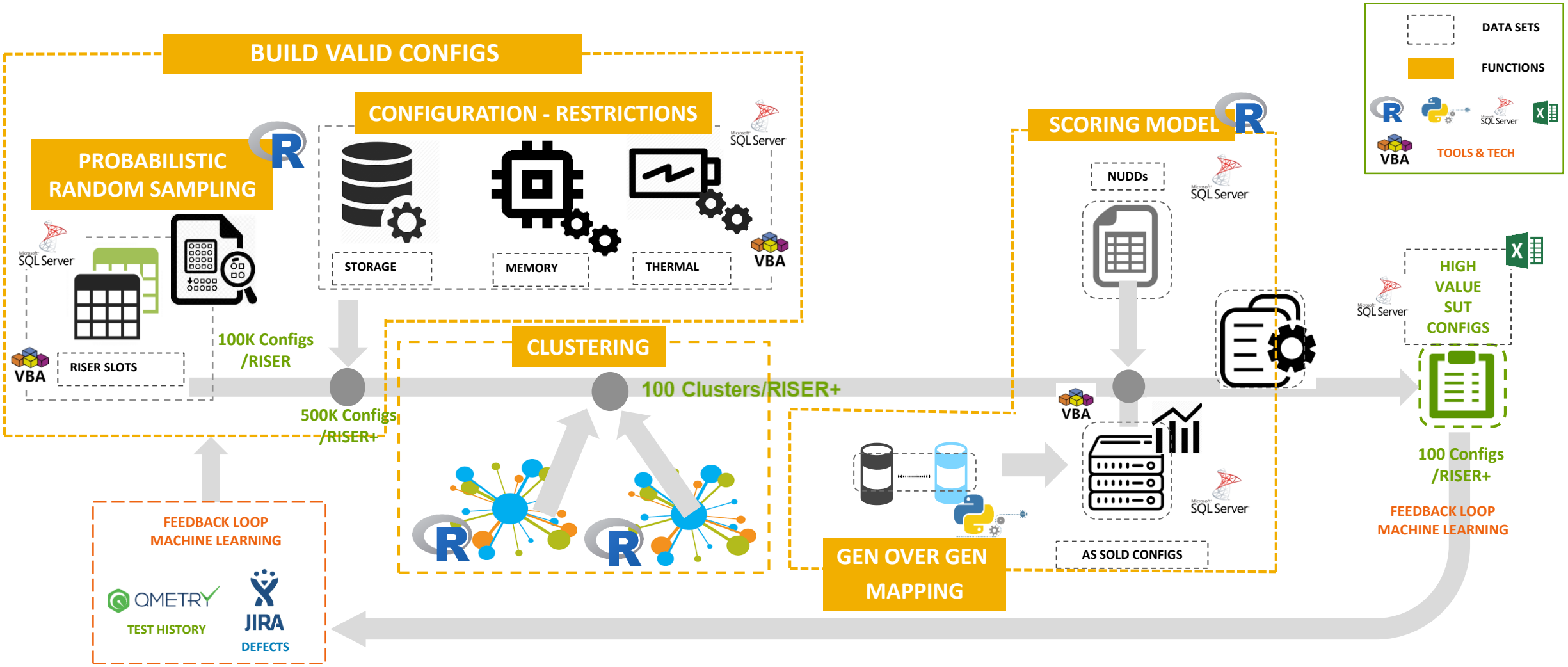
Abstract

Title: What's our job when the Machine does Testing?

Description: After its hyped introduction decades ago, followed by a quiet "winter", Artificial Intelligence (AI) has slowly crept back into our 21st century consciousness. While our Siri and Alexa assistants entertain us, Machine Learning (ML) has also brought convenience into our lives with solutions such as Nest and Netflix. Today, AI brings society to the tantalizing brink of the autonomous vehicle and the sea change of this 4th Industrial revolution has already started to disrupt industry after industry. The emerging chapters of these fascinating Machines demands our attention as AI starts to be applied in ways that directly affect the workplace, one in which the Test community won't be immune.

Geoff explores industry-wide applications of Analytics and Machine Learning and provides a view into how this next generation of automation is being used to optimize Test operations. He identifies opportunities across the Engineering and Test landscape for the application of AI, ranging from the identification of high-value Test Cases and Test Configurations which streamlines regression testing to dynamically generating change-based regression test suites when time is not on your side. Most importantly, Geoff provides tips to prepare yourself in skillset and mindset so that you willingly embrace the application of Analytics in your Test operations.

Q Process Flow



How Does Q Help?

- **Improved Test Coverage -** Maximizes Test Coverage given limited availability
- **Data-driven -** Institutionalizes the Test Configuration Planning process
- **Cost Savings -** Optimizes number of prototype configurations needed for test
- **Time Savings -** Reduces Test Configuration Planning from weeks to hours
- **Maintains Optimized Coverage –** When components/features are delayed

- Increase precision of predictions by extending data sets:
  - Test Execution & Defect History (JARVIS integration)
  - As-Deployed customer configurations
  - As-Tested configurations
- Cost Optimization of prototypes/parts for new platforms