

Do You Know if Your Test Automation ROI is Good Enough?

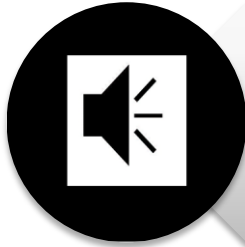
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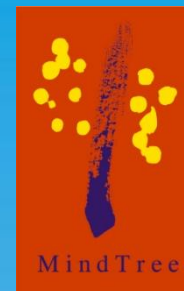


Our Distinguished Panel



John Scarborough
Vice President
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How Do You Know If Your Test Automation ROI is Good Enough?

John Scarborough
VP, Quality Engineering
MindTree, Ltd

Laurent Vernhes
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Microsoft

Poll Question # 1

Have you used test automation?

Select all that apply

- Presently using test automation
- Previously used test automation
- Likely to use it within next six months
- Never have used it



- What is ROI?
- Variables in computing test automation ROI
- ROI calculation and maximization
- Costs of test automation
- Quantifiability of test automation benefits
- ROI of test automation in IT environments
- What do CIOs look for in test automation proposal?
- ROI and the business case
- ROI and cost-benefit analysis
- Negative aspects of test automation ROI
- Summary

Poll Question # 2

Are you satisfied with your current test automation ROI?

Please select ONE of the following:

- Delighted
- Satisfied
- Somewhat satisfied
- Not at all satisfied
- Not applicable

What is ROI?



- Simplest Formula

$$\frac{\textit{Investment benefits}}{\textit{Cost}} * 100 = \% \textit{ ROI}$$

- When others talk about ROI, find out how it has been calculated; when you talk about ROI, be rigorous in explaining its calculation
- ROI's greatest value is in evaluating very short-term returns, provided that there is an unambiguous relationship between the investment and the return

ROI is not just about costs



Factors

Cost

Time

Quality

Risk

Key Variables

System under test

- Stability of the system under test
- Dependencies of the system under test on external systems
- Time or number of releases over which ROI will be measured

ROI calculation

- Scope of costs included in calculation

Automation Requirement

- Stage of SDLC when automation is developed
- Automation usage #
- Expected lifecycle of AUT
- Degree of planning
- Common library and component re-use
- Type of automation
- Quality attributes addressed
- Ease of data generation, amount of data required, uniqueness of data required

Infrastructure

- Extent of virtualization
- Tool cost
- Varying productivity of manual testers and automation developers

Calculating ROI (1 of 2): Know your terms



- Need reliable statistics and metrics of staff productivity
- Assessing value of a benefit requires apple-to-apple comparison of the new to the old
- Use fully loaded rate for labor expense
- This formula is “non-discounted”: it does not take into account the cost of using money over time
- Amortization of fixed costs can also affect ROI if calculated over several quarters, but for short term calculations of benefits it is insignificant

Investment benefits

Cost

**100 = % ROI*

Calculating ROI (Slide 2 of 2): Incremental costs



$$\frac{(a+b) + (K^* (c+d)) - ((e+f) + (K^* (g+h)))}{e+f}$$

- ROI should include the costs of maintenance and the cost of additional features in future test releases
- Calculate the same costs for the present means of testing to correctly evaluate the value of the benefit

As your calculation becomes more accurate, it may become more complex. It also becomes more difficult to explain, and easier to corrupt through carelessness.

ROI calculation example, labor cost only



Items \ Product Releases		R1	R2	R3	R4	R5	R6
Manual test execution (R2 thru R6 reflect costs of manual testing remaining after automation)		\$100,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Cost of maintaining manual scripts, current release	30%	\$0	\$600	\$720	\$840	\$960	\$1,080
Cost of developing new manual test cases, current release	20%	\$0	\$400	\$400	\$400	\$400	\$400
Total cost of manual testing, individual release		\$100,000	\$3,000	\$3,120	\$3,240	\$3,360	\$3,480
Cost of initial automation development		\$150,000	\$0	\$0	\$0	\$0	\$0
Cost of automation tool license		\$90,000	\$0	\$0	\$0	\$0	\$0
Cost of automation maintenance, current release	12%	\$0	\$18,000	\$21,600	\$25,920	\$31,104	\$37,325
Cost of automating new features, current release	20%	\$0	\$30,000	\$36,000	\$43,200	\$51,840	\$62,208
Annual maintenance (No cost for 1 st year)		\$0	\$0	\$0	\$0	\$0	\$0
Cumulative Cost of today's 100% manual testing		\$100,000	\$250,000	\$406,000	\$568,000	\$736,000	\$910,000
Cumulative cost of adjusted manual testing		\$100,000	\$103,000	\$106,120	\$109,360	\$112,720	\$116,200
Cumulative cost of automation		\$240,000	\$288,000	\$345,600	\$414,720	\$497,664	\$597,197
Cumulative cost of testing (adj manual & auto)		\$240,000	\$391,000	\$451,720	\$524,080	\$610,384	\$713,397
Return on Investment for Test Automation		(\$240,000)	(\$141,000)	(\$45,720)	\$43,920	\$125,616	\$196,603

ROI here varies with %manual testing; tool cost; % maintenance; % new features

ROI of early discovery - not necessarily of automation



Issue Type	Phase in which Issue was Found				
	Reqs	Design	Code	Test	Integration
Reqs	1	5	10	50	130
Design		1	2	10	26
Code			1	5	13
Test				1	3
Integration					1

If an issue is introduced in the Design phase (see highlighted row), it takes 2X the time in Coding phase to fix it as it would have taken in Design phase, and 74X to fix it after deployment.

It is not the case that automation necessarily enables earlier discovery of bugs; if it can, ROI increases.

Poll Question # 3

Have you maximized your test automation ROI?

Please select ONE of the following:

- Yes, we have maximized our test automation ROI
- There is still scope to maximize the ROI
- How do I know if we have maximized our test automation ROI
- We have not used automation yet

How do you maximize ROI?



**Minimize Investment
(costs)**

**Maximize Returns
(benefits)**

**Accelerate Returns
(maximize efficiency)**

What are the cost factors in test automation?



Fixed Cost

Tool licenses	Client machines	Power supply backup	Data servers
Network infrastructure	Controller machines	Fail-over	Script servers
Software infrastructure (OS, databases...)	Test management software	Configuration management	Training

Variable Cost

Lab setup	Framework design	Test case development	Creation of test oracles
Data generation	Debugging & root-cause analysis	Script maintenance	Reporting
Script review		Script verification	

Quantifiability of test automation benefits (1 of 2)



Benefit	Type	QUA?
Machines testing machines overnight	🕒 \$	Y
Automation of test results reporting	🕒 \$	Y
Reduction in full regression test duration	🕒 \$	Y
Increase time available for brain-intensive testing	🕒 \$	Y
Increase test coverage	★	Y
Increase code coverage	★	Y
Early discovery of bugs manual testing would find	\$	Y
Test case reuse	🕒 \$	Y
Speed up build acceptance process for QA	🕒 \$	Y
Stress testing and long-haul testing are enabled	★	Y
Reduction in maintenance costs	🕒 \$	

\$ Cost factor 🕒 Time factor ★ Maturity factor

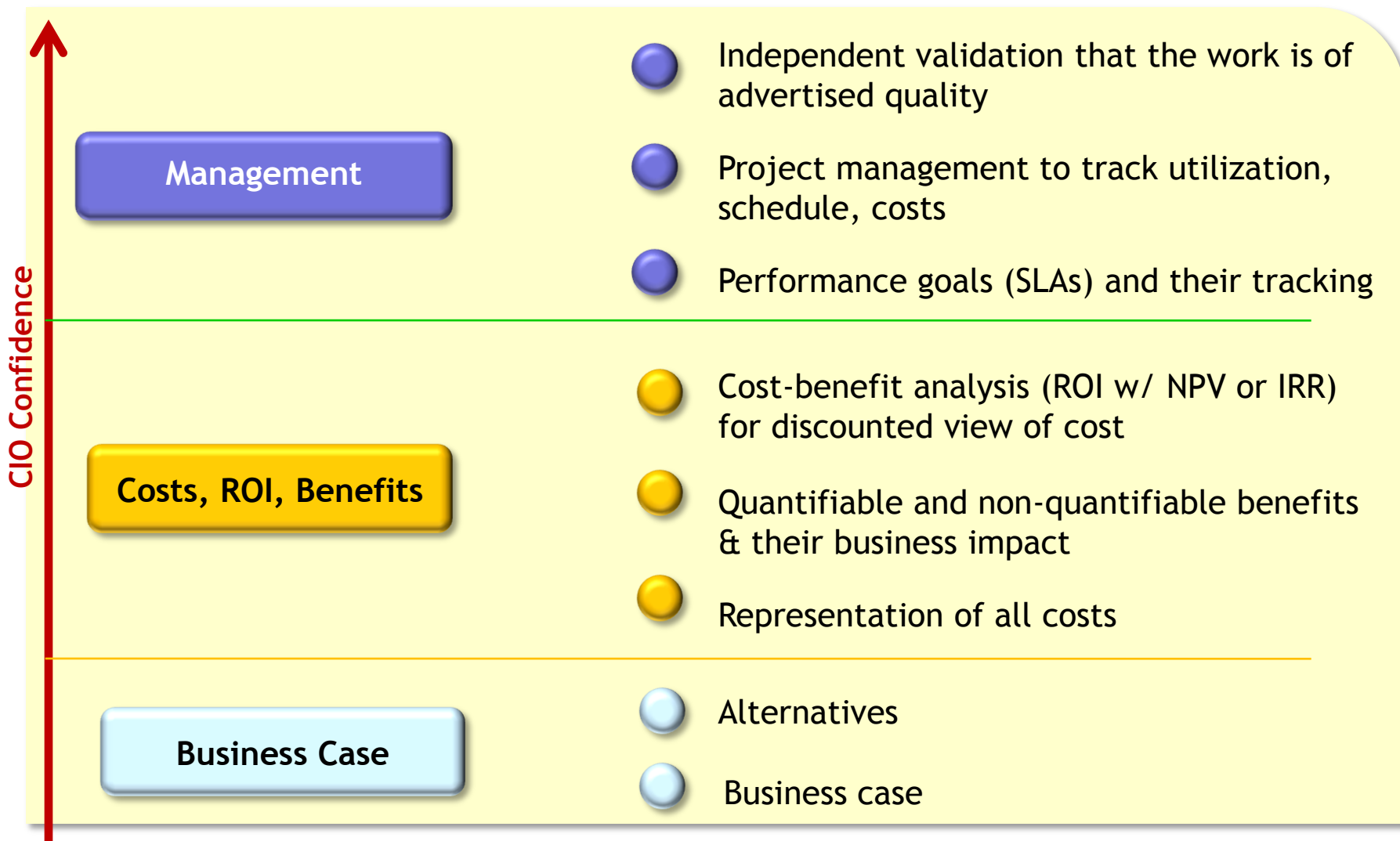
Quantifiability of test automation benefits (2 of 2)



Benefit	Type	QUA?
Faster more precise location of bugs by use of asserts and logging	🕒 \$	M
Reduction in time to market	🕒	M
Management needs numbers		M
Increased opportunities for future improvements		M
Early discovery of bugs not found by manual testing	\$	M
Risk reduction		M
Ability to run tests that cannot be run manually	★	M
Motivation for understanding the SUT	★	N
Removal of subjective element in testing		N
Objective baseline for build on build comparison	★	N
Reduction in the boredom factor	★	N
Removal of risk in executing of complex tests	★	N

\$ Cost factor 🕒 Time factor ★ Maturity factor

What CIOs look for in test automation proposals



Is ROI the same thing as cost-benefit analysis?



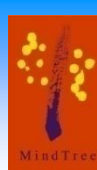
Cost-Benefit Analysis (C/B A)

- Provides quantitative comparison of costs and benefits across two or more solutions and an accounting of when costs will be incurred & when benefits will accrue. A time-based cash flow analysis
- C/B A often discusses parameters for financial value of soft benefits (mindshare, brand recognition, market entry...)

ROI

- Looks only at the beginning (what we put in) and end (what we get out of it)
- When ROI formulas use IRR and NPV, they are virtually identical to C/B A

What are the negative aspects of test automation ROI?



- May become a goal unto itself
- Can easily distort cost and benefits
- May ignore non-quantifiable benefits
- Questionable for long-term returns
- Calculations can become incomprehensible
- There's no ROI in analyzing the ROI of everything

Summary - How do you know if your ROI is good enough?



- Understand the business case, quality goals, & success criteria
- Know what you want from test automation, and how it will contribute to fulfilling your success criteria
- Quantify as many of your test automation goals as possible
- Set a target level and a fallback level of test automation (“don’t go for all or nothing”); use ROI analysis to support each
- Verify whether you have achieved your ROI as projected; adjust the model continually
- Use different ROI models for different purposes for the same project
- Your ROI is good enough if you have met your success criteria



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