NTT DATA
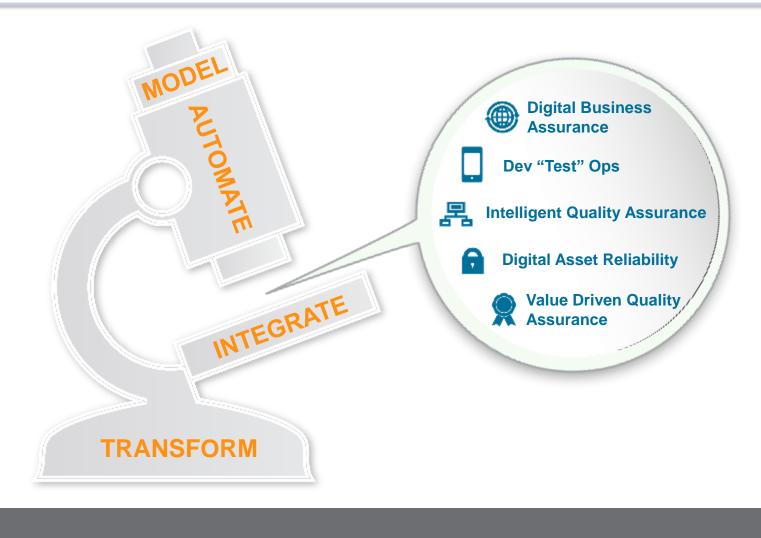Services

Next Generation QA & Testing using Machine Learning / AI
CRESTA

September 2017

Quality Assurance & Testing Services Overview

Insights

- **Process** (orange)
- **Services** (blue)
- **Capabilities** (gray)

MODEL

AUTOMATE

INTEGRATE

TRANSFORM

- **Digital Business Assurance**
- **Dev "Test" Ops**
- **Intelligent Quality Assurance**
- **Digital Asset Reliability**
- **Value Driven Quality Assurance**

- Up to 80% software test automation to improve productivity

- Combination of 40+ Industry Solutions and Tools / Accelerators

- Up to 100% improvement in quality

- Up to 40% reduction in overall testing costs

- Up to 50% faster time-to-market

- Strong industry recognition by leading analysts

Automation Platforms Open2Test, T3A	CRESTA U-RACE	CUE^2 CFF^{SM}	TDMS QuanTM	IntelliPERF IntelliTEST

OUTCOME

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Market Trends: Evolving from Verification & Validation to Business Assurance
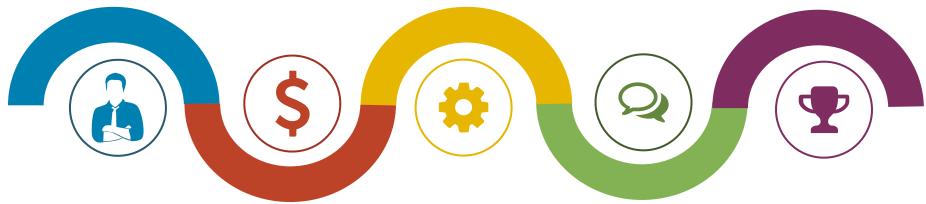
Agile and DevOps

- Continuous Delivery – BDD, TDD, ATTD
- Increased Test Automation (up to 80%)
- Convergence with performance and security testing (especially with mobile)
- Multi competency focus

Functional and non functional shift left

- Unit testing from 50-60% to 100% for new custom code development
- Simulation and service virtualization will embed itself in dev-testing
- Manual will become all exploratory testing (no more than 10-20% total testing)

Shift right

- AI / ML based Test Optimization, Automation, Defect Prediction, Defect Prevention

Automation

- GUI automation will decrease substantially in favor of API testing
- Business Process & Instance based
- Scriptless, Touchless (Self Healing)
- Visual based testing
- End to End – Ecosystem wide

TCoE Transformation:

- Federated and capability oriented
- Alignment with industry domains
- Support federated teams, self managing teams, more integrated with AGILE PM.
- Reporting will include growing analytics
- Stable practices for Test Data Management, Test Environment Management

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Differentiating Strategies to Address Dramatically Changing Needs

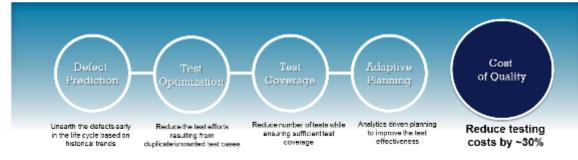|	Digital Business Assurance (Compliance, Growth & Profit.)	Dev "Test" Ops (Experience, Growth)	Intelligent QA (Experience, Value Generation)	Digital Asset Reliability (All)	Value Driven Quality Assurance (All)
Solution	▪ Identify, map and validate business processes ▪ Compliance Monitoring ▪ Market Readiness	▪ Design test first, code later ▪ Continuous Integration / Continuous Delivery ▪ Expand scope	▪ Predictive analytics from historical test assets ▪ Optimize test suite and coverage	▪ Performance Testing ▪ Security Testing ▪ Infrastructure Testing ▪ TDM, TEM ▪ Remote mobility	▪ Collaborate to build centralized, federated or virtual COEs ▪ Outcome based full service models
Tools	▪ TDO, Uptimizer, Hotpac Analyzer, QCertify ▪ Payment Engine ▪ EBT, Customer Friction Factor	▪ ATDD, BDD, TDD, T3A, O2T, Robot Automation Frameworks ▪ Collaborative	▪ CRESTA (Machine Learning) ▪ NLP, Text Analytics, Real Time QA	▪ LISA, Remote TestKit ▪ NTT DATA Intelliperf ▪ NTT DATA TDMS	▪ Maturity Benchmarking ▪ Testing As A Service ▪ NTT DATA QUANTM
Benefits	✓ Improved conformance, reduced risk	✓ Reduced effort, time to deployment	✓ Improved quality, Reduced time to deployment	✓ Reduced time to deployment	✓ Reduced cost, risk

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Using Artificial Intelligence to Drive Risk Management & Optimization

CRESTA (Comprehensive Robotic Engine for Software Test Acceleration) - An innovative analytics driven testing engine leveraging intelligent robotic automation technologies such as Machine Learning, Test Analytics and Natural Language Processing

CRESTA

Predictive Analytics	Post execution Analytics
Machine learning on historical test assets	Log exploration analysis to identify untested areas

Optimize test suites	Visual Coverage
Text analytics/NLP thru redundancy and reusability analysis	Cluster/classification algorithm to expose coverage issues

Data aggregation	Scalable Architecture
structured/unstructured data aggregation from standard tools	On-premise or Cloud deployment solution

Defect Prediction — Unearth the defects early in the life cycle based on historical trends

Test Optimization — Reduce the test efforts resulting from duplicate/unwanted test cases

Test Coverage — Reduce number of tests while ensuring sufficient test coverage

Adaptive Planning — Analytics driven planning to improve the test effectiveness
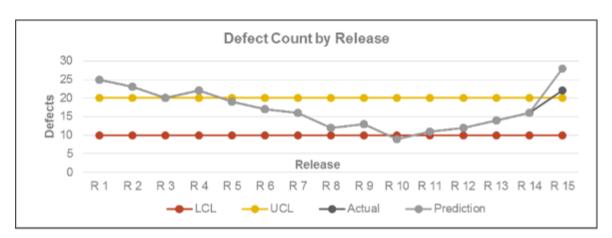
Cost of Quality — Reduce testing costs by ~30%

Powered By Jubatus

Jubatus is the first open source platform for online distributed machine learning on the data streams of Big Data developed by NTT

Sample Defect & Risk Prediction

Defect Count by Release

High Risk	Medium Risk	Low Risk
Module 3	Module 2	Module 1
Module 5		Module 4
		Module 6

Case Study

Customer : American multi national banking and financial services corporation
User base : ~23 Million bank customers
Service offering : Test Automation, Mobile Testing, Machine Learning
Outcome : ~95% prediction accuracy of defects. Automated process of project estimation, risk analysis and budgeting through adaptive planning

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Benefits

- Identify potential quality gaps prior to the release
- Reduce number of tests while increasing coverage
- Analytics driven planning to improve the test effectiveness
- Comprehensive Dashboarding / Reporting

(1) For more details you can view this webinar. (2) Our blog on Cresta is here .

CRESTA – Use Cases

	Situation		Solution		Benefit
1	Which Modules are defective and are more likely to result in customer dissatisfaction ?		A tool that can consolidate all the test management / defect data and predict the health of all the modules		**Improve Quality**
2	What are the minimum number of test cases that can be executed with out increasing risk?		A tool that can analyze test cases provide reports on duplicate test cases that can be retired without risking product quality		**Reduce Risk**
3	Are Test cases well written? Do they match up with the requirements?		A tool that can scan all the test cases and compare them to requirements intelligently		**Faster Cycle Time**

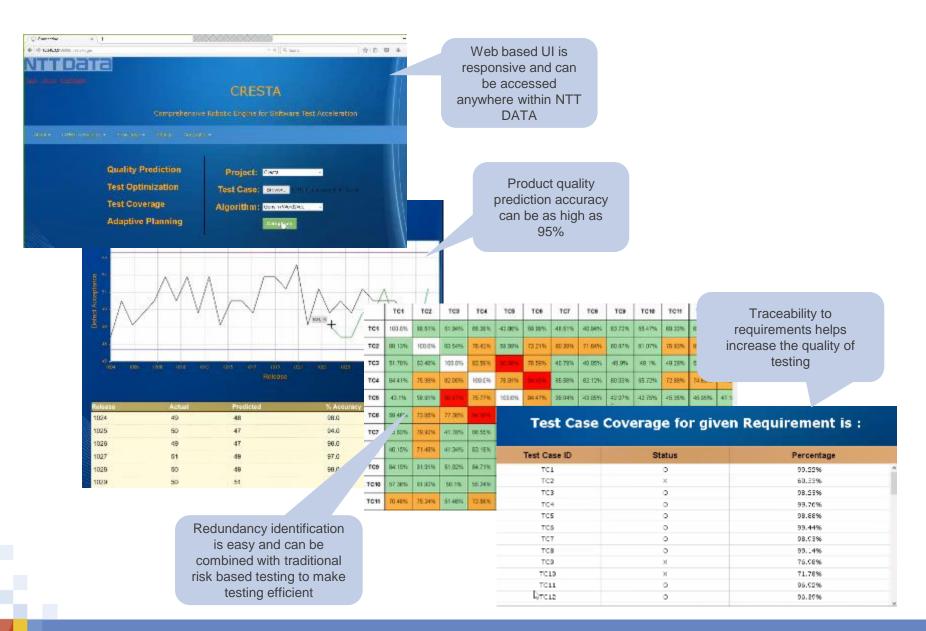*Coming soon…*

4	How much budget is needed to complete an upcoming release? What are the options to contain cost with out compromising quality?		A tool that can intelligently predict budget, schedule, effort etc. to help the management in decision making		**Increase Effectiveness**

Typical Outcomes

- Achieve initial accuracy levels of ~90% involving limited data sets from HP ALM (Application Life Cycle Management)

- Gradually improve the accuracy of prediction to 95% by building relevant data dictionaries and fine tuning the algorithms

- Optimize the test coverage by eliminating redundant test cases in regression suites resulting in ~30% effort savings per cycle

- A scalable solution that can be deployed across the enterprise to achieve greater efficiency and effectiveness in testing.

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Product Features

Web based UI is responsive and can be accessed anywhere within NTT DATA

Product quality prediction accuracy can be as high as 95%

Traceability to requirements helps increase the quality of testing

Redundancy identification is easy and can be combined with traditional risk based testing to make testing efficient
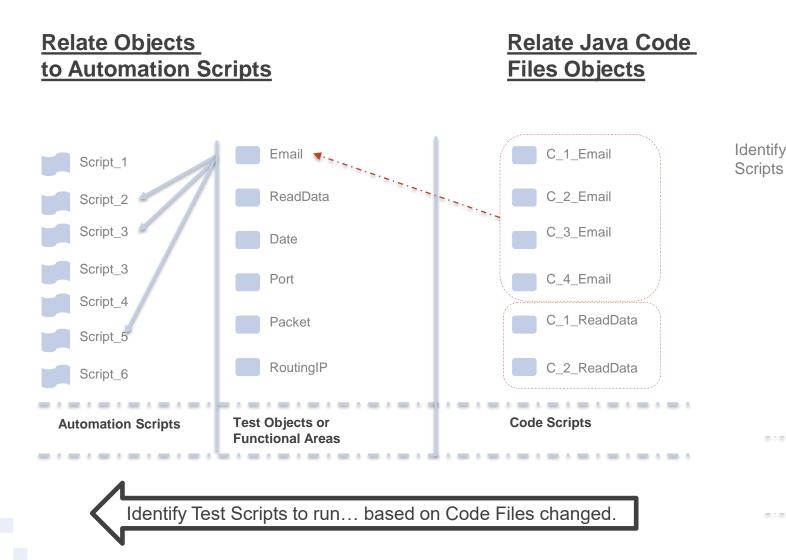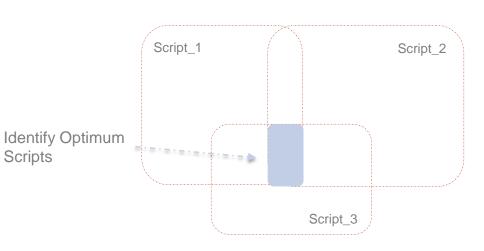
Key Features

- Built ground up for QA based use cases

- Integrates with HP QC / ALM, QuanTM, MySQL, Redmine, Excel, etc to import test cases, project data, test management data

- Uses latest technologies like R, Python, Django, Ace for importing, processing & presenting data

- Leverages Jubatus for self learning ML for predictive analytics, Gensim and other tools for Natural Language Processing

- Extensible APIs can be leveraged for any custom integration (such as Qlikview for one client implementation)

Live demo recording link is [here](#)

Advanced Use Cases for CRESTA

Optimize Coverage for Automation Test Scripts

Relate Objects to Automation Scripts

Relate Java Code Files Objects

Script_1

Script_2

Script_3

Script_3

Script_4

Script_5

Script_6

Email

ReadData

Date

Port

Packet

RoutingIP

C_1_Email

C_2_Email

C_3_Email

C_4_Email

C_1_ReadData

C_2_ReadData

Automation Scripts

Test Objects or Functional Areas

Code Scripts

Identify Test Scripts to run… based on Code Files changed.

Script_1

Script_2

Script_3

Identify Optimum Scripts

Reopen Regression Defects based on error Logs

Defect_1

Defect_2

Env_1

Env_2

ScriptIssue_1

ScriptIssue_2

Error_Obj_1

Error_Obj_2

Error_Obj_1

Error_Obj_2

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