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Effective QA Methodology for Enterprise Storage

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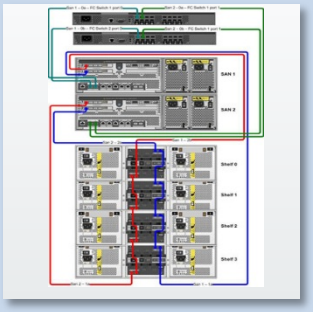
Agenda

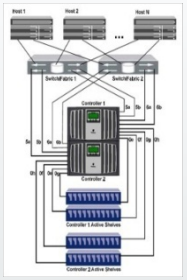
1	Significance of Testing in Enterprise Storage
2	Testing Methods Applicable to Storage
3	Effective Methodology for Enterprise Storage Testing
4	Differentiating Factors
5	Case Study

Significance of Testing in Enterprise Storage

Storage is **not a standalone entity**



Multiple entities play their respective roles in **enterprise storage** functionality



Integration with each other is also as important as **functionality**; **performance** and **reliability** depends on it

Multiple releases of components across the stack makes the **test matrix complex**

Requirement for **data accuracy/availability** increases the need for **thorough and robust testing**

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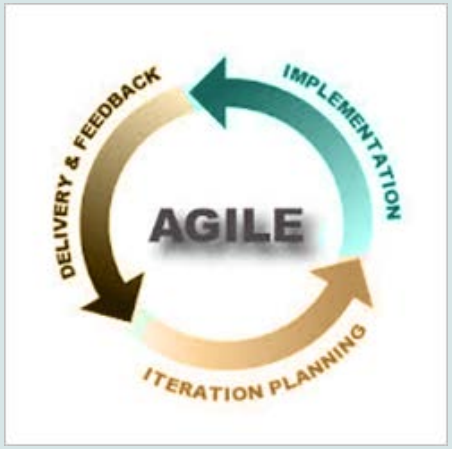
Testing Methods

Agile



Lean

Waterfall

- Requirements
- Design
- Implementation
- Verification
- Maintenance

BENEFITS

- Flexibility
- Advantage of scrum meeting
- Continuous improvement on planning

- HW optimization
- Saving time by reducing man machine intervention

- Robust planning during initial phase
- Provision of accommodating regression defect fixes

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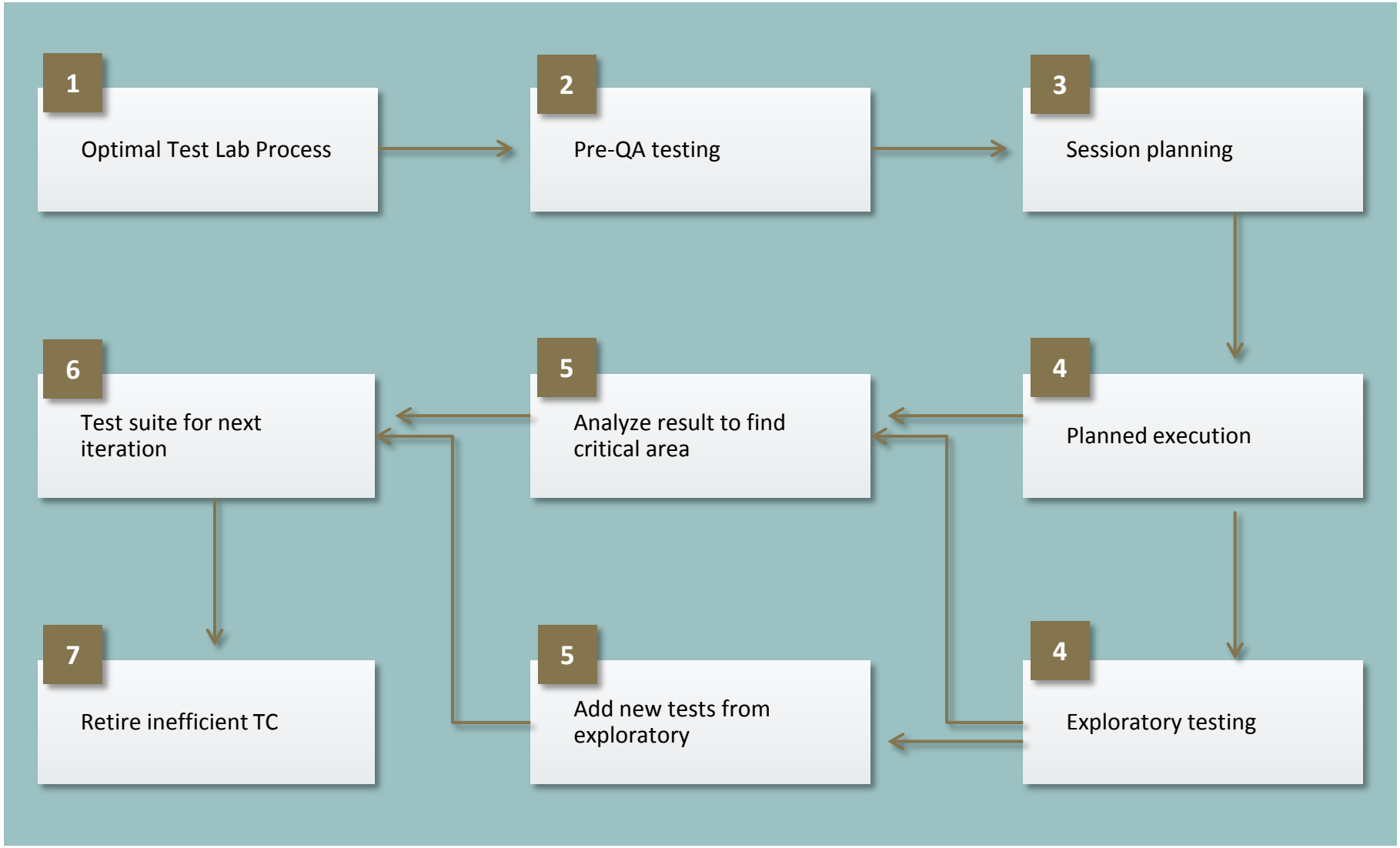
Endorsed Effective Methodology – Process Flow



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Effective Methodology

Optimal Test Lab Process

- Design of the test lab to reduce Man–Machine interference.
- Implement cron and script for the basic configuration to save time during execution.
- Create robust troubleshoot register, update it frequently, circulate with team.

Pre-QA Testing

- By implementing a pre-QA cycle to testing to get early defect detected and make the build ready for QA qualification.
- A basic test suite can be identified for the same.

Session Planning

- A template-based session planning at beginning of the release for all milestones.
- Reuse the template; make it generic and scalable for new Use Color Code feature.

Make Test Suite Effective

- After each release analyze the result to find critical area to test in a typical product.
- Allocate time for exploratory testing.
- Include scenario from exploratory tests and retire ineffective tests.

Template-based Planning Example

Session Planning

- Multiple component in different axis
- Green/Red for supportability parameter
- Y/N for covering the particular combination on the particular milestone
- Same template to be used for other milestone of same release

Execution Planning

- Multiple feature with multiple HW
- Number of resources with number of test cases
- Total days required by the feature
- Remaining days on exploratory

		Feature 1 (No of TC)	Feature 2 (No of TC)	Feature 3 (No of TC)	Feature 4 (No of TC)	Days Required
HW 1	Resource 1	xx	xx	xx		
HW 2	Resource 2		xx	xx	xx	
HW 3	Resource 3	xx			xx	
HW 4	Resource 4	xx	xx	xx	xx	
HW 5	Resource 3		xx	xx		

Release-1-Milestone1

Component 1

Component 2

	C1-V1	C1-V2	C1-V3	C1-V4
C2-V1	Y		N	Y
C2V2	N	Y	Y	
C2-V3	Y		Y	N
C2-V4	N	Y	N	
C2-V5		Y	Y	Y

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Differentiating Factors

1. Take care of **optimal HW configuration** at the **beginning** of **iteration** to **save time**

2. Make a robust **trouble shoot mechanism** with simple tools that helps achieve better execution throughput

3. **Template-based session planning**

4. **Constant analysis** and perpetually improve the test focus; remove the ineffective test cases

5. **Simple home grown tools** to help **save time** on various issues during execution time. Ex: Cron to auto download, defect details giving tool, lab management tool, defect dash board, input file generator

Case Study

Environment/Testing Components

- Hardware Platform - Compute & Storage
- Multiple Peripheral firmware and driver releases
- Customized OS with new features
- Third party Storage /Network equipment
- Multiple application

- Reliability and Performance
- Testing Interoperability

- Software Utilities and Tools
- Third Party Applications Testing
- Third Party Certification WHQL-HCT

Storage Testing

- Storage servers with Raid sub-system
- Protocol compliance testing
- FC integration of servers and enclosures
- SAS/SATA compatibility testing on enclosures
- Enclosure management testing

Firmware

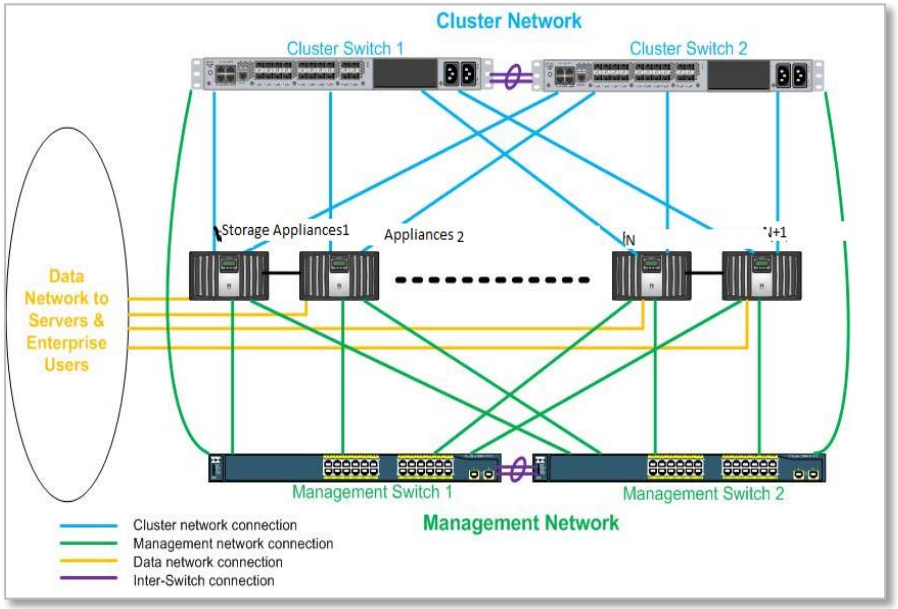
- Verification and Validation of enclosure management services against the specifications
- Testing of SES pages from CLI and UI debug utilities
- Stress testing of firmware Suites
- Automated tests for upgrades/downgrades

Operating Systems

- Kernel Customization
- Device Driver Testing
- Modules Implementation

Typical Test Set-Up

- Multiple storage appliances
- Cluster of switches
- Management switch



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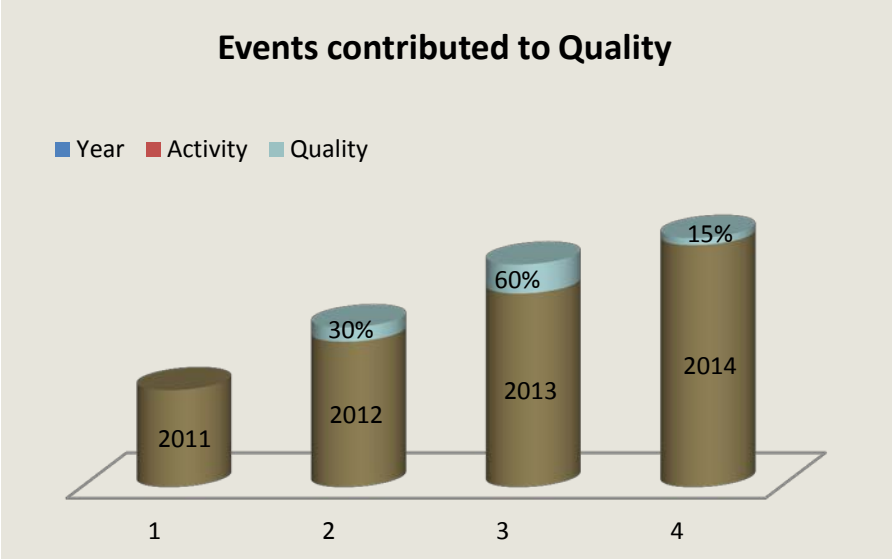
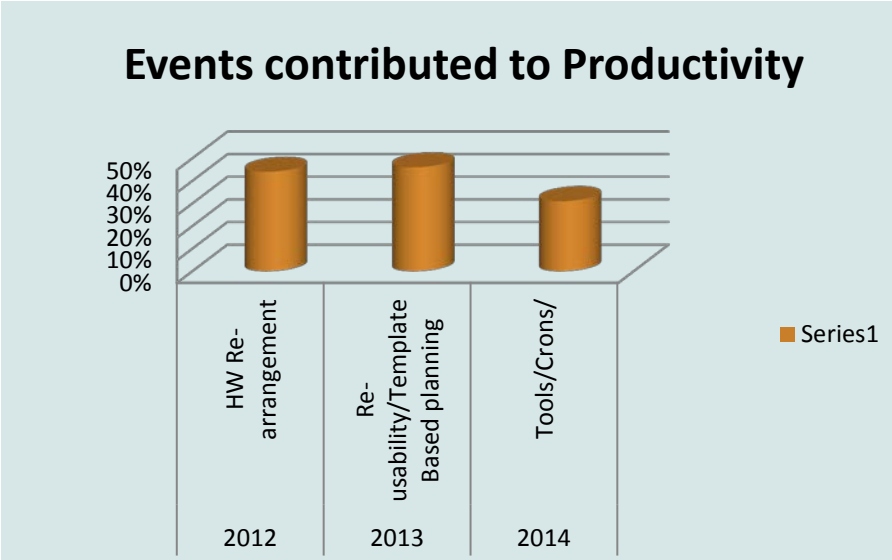
Case Study (*Continued…*)

Modified Process & Improved Metrics

- Analysis of Test efficiency metrics
- Enhanced productivity through effective lab usage
- Multiple sessions within a planned iteration
- Home grown tools to ease test management



Year	Activity	Productivity	Quality
2011	Gather metrics and study limitations		
2012	HW Re-arrangement	44%	30%
2013	Session planning and analysis to identify focus areas	46%	60%
2014	Tools/Crons/	31%	15%
Indirect Impact on Quality			



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QUESTIONS
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ANSWERS
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Thank You

