

Testing Transformation to 'Beyond Testing'

An holistic approach to implementing Test Optimization and Shift Left principles

For a number of years, organizations have increasingly considered the operation of testing as a separate activity within the Software Delivery Lifecycle (SDLC). A number of models have been developed to manage this discrete activity, including a Managed Testing Service (MTS). This has proved to be a robust and effective model for structuring and running a test organization, with one or more 3rd party providers taking full or partial responsibility for a full range of test activities, at either enterprise or program level.

Using Test Centers of Excellence and a Test Factory¹ model, an MTS is often seen to be the most appropriate solution for major test challenges such as overstretched dedicated testing resources, increased consumer/user intolerance of software glitches, and of course reducing costs. In addition, it also provides the benefit of building in quality improvements by, for example, applying best practice tools and methodologies, and specialist skillsets, not available or cost-effective to provide in-house.

Central to this approach is the flexible, scalable resource pool, which can take many forms from in-house onshore, nearshore, and offshore teams, as well as outsourced units, all built around the concepts of standardization, industrialization and automation. The benefits for many businesses are significant: improved operational efficiency, clearer managerial focus, streamlined supplier environment, and reduced year-on-year costs for testing.

The next step on from MTS?

It could therefore be argued that the MTS model has stripped back costs as far as possible and the test organization, processes and environments have been improved sufficiently to achieve optimal results and dependable software. However, for some organizations, this does not take test optimization far enough, particularly as downward economic pressures continue to compel organizations to look for further opportunities to drive even more costs out of the business, with the IT department often high on the list of cost-cutting targets.

One reason for re-evaluating MTS is that the traditional resourcing approach to MTS contracts does not always help to drive down costs because fixed-price agreements can actually result in driving up the volume of resources, and therefore costs. Also for some companies, there is a tangible and intangible ceiling on offshoring, beyond which there are

limited returns on increased offshore leverage, together with complications regarding transfer of resources, such as local employment regulations, public opinion, protection of key 'internal' business knowledge and staff welfare.

Moreover, testing innovation can also slow down once the move to offshoring has been initiated, as suppliers can often look to optimize headcount, rather than proactively introducing innovative practices that could reduce headcount over time.

Elsewhere other organizations have not adopted an MTS model. In our experience, many have developed an evolved form of the effort-based Time and Materials (T&M) or Staff Augmentation Testing model, some even moving from cost to profit center status. With distributed teams, this model has served many businesses and other organizations well.

Nevertheless working within highly competitive environments, this model, with loosely aligned and unstandardized processes, can also show strain and become less cost-effective, as resourcing costs are viewed as sunk costs over the contract period. So, as with MTS, traditional T&M has its limits, and some companies are now looking for a different way to optimize their testing in order to gain further efficiencies.

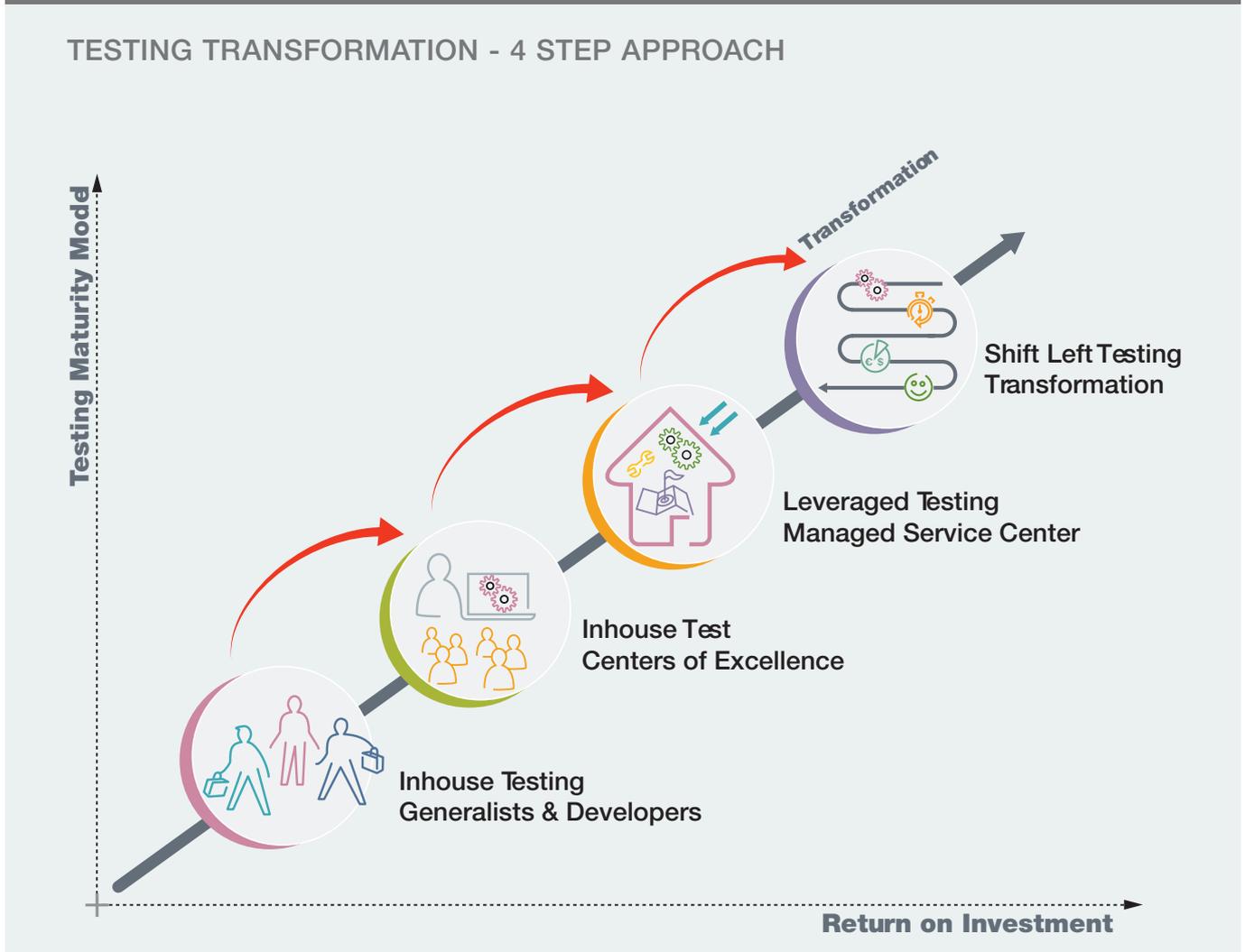
The challenge therefore facing a number of organizations already employing an MTS is how to generate greater value from the service, by not only reducing costs still further, but also by maintaining or even improving quality. And for other companies who are still at the less 'developed' end of the spectrum – i.e. T&M Staff Augmentation model – is there a way of bypassing MTS and still radically improving their testing performance?

How the Testing Transformation journey can take an organization 'Beyond Testing'

Capgemini and Sogeti believe that testing can indeed move to a greater level of optimization, which takes the Testing and QA function more firmly into the perceived role of Quality Improvement and so to 'Business Assurance', and away from the 'find and repair' approach. We refer to this model as Testing Transformation, which is represented in Figure 1 next page as part of the Capgemini and Sogeti continuum of Testing's evolution.

¹ Test Factory Model: managed testing environment, executed using factory-type delivery structures, processes and metrics for the execution of high volume testing, using a shared or defined resource pool.

Figure 1: The Evolution of the Testing discipline, in terms of maturity and return on investment



Our definition of Testing Transformation is an integrated approach that combines two key elements: a program of streamlining costs and improving productivity within the testing function; plus implementing a truly integrated Shift Left² approach, (the benefits of which have been widely promoted but rarely achieved) which impacts beyond the testing function and into the broader SDLC. In this way, the journey to the next level of testing starts with a focus that is *internal* within Testing, but moves to having an impact that is *external or beyond Testing*, and the result is measurable benefits to the broader business, year-on-year.

This is consistent with what is known as the “experience economy” or next-generation customer experience, which argues that improving the experience for customers, using new technologies, is linked to the value of the ‘transformation’ that this experience provides; in other words a natural progression of the term ‘value added’.

Intrinsic to this is the principle of ‘trust’ of the business in the service provider. This concept of trust sets out that the service in question will be delivered according to the agreed year-on-year commercial deal, but also that it will be returned to the

² Shift Left: working methods and processes used to drive defect discovery as far upstream as possible to reduce costs and time to market

business in an improved state, with embedded 'extra' added value (when compared with the sunk cost of time and materials over the same time period).

We now look at how this transformational approach can be practically implemented and can achieve not only better testing value for money but also the business benefits of improved time-to-market, enhanced quality, greater flexibility, reputation management and corporate risk mitigation.

Plotting a shared Testing Transformation Roadmap

An important starting point is to understand that Testing Transformation is a journey that an organization needs to see in terms of a change program, first of the Testing function itself and then more widely within the IT function.

From a supplier perspective, working closely with a client means developing a common view of the future state of their testing, factoring in the organization's existing structure and operating model and planning carefully how to manage the change over a specific period (the Roadmap). Implicit in working together is the concept of partnership – between the client and supplier. If the full benefits of transformation are to be realized, there has to be a greater shared responsibility by both parties – not just the supplier - and recognition of the need for active input and contribution from the client.

Linked to this is the concept of shared risk and reward. A strong clearly-articulated commercial imperative helps to drive both the supplier and the organization in this commercial model, embedding obligations on both sides. It is in the interest of both entities to identify ways of generating better metrics, and processes that together drive up efficiency and drive down the costs.

For the organization, this means a rigorous approach to managing this change within Testing and beyond as a strategic program, together with the resources, control mechanisms, management commitment, investment funds and willingness to see it through, despite conflicting priorities and other calls on time and effort.

As Figure 2 on next page illustrates, the roadmap involves three major phases: Transition (project set up); Steady State (providing the best possible baseline); and Future Mode of Operations & Beyond Testing (a multi-faceted transformation program of projects). Each phase follows a standard project lifecycle, with agreed governance, resources, project deliverables, metrics and timelines.

Optimizing the 'internal' mechanisms of delivering testing

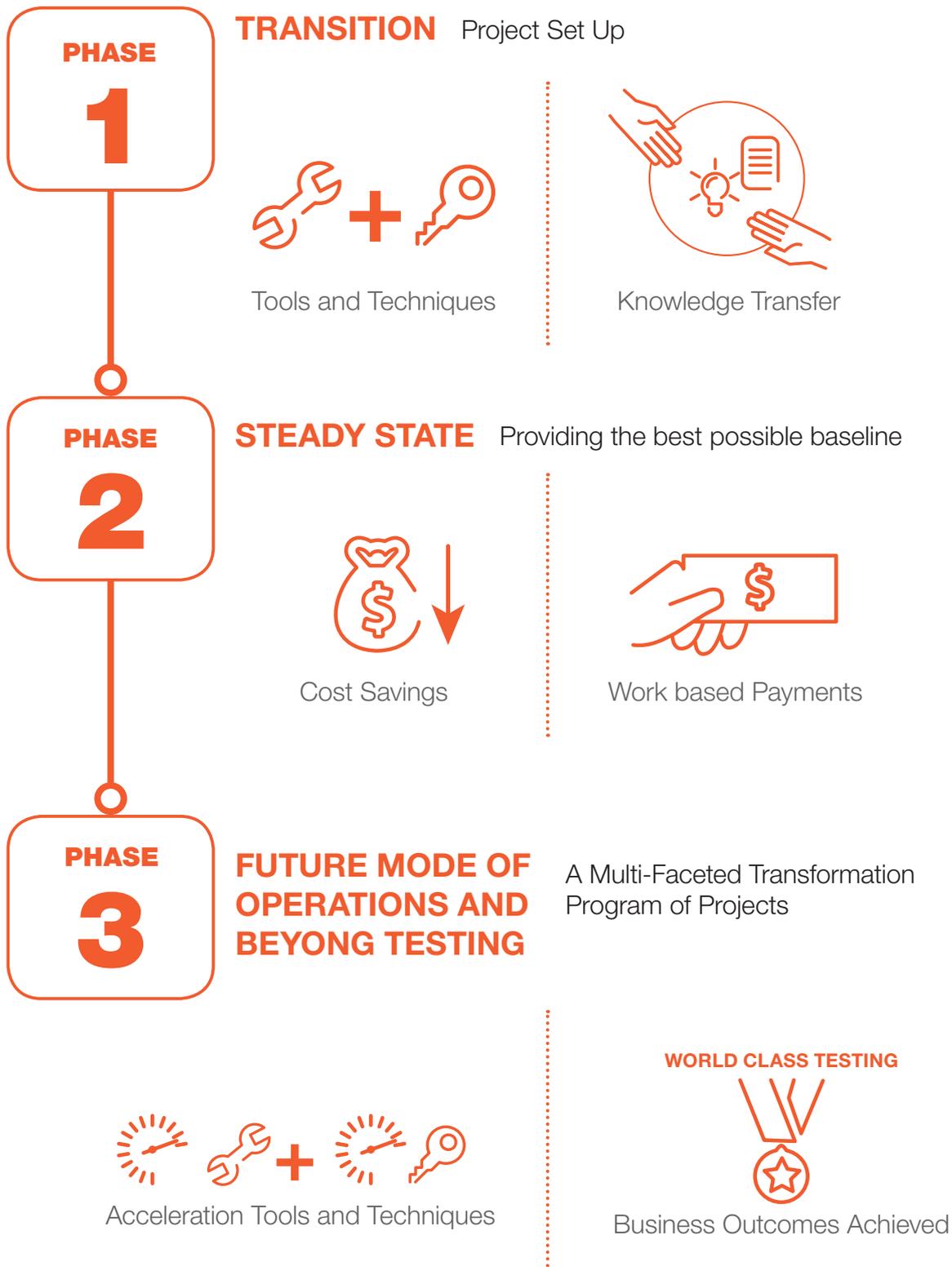
The second element is to focus on improving still further the efficiency and performance of the testing function itself, by determinedly focusing on commercial models, offshoring and process, as well as being open to new tools, techniques and technologies, or practices from other disciplines.

Maximize offshore leverage

For many organizations, there is perceived to be a natural limit to the percentage of testing tasks that can be sent offshore for execution, while some functional tasks are kept onshore for commercial, security or risk reasons. However, as the growing number of offshore and nearshore locations around the world and the establishment of teams of highly experienced and software-specific test professionals attest, there is the potential to increase this percentage further and gain cost and performance advantages based on time zones that overlap.

This specialist offshore expertise means that organizations have a clear opportunity to offshore a greater proportion of test tasks, importantly even those that are traditionally and generally considered to be too complex or risky, such as Agile testing and test and stakeholder management. Distance can also be less of an issue for some if not all teams. The increasingly valuable range of remote communication tools can be an acceptable and effective way of interacting with offshore teams, especially if key members of the offshore teams have spent some time onshore, to understand more closely the organization's culture and way of working.

Figure 2: The Evolution of the Testing discipline, in terms of maturity and return on investment



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Within Capgemini and Sogeti, we refer to this model of flexible resourcing as Rightshore®, in which the percentage of work offshored is determined as being appropriate to the client's needs (rather than a fixed ratio), using a highly elastic model of onshore, offshore and nearshore resources that can be flexed according to required outcome deliverables and service levels.

Consider an innovative commercial model

Reducing cost is not just about increasing the percentage of offshore leverage or indeed lower resource costs. As part of Test Transformation, Capgemini and Sogeti put an emphasis on the measurement of testing outputs, rather than effort (time and materials/man days), and this is reflected in the underlying commercial model.

Test outputs are estimated by the organization based on a 'fee' (agreed, using base-lining activities undertaken during early engagement) and expressed in non-financial units, referred to as Test Case Points (TCP). This means that the organization pays a fixed price for a fixed scope of delivery and the associated test outputs, rather than a pre-determined number of testers and thus pricing relates directly back to business-outcomes.

The TCP model is an accurate estimation model, as it takes the unit of a Test Case Point to estimate and measure test size (which is critical) and test effort. It is then moderated and weighted by historical data (if applicable) and complexity of the entire testing cycle, and then translated into size of test cycle. Having robust metrics in place to start with is therefore critical to producing accurate data that feeds back into the ongoing TCP calculation.

Monitoring test metrics provides greater insight into productivity (throughput per hour), and defect rates, and in turn the TCP model strongly encourages the business and the testing provider to implement efficiency improvements, particularly in the context of an overall change project. As efficiencies take effect, so the effort expended to deliver each output reduces. TCP method is therefore a more accurate reflection of what needs to be done than traditional methods – resulting in reduced waste, and a clearer means of monetizing process efficiency, without sacrificing quality.

While the rewards are significant and reflect the reality of the testing tasks in hand, this type of commercial relationship can necessitate some upfront 'investment' such as data collection and scenario modeling. It also requires a more collaborative approach to the supplier/provider engagement, based on a shared risk-reward mechanism, linked to agreed metrics and SLAs. In this way, the value of testing now starts to move onto the CFO's radar and even that of individual P&L business owners.

Implement regular Test Process Improvement

Getting the basics right is fundamental to any improvement or optimization path, in order to drive the test effort effectively - including resourcing, metrics, processes, and test basis (requirements, functional specs, designs, etc). Of particular note is the need to benchmark current performance; and fine tuning the test process for the business is essential before moving to a transformation journey. A process improvement or maturity assessment methodology, such as TPI NEXT^{® 3}, establishes a baseline against which the functional efficiencies can be measured. It also provides an auditable scale of maturity, and guidance on the priority areas to tackle and the quick wins to deliver, essential if transformation activity is to highlight the benefits from early on in the journey.

Whichever process improvement model is used, it is important to not only create an improvement plan but to also revisit the assessment periodically to demonstrate and confirm the positive impact the changes have made, typically every six months or so.

Keep open to new or 'out of the box' thinking

Often 'innovation' takes a back seat while the focus is fixed on existing ways of working, but we believe it is important to proactively scan the environment and be constantly open to new or existing technologies, methodologies and working relationships – not necessarily related to testing – to reduce time and cost.

Cloud technology, for example, can cut costs by adopting a pay-per-use pricing model for test tools and test environments, which can speed up the process for setting up tests without being locked into expensive capital assets – software licenses

or datacenter/server infrastructure. Not having to negotiate internally for key resources or buying in specific compute capacity can generate additional benefits such as agility, scalability and speed to market.

Similarly, as software development continues to move towards any one of the multitude of Agile development models, testing needs to keep reviewing its use of Agile testing techniques and its capability to support Agile development. Testing in an Agile environment can be improved by embracing specific Agile testing methodologies and tools, where and when appropriate primarily to speed up the development/testing cycles and improve flexibility.

Other manufacturing techniques may not be new per se and be in common use in other production environments, but their application to testing may well be. For example, we have applied aspects of the LEAN framework and techniques⁴ within a testing program, which resulted in more efficient, industrialized and standardized processes across the service. Where LEAN foundations have been employed in a pure testing environment, our experience is that efficiency savings of up to 50% can be achieved across all data preparation and execution activities. Smaller but significant improvements have been recorded in other activities.

Implementing Shift Left and 'beyond' Testing

Taken together, the changes outlined above when carried out within the Testing function can drive down costs by approximately 30-35%, over the typical 5-year life time of a managed service, depending on the functional maturity of the organization. A positive achievement in itself, but in our view, a point from which there are further changes that can be made that will not only improve the effectiveness of testing as a discipline, but also the wider SDLC functions, delivering more wide-ranging benefits to the business.

In this part of the Transformation phase, Testing becomes more visible for its positive impact on the overall project delivery lifecycle – including other suppliers, vendors, developers, designers – and can change the business' perception of Testing's remit and IT's Quality Assurance mindset.

³ TPI (Test Process Improvement) NEXT[®]: recognized as an industry standard for the assessment of an organization's testing maturity as well as implementation of process improvements, originally developed by Sogeti.

⁴ LEAN: a production practice, originating in car manufacture that requires that all effort expended has to create value for the end customer, or be eliminated.

Put Shift Left concepts into practice

A key component in generating the transformational benefits from this model is to leverage the concept of Shift Left, which Capgemini and Sogeti have developed into our PointZERO® approach. This is a step-change approach to driving out the defects at the earliest possible stage in the building of a system/application. If a business wants true efficiency in its application development, resulting in a solution that has 'real' rather than 'perceived' quality, PointZERO® is essential. If this is not carried out, in our view, the improvements will always be marginal rather than substantial.

The concept of Shift Left is not new - it's been around for some time - and much has been said of its theoretical benefits, but much less of its tangible results. To dismiss Shift Left as just disruptive and therefore risky would be to overlook its potential, however difficult it may appear to be to put into practice. The imperative to persist is evident: Defects and flaws are being delivered daily into a system's development, and multiple iterations at the testing stage are required to achieve 'perceived quality' and clean testing.

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We have found, working with current MTS and Transformation clients, that the step change to tangible results is to take an integrated approach to executing a range of PointZERO® initiatives. These are planned, measured, managed and interactive, and build on the partnership approach and the buy-in of the organization where changes are being made.

In this way, Test Transformation should really be viewed as delivering a change program within the project delivery function, with ramifications beyond the confines of the Testing function, potentially impacting all testing's touch points in the solution delivery process.

PointZERO® uses a coordinated combination of techniques, such as Model-Based Services for Testing (MBST), Root Cause Analysis (RCA) ⁵, and a Phase containment model, in which no defect is found more than two phases away, to ensure defects are either identified or removed as close to the point of introduction as possible or not introduced in the first place. Coupled with an increased use of accelerators wherever possible, and accelerated automation, where functional automation extends well beyond just regression testing, these techniques can realize savings of between 20 and 45%, when compared to manual execution costs.

In this way testing can add real value rather than being seen as just a corrective discipline and efficiency savings are multiplied for the business. We believe PointZERO® activities are not optional, they are imperative!

Use Business Consulting techniques

Testing is rarely the focus of traditional management consultancy practices, but as part of the Testing Transformation approach – essentially a (step) change program – we have found that the Testing function can really benefit from the analytical focus and use of management frameworks and change management techniques, as indeed they have for other disciplines. By analyzing the difficult issues that impact testing, insight can be gained into the changes that could be made by the organization and service provider working together.

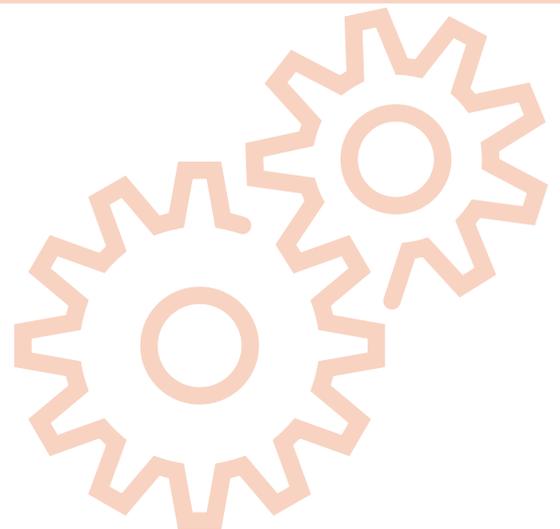
⁵ Root Cause Analysis (RCA): a method of problem solving that aims to identify the root causes of faults or problems that cause operating events.

For example at Capgemini and Sogeti, we use an Accelerated Solution Environment (ASE), which leverages a number of QA and consultancy techniques, in a free-flowing but focused and managed setting. More than a traditional workshop, this facilitated environment brings together key stakeholders from across the IT function and from the lines of business and even Finance.

This encourages lateral thinking and a more collaborative (rather than siloed) approach towards the issues at the heart of the identified challenges – whether business or technology-specific. The context provides the participants with ‘thinking space’ to clearly focus on underlying issues, frameworks for new ways of thinking and acting as well as the supportive context to work through the issues and come up with practical solutions that can be agreed upon then and there.

Testing can provide Best Practice for other functions

Combined, these initiatives help to build-in quality earlier in the application development process, and take industrialization and utility usage to another level. What it also provides is an example for the wider IT function of how best practice and innovative approaches can deliver real measurable results, and how a Quality function can deliver what the business actually needs - improved time-to-market, enhanced quality and greater flexibility.



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Sogeti is a wholly-owned subsidiary of Cap Gemini S.A., providing local professional services, specializing in Application Management, Infrastructure Management and High-Tech Engineering. Sogeti offers cutting-edge solutions around Testing, Business Intelligence, Mobility, Cloud and Security. Sogeti brings together more than 20,000 professionals in 15 countries and is present in over 100 locations.

The Capgemini Group has created one of the largest dedicated testing practices in the world, with over 11,000 test professionals and a further 14,500 application specialists, notably through a common center of excellence with testing specialists developed in India.

Together Capgemini and Sogeti have developed innovative, business-driven quality assurance (QA) and Testing services, combining best-in-breed testing methodologies (TMap® and TPI®) to help organizations achieve their testing and QA goals.

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