

Hidden costs in the development lifecycle

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Listen | Challenge | Understand | Interpret | Create





Table of Contents

In Short	4
A Failure of Quality? An even Broader Challenge!	4
Is it Process? Is it Technology? Or is it People + Process + Technology?	5
Option 1 - Process rules!	6
Option 2 - Technology rules!	6
Option 3 - People + Process + Technology rules!	7
So What Do the Professionals Say?	7
Towards a New Professionalism	8
In Conclusion	9
About the Authors:	10

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In Short

We believe that Testing is at a key juncture in its development as a Profession.

We believe that Testing is at a key juncture in its development as a Profession... here is our proposal for a New Professionalism!

It can no longer simply position itself as a gate keeper charged with the role of making a 'pass/fail' judgment on code passed to it along a production line. The demonstrable consequences of this approach are now very clear - hidden, often major, costs in the development lifecycle of code arising both from the costs of fixing defects, and from the costs of managing change late in the lifecycle. Even more seriously, business confidence that new systems can be delivered to time and to budget is eroded.

In this paper we argue that a new testing professionalism is required, rooted in an approach to Quality understood as *fitness for the purpose defined, right though the lifecycle, delivered on time and within budget*. The challenge is how best to deliver Quality by orchestrating resource in the fullest sense (people, process and technology) to this end. Confidence in the delivery of outcomes is, for a business, an operational and strategic strength; the new testing professionalism is above all about delivering confidence in outcomes.

A Failure of Quality? An even Broader Challenge!

It is everyone's nirvana; they can deliver a project on time, within the lowest cost profile and of high quality. But we just don't seem to be able to get there: the balanced eternal triangle of controlled costs, timescales and quality seems to always elude us. Yet for a business, confidence in outcomes is an operational and strategic strength, a business that can invest resource for a purpose, and know with confidence that its objectives will be met, is a business that can act with determination.

We know that the 'tick tock' of Moore's Law ('the number of transistors per chip doubles every two years') underwrites a continuing exponential reduction in the underlying cost of data processing. But what we forget is that this also continually reduces the cost to deliver value. The value delivery equation is a complex one: at its core is the three dimensional framework of 'people, process and technology' – each axis interacting with and influencing the other two. Thus the insight distilled in Metcalfe's Law that the value of a telecommunications network is proportional to the square of the number of connected users.

It is everyone's nirvana; they can deliver a project on time, within the lowest cost profile and of high quality

All three dimensions of 'people, process and technology' are now in a major interactive flux across the operational stage of contemporary ICT. For an older example consider Google 'search' – technology rewriting the role of the librarian/information scientist, people then rewriting the processes that require 'search', including creating a new commerce of advertising paying for the search. *This is creating a major challenge to the testing profession.*

We have watched our industry swing its focus from unit cost reduction over the last few years to worrying more about speed to market but we don't see many worrying about Quality. In this paper we focus on the holistic view of Quality across the lifecycle, Testing plays its vital part but what we are referring to are projects working as cohesive units to ensure that their individual deliverables are of the best possible quality – that is ensuring best quality requirements, design, code and test. We have never met one person who deliberately sets out to produce poor outcomes, so given the right focus everyone can produce quality outcomes. And what do we mean by best possible quality? It depends on the specific customer needs – and thus is different for each project. In order for this to be achieved it requires, and to emphasize the point, *a holistic view of quality across the lifecycle.*

In 'creating the new' (software, applications, systems...), today's business has to be able to move faster and with confidence, respond to developments more flexibly (the agility factor) and use its key resources more effectively and efficiently (we are in the era of the lean). At the same time the



spread of factors that must be proactively managed across the lifecycle in 'creating the new' is widening: for example, how will new code run in the virtual data centre, and will it, in so doing, help better deliver the green agenda? For the contemporary testing professional the challenge now is to assure the integration of an ever widening series of key factors: effectiveness, efficiency, risk management, agility, operability, standards (open or otherwise), greenness.....
This is about Quality in the broadest sense and right across the lifecycle.

Focusing on Quality has been evidenced to meet all three criteria of controlled costs, timescales and quality

Focusing on Quality has been evidenced to meet all three criteria of controlled costs, timescales and quality – we have an Experimentus case study that demonstrates delivery six weeks earlier than planned, with a saving of over £400k, and no production problems in the first twelve months. In contrast focusing on cost and timescale alone has been frequently evidenced to raise costs and produce lower quality output – we all have examples of these projects. Quality requires a focus on the 'Do it once and do it right' principle.

So many projects today start from the proviso that quality is the job of the testers and that testing holds up the project - or there are demands that testing guarantees that project plans will be achieved. Yet it is self evident that the tester's ability to deliver on time and provide any guarantees is totally dependent on the quality of the code that arrives for testing. Experience shows that:

- Software Testing can absorb up to 50% of a project budget
- 75% of defects found in UAT and live can be directly attributed to poor requirements definition
- The biggest impact on the costs and timescales of any IT project are the stops and rework that is required to fix defects found during testing in the later stages of the project.

There are real parallels here with the earlier experience of the auto industry before it took the quality revolution to heart. In the key study of 'the motor industry as the Lean Machine'¹ BMW was shown to have had a greater floor area of its manufacturing plant devoted to fixing what the production line had failed to get right first time than was devoted to the production lines themselves. If the code is of poor quality, testing is seen to hold delivery up whilst fixes are made: if the code is of good quality, testing flows and simply confirms the quality of the code without continual stop/start. It is better to get it right as it is built rather than waiting until the end to find issues - prevention rather than detection.

These insights point the way towards the need for *a new professionalism in the management of Testing and Quality across the lifecycle* – design to deliver quality in the fullest sense across the lifecycle, to ensure that elusive but vital confidence *in outcomes*. The starting point has to be process, and how best to architect processes relevant to delivering these ends. But the delivery of value in our industry has long been recognised as not lying in process alone, but as rooted in effectively blending process with *the human contribution* and *the (enabling) technology*. So let us revisit how best to achieve the successful delivery of controlled costs, timescales and quality through the contemporary context of 'people, process and technology'.

Is it Process? Is it Technology? Or is it People + Process + Technology?

Consider three scenarios defining different approaches potentially taken to achieve controlled costs, timescales and quality.

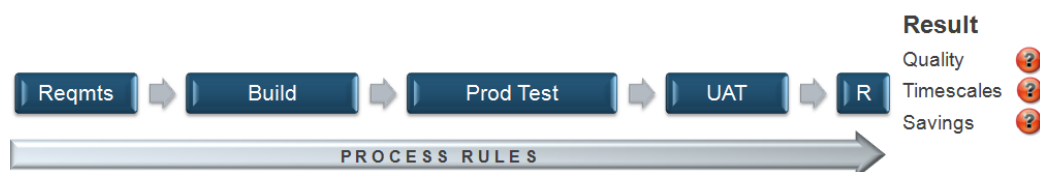
¹ 1 [*The Machine That Changed the World James P. Womack , Daniel T. Jones, Daniel Roos (1990)]



The three options could be titled:

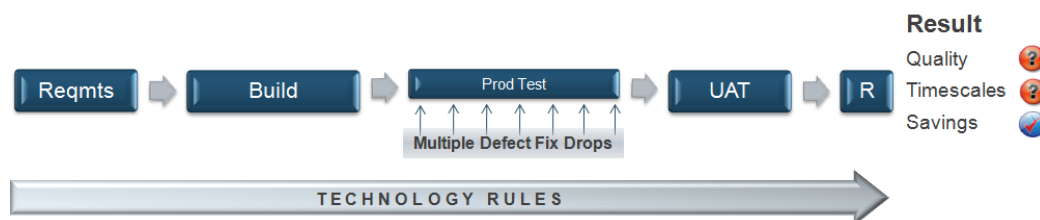
- 'Process': Cut away chunks of the process – this used to be called process re-engineering
- 'Technology': Automate the test
- 'People/Process/Technology': Focus on building a quality product from day 1 – sometimes called *lean*

Option 1 - Process rules!



A group of people look at the process and remove what they consider to be unnecessary or redundant steps. This is normally undertaken without reference to other parts of the software development life cycle. For example, development look at what they can do, design look at what they can and test look at what they can do. Everyone then picks up the next project, and finds that actually the processes they removed (although not perceived as important for the stage of the lifecycle that removed them) were actually important for the latter stages of the life cycle. The net effect of this is that the code quality when delivered to System testing and beyond is not good, and (as noted above) the whole process is held up whilst defects are analysed and solutions agreed and recoding/fixing takes place. It is likely that the project will take just as long as before with roughly the same costs and more importantly lower quality. Obviously some projects make the right decisions about process cuts, or are just lucky (maybe it's more that than anything else) and do deliver better quality within reduced timelines, but experience shows that these are more chance than scientifically concluded.

Option 2 - Technology rules!

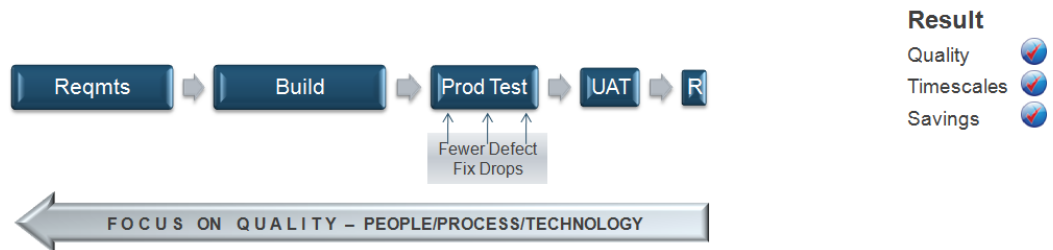


Automated test tools are seen as the panacea and purchased, manual tests are converted to automation scripts and are run to replace the existing manual activity – normally this focuses on repeatable regression tests, but with the growth of adaptors that sit on top of the tools enabling business written test cases and scripts to be automatically generated as test tool code this is becoming more and more popular and used for more than just regression. There is no change to the development approach so the same levels of defects are left in the code. The effect of this work is that the same testing is completed in a quicker way. However, as with all development projects, scope creeps so additional tests are added (as it's so quick to run them). More importantly, lots of defect notifications are generated by the tools, and then there are the delays whilst defects are analysed and fixed, the net impact is a reduction in cost, but no or a small change in time, and a negligible improvement in quality.



As the great Peter Drucker once noted “There is nothing so useless as doing efficiently that which should not be done in the first place.”

Option 3 - People + Process + Technology rules!



This requires commitment and changes within testing but also across all functions, the whole lifecycle. What this option requires is that each stage of the lifecycle takes real ownership of the quality of their deliverables. One way this can be achieved is by employing a semi agile approach of deploying quality focused resources into all of the earlier lifecycle stages to ensure quality and testing have been efficiently handled. This may increase the time needed for each of these earlier lifecycle stages but by delivering quality requirements, designs and code (and maybe even automating some of the testing) this rarely increases the overall cost of testing itself. The effect is to shorten the time taken to test at the end of the lifecycle, as test validates the quality without the stop and start of defects – in the earlier Experimentus case study example a normal 7 week test cycle was completed in three days. The overall impact of this approach has been proven to be a reduction in the overall cost of the project, the main saving is in the earlier reallocation of development resources that don't need to be available to do defect fixes.

The case study referred to earlier shows that when the whole lifecycle has a quality approach (everyone owns quality) significant savings can be made, of up to 25% of the project costs, with a massive increase in quality to the customer!

For option 3 to be effective, all of the silos in the Software Development Lifecycle need to be seen as a single entity: setting quality or cost objectives individually to each silo can have the effect of setting teams against each other. *One single and shared objective 'to get to market quicker with a higher level of quality' is far more productive.*

So What Do the Professionals Say?

We have seen that a sharp focus on Quality can dramatically reduce costs and timescales. So why don't people take this approach? There could be many reasons, but here are a few insights drawn from our experience.

- **The Tester** - key to the focus on quality is the capability and attitude of the testers. So often when we talk to testers about the quality approach of prevention rather than detection they take the attitude that that is cheating. This reflects the view that 'a testers role is to find defects' positioned over many years by gurus and books, rather than to stop defects occurring in the first place.
- **The Development Manager** – the issue here is that the culture of delivery to test must happen come rain or shine on a certain day at a certain time, regardless of code being ready. We have spoken to developers who have simply had their code taken away from them and delivered to test before they have run any tests themselves just to meet a deadline.

“There is nothing so useless as doing efficiently that which should not be done in the first place.”



- **Independent testing** – another roll over from the early test gurus and books. This is where testing believes it has to be totally independent of any other aspect of the lifecycle so refuses to work directly with anyone and is positioned to follow all other code development activity. What this is actually supposed to mean is independence of mind, having the ‘testing’ rather than the ‘creative’ attitude. But it is so often implemented as separate testing teams that it becomes segregated from the rest of the project and communication breaks down.
- **Development** – whilst we allow developers to be creative (and whilst we accept that some developer’s creativity helps, unfortunately most do not record or track the improvements they make) with their solutions we will always have the risk that solutions will not meet the customer’s expectations or needs, and therefore change control is brought into play to delay things at the last minute. When building a house, if we were to ask you whether you would prefer a builder who built to the agreed design or someone who might be creative with their solution but with no guarantee of meeting your design, which one would you prefer to use? So why do we allow this with software?

The hidden cost in the lifecycle is therefore the cost of fixing defects/managing change late in the lifecycle when there really is no need to do so. Back to Peter Drucker! So what is to be done?

In its early days testing developed as a distinct craft but the landscape around it has now changed quite radically

Towards a New Professionalism

In its early days testing developed as a distinct craft but the landscape around it has now changed quite radically. In those early days, as the Testers emerged from the older profession of Business Analysts, technical constraints significantly drove code quality. For example, anyone who remembers the Millennium Bug will also remember its root cause – that aspect of the technical landscape has certainly changed beyond all recognition. In the following four ‘arguments’ we set out what we believe are the key features of the New Professionalism relevant to the delivery of Quality as we have explained it in this paper..

Firstly, *Quality dictates that Testing cannot now sit in isolation, awaiting the arrival of the goods to be tested.* The professional requirement is surely to understand and orchestrate the overall process as a Quality process, from the setting of the quality requirements to the final delivery of a quality outcome - working with a clear insight into the integrated contributions of people, process and technology. A culture of *prevention rather than detection* is no longer to be seen as cheating but the new golden rule [with Peter Drucker perhaps the new Saint?]. So Testing is in the business of *process design and management*. It is also in the risk management business, integral to the process design and management. In delivering its Testing brief it is challenged to look to all the key elements that influence reliable and cost compliant delivery of Quality across the overall lifecycle of new code.

Secondly, *Quality requires of the Testing profession a sharper awareness & recognition of the newer, more complex, technological and operational landscape it now operates in.* In an increasingly virtual world is there the required compatibility with agreed Standards, open or otherwise? Or will the new code fail the test of compatibility to standards, relevance and sustainability in contemporary operations? In an increasingly environmentally sensitive world, will the new code run ‘green’ in the virtual data centre? Or will the new code impose environmentally expensive restraints in practice? *Operability and usability* have increasingly business distinct dimensions now – does the code, when run, meet requirements? Security and privacy rule – does code design and structure help or hinder their delivery?

The world is ever a more dynamic place. Business requirements may well shift even as code is being developed. The world is competitively an unforgiving place – resource cannot be left idle and unexploited. So, thirdly, *Quality requires of the Testing profession a determined & ongoing role in the orchestration of process and resource in real time even as code is being cut.*



a new Testing Professionalism capable of orchestrating resource in the fullest sense (people, process and technology) to ensure the delivery of Quality

The means by which code, software and systems are now created and operated are themselves being innovated anew. Consider the 'platforms in the Cloud' such as Salesforce's force.com and the iPhone iApps platform. This is a world of speed, of code re-use and reworking, of mash-ups. In the newer world of *software delivered as services*, the long established disciplines of SI as Systems Integration (with its close parallels to classic code development) are being replaced by SI as Services Integration (where code conformity to agreed Standards enables service compatibility and ease of interaction). So, fourthly, *Quality requires a new Testing Professionalism able to orchestrate the road to Quality in these new modus operandi in code development.*

We believe that these four 'arguments' scope the key dimensions of a testing professionalism more relevant to today's world. They also relate closely to the core principles of the 'Test Maturity Model integration' (TMMi) that is now being adopted across the world as a de facto international standard for measuring the overall delivery process of software testing. *Taken overall, they provide a strong basis on which to work to renew the mandate for our profession which we would argue is a very overdue exercise.*

In Conclusion

The contexts in today's world for software and systems testing are now very different than those that ruled even a decade back. The importance of testing is nonetheless arguably even greater in our increasingly virtual world. *Quality* is the key word – Quality as *fitness for the purpose defined*, right through the lifecycle, delivered on time and within budget. Orchestration is perhaps the second key work – a new Testing Professionalism capable of *orchestrating* resource in the fullest sense (people, process and technology) to ensure the delivery of Quality – and so doing in an increasingly complex world of options to that end.

As noted at the start of this piece, confidence in outcomes is, for a business, an operational and strategic strength. The new Testing Professionalism is above all about delivering business confidence in outcomes.



About the Authors:



Dr Richard Sykes is a businessman with a breadth of involvement & experience that spans the chemical industry, the IT industry and the world of arts. He has held senior executive roles in a major global multinational and non-executive chairmanships in a number of smaller ventures – and has lived and operated internationally.

Today Richard has a personal practice ('Dr Richard Sykes') as a board-level trusted advisor, strategic coach & facilitator. He works with senior management in the practical shaping of effective business information & communications technology (ICT) strategies & their implementation, sourcing & governance. He has a particular expertise in the workings of the ICT Services and Business Process, sourcing & outsourcing market place – including through the agency of 'the Cloud'.

Richard is newly elected as Chair of the TMMi Foundation. He is also an elected Board member of Intellect, the UK association of the IT, Telecoms and Electronics industries.



Geoff Thompson has a real passion for quality and software testing. He is the Consultancy Director for Experimentus and a founder member of the International Software Testing Qualification Board (ISTQB).

He is currently the Chairman of The UK Testing Board and Chairman of the Management Committee of the TMMi Foundation. He co-authored the BCS book Software Testing - An ISEB foundation.

In 2008 Geoff won the EuroStar - European Testing Excellence Award. He is a popular speaker having recently delivered keynote presentations in India, Australia and Korea as well as being a regular speaker at EuroSTAR and the BCS SIGiST.





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