Visibility of Value

Testing Within the Organization

By Trevor Atkins **May 5, 2009**

Low Visibility. Reduce Speed. To be safe driving on the road, you must be able to see dangerous situations before they happen and respond to them quickly and effectively. This is called defensive, or strategic, driving.

In "Safe and Responsible Driving" the Ministry of Transportation for the Government of Ontario describes defensive driving as based on three ideas: visibility, space and communication:

- Visibility is about seeing and being seen. You should always be aware of traffic in front, behind and beside you. Keep your eyes constantly moving, scanning the road ahead and to the side and checking your mirrors. The farther ahead you look, the less likely you will be surprised, and you will have time to avoid any hazards.
- Managing the space around your vehicle lets you see and be seen and gives you time and space to avoid a collision. Leave a cushion of space ahead, behind and to both sides. Because the greatest risk of a collision is in front of you, stay well back.
- Communicate with other road users to make sure they see you and know what you are doing. Make eye contact with pedestrians, cyclists and drivers at intersections and signal whenever you want to slow down, stop, turn, or change lanes. If you need to get another person's attention, use your horn.

Anticipating dangerous situations before they happen, avoiding hazards, and mitigating risks share a strong commonality of purpose with the testing activities on a software project. However, does the organization recognize the potential value of the testing group to give the project team and the organization the visibility it needs to act effectively? Perhaps the signals are being sent but not in a form where they are well received or understood? In this case, the testing group needs to improve the visibility of its own value.

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Consider the last time the testing group was involved from the beginning of a project, had an influential voice in the development of the project plan, was able to hire for test planning, and was treated as a strategic competitive differentiator by the company.

Each of the aforementioned items is related to the organization's perceived value of the testing group. Not only must the testing group be concerned with knowing and performing the activities of software testing to a high standard, but it must also understand how it should participate within the larger activities and priorities of the organization, making visible the value the testing group delivers in that regard.

Testing is typically a substantial portion of any software project, but it is still often an afterthought in many organizations where the testing group is an unequal stakeholder with respect to budget, resources and project planning.

> *"Corporate management does not care about quality. This is the cold, hard reality of the software world. Management cares about profits, revenues, earnings, and market share. Software is a profit center that makes money. Quality is a cost center that eats money."* – Jeffery E. Payne, "Quality Meets the CEO"

While it is true that the degree of quality doesn't directly impact market share, the lack of quality, competitively, will certainly have an adverse impact on reputation and revenues.

Investing in testing is expected to help to increase product quality, increase customer satisfaction, and improve the overall organizational profitability. Testing is part of a set of risk mitigation activities where the basic principle is to spend money wisely now in order to avoid greater costs later. Each organization and even each project must find the optimal mix of investment in upfront activities versus potential costs of inefficiency or failures later to minimize the Total Cost of Quality.

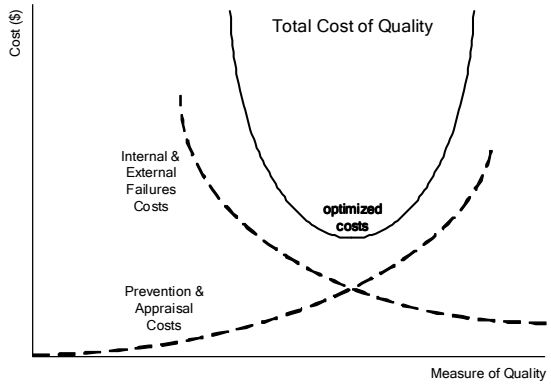

Figure 1: Optimizing the Total Cost of Quality

Perhaps the most important goal for a testing group within any organization is to move from the perception of being a cost center to being an effective and efficient cost-optimization center. This goal can be readily achieved through making visible the impact and value of the risk mitigation efforts of the testing group to the key stakeholders of each project and across the organization for review and improvement.

The Challenges

Compounding the weakened position of being considered only as an afterthought with respect to proper planning, testing typically gets squeezed when the project needs to make up time or budget. Repetition of this cycle with a given product or organization leads quickly to the "lack of quality" scenario; increasing costs from fixing problems after the fact, harming the organization's reputation, and sapping revenues. These are both symptoms of the underlying challenges that make it difficult for the testing group to accomplish its fundamental goals of service to the organization, visibly and successfully.

> *"Managing or leading a testing team is probably one of the most challenging positions in the IT industry. The team is usually understaffed, lacks appropriate tooling, and financing. Deadlines don't move but the testing phase is continually being pressured by product delays."* – David W. Johnson, "Testing & The Role of a Test Lead / Manager"

Traditionally, testing is hampered at the project level by the following two challenges described by Wolfgang Strigel in "Testing – The Neglected Child of our Industry":

- *"Lack of planning is arguably the number one problem leading to insufficient testing. At the beginning of the project, a lot more thought is normally invested in estimating the effort for design and code than into planning a detailed test strategy. This problem gets compounded when design changes are made at some later point in the project. It is quite common that corresponding changes in test effort are not considered."*
- *"A more insidious problem is created by schedule overruns. Most projects work against a fixed deadline for delivery. The deadline may be imposed by a customer, a trade show, or similar. It typically is very difficult to move that end date and in some cases severe financial penalties or opportunity costs are associated with a slip. When design and development activities overrun (and they almost always do), testing gets squeezed between the end date for development and the immovable delivery date."*

Over the last several years there has been marked improvement in regards to the recognition and acceptance of testing as an integral part of any software development process. In fact, testing is becoming big business with IDC reporting that software testing is worth $13 billion worldwide (Worldwide and U.S. Offshore IT Services 2006-2010, 2006).

This acceptance presents an additional challenge at the organizational level in the sense that:

> *"Although executive management has a much clearer vision of the marketing, sales and finance parts of the product release process, most executives still lack an understanding of the challenges of quality and software testing, or they understand the challenges but have little confidence in the proposed solutions."* – Hung Q. Nguyen and Rob Pirozzi, "The Early Evolution of Software Testing"

Without a clear understanding by corporate management in regards to the value of testing, integrated across the software development lifecycle, the testing group can receive misguided priorities and direction, inadequate resourcing and infrastructure, and face unrealistic expectations.

These challenges are exacerbated by there being little or no visibility into the effectiveness, and thereby the efficiency, of testing. For example, it is not uncommon to hear the following generic complaints from development:

- Testing takes too long
- Testing is logging bugs that aren't important
- Testers have overly negative or critical attitudes

Even the testing group itself often has low visibility into its own purpose and value-generation activities where typical complaints could be:

- Product quality is always poor
- We need more time and/or people
- If only testing was the approver of the release

Additionally, testing may often complain that if only quality issues were understood by management to be more important than other concerns, then the product would be better, the customers would be happier, and the testers would be valued more highly.

"Often, quality professionals focus on trying to educate Management about quality. This is the wrong starting point; instead, focus first on tactical successes that impact the short-term bottom line. 'Short-term' means from now until the product ships." – Jeffery E. Payne, "Quality Meets the CEO"

However, it is important for the testing group to recall that software quality is rarely a selling point for the organization, but that the noticeable lack of software quality is frequently a selling point for competitors. Thinking in these terms when considering or communicating the importance of performing certain test activities will aid in evolving the testing group's services to match with what the organization needs to succeed in the marketplace with respect to quality.

Solution Approach

The testing group acts as a service provider of specialized functions within and for the benefit of the overall organization. In general, testing helps produce quality software products and provides information about software quality at any given point in time to aid management in making informed decisions.

If testing is effective, the organization will have greater confidence in the software product's completeness and robustness, development will have a stronger code base and more time for producing new features, and customer references will likely be stronger.

However, how does the organization, or even the testing group itself, know if the testing efforts are effective from a business impact point of view?

> *"There is an inherent good in producing quality," says Massachusetts Institute of Technology's Larry Meador. "But, the kind of culture that likes to focus on quality as 'a good thing to do' tends not to communicate how that 'goodness' translates to business outcomes."* – Larry Meador, "Getting to Yes: A Few Lessons Learned"

"If there are no formal testing practices in place, there is a substantial potential for releasing defects that can expose a company to rework, poor customer satisfaction, and possible legal action." – Forrester Research, Inc., "Quality Assurance Versus Quality Control"

The testing group needs to be able to address the following questions:

- How good are we at finding the issues in a timely manner?
- How do we know we are testing the right things at the right time?

- How do we determine the effort, the number of resources, skills, tools, and infrastructure needed?
- How do we quantify the return on investment (ROI) of the testing group's activities?
- How is the value of testing being made visible to the appropriate people?

Looking at testing as a business within a business can help the testing group greatly in becoming a more successful and influential participant in the overall organization. Specifically, the testing group must determine: who are their customers, what their customers' needs are, how those needs are being met by the testing group's activities, and how are the customers being informed of these activities and their benefits.

Know Your Customers

Knowing your customers is key to answering the questions of what do they like or dislike with respect to your products or services, how you deliver them, and how you can improve.

In the case of testing, determining who receives benefits from the services provided by the testing group is critical. To help identify the stakeholders, first make a list of people or groups who might have an interest in directly participating in, reviewing, or providing input for the strategy or effort of testing the system. Then add those who are affected directly or indirectly by the testing activities or quality of the system. Finally, add those that may directly or indirectly have a decision-making impact on the development, testing, or deployment of the system.

! Responsibility charting using the RACI format can help to quickly identify key activities or deliverables, clarify individual / team roles and responsibilities, identify accountabilities, reduce duplication of effort, and eliminate miscommunication.

RACI stands for:
"R" – Responsible (the doer)
"A" – Accountable (the approver)
"C" – Consulted (get input from)
"I" – Informed (keep up-to-date)

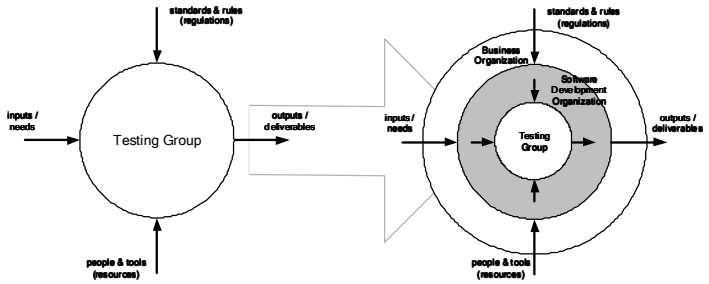

Figure 2: Testing is Part of a Larger Whole

For each stakeholder identified it is important to understand:

- What are the needs of their role?
- What are their motivations or goals for the given product release?
- How will they participate in or support the testing effort for that release?
- How can testing or information about quality support them?

In general, the stakeholders will fall into four classes with one or more stakeholders in each:

- Business Organization (strategic planning, budget setting, corporate management)
- Management (project management, departmental management, resource management)
- Technical "Peers" (developers, architecture, business analysts, support),
- The Testing Group

Regularly Refine Agreement

Project constraints and scope volatility pose constant challenges to testing in terms of resource and coverage requirements. How can the testing group get their job done "right" if there are these continual challenges for time, people, information (requirements), etc.? The rest of the project team has the same challenge, but testing carries the weight of quality – or does it?

Statements such as "completely test the system" and "find all the bugs" or even "find all the important bugs" imply an enormity of effort that just isn't reasonable for the typical software project. It is more reasonable to perform a sufficient level of testing to achieve balance in terms of risk tolerance between the quality requirements, the scope, and the constraints for a given product release.

Figure 3: Balancing Variables and Constraints with Risk

In order to make sure that the limited time and budget are utilized as effectively as possible, it is critical to negotiate and agree to the scope and success criteria of the test effort with all the appropriate stakeholders.

For example, if it is realized that "quality can't be tested into the product", then there is the much greater potential for agreeing that it is the testing group's responsibility to report on the quality or, more specifically, the lack of quality of the product.

To start refining this agreement, the testing group can describe its purpose and goals by way of a mission statement, such as perhaps:

> *"To report to the organization and the project team, in a timely manner, all such defects and issues encountered through our efforts that are felt, by the reporter, to be compromising to the quality of the intended product functionality or user experience."*

In the mission statement example given above, the scope of responsibility and value-add is already being shaped and constrained at a high level. These expectations can be easily reviewed and modified if the mission statement does not meet the goals of the organization in terms of the needs of the stakeholders.

A next level of definition can be provided in describing the scope of testing generally expected to be undertaken in the context of each product-line, release type, development methodology, or other large classification of the work being performed by the organization.

At this level, it is important to make sure that the capability of the testing group is equal to or greater than that of the scope defined for each case, or that a defined amount of investment will be made to achieve the required capability.

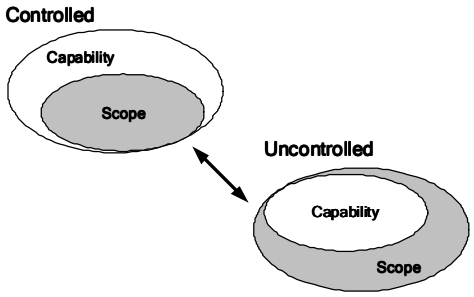

Figure 4: Containing Scope within Capability

Practically, the stakeholders will give agreement as to what the scope of testing will be for a given product release in terms of:

- What is critical or strategic?
- What is risky or complex?
- What is time consuming or quick to do?
- What are the must-haves versus the nice-to-haves?

This information and the resulting approach to the testing effort can then be captured within a test strategy document along with other important contextual information regarding milestones/schedule, resources/budget, quality requirements/goals, priorities of functional areas, and non-functional attributes to evaluate for each specific product release.

! A test strategy provides the central plan on how testing will be approached on a given project, providing a tailored description in the context of a given project's constraints of the scope of effort and test methodology to be used.

Of course, the scope of the testing effort and the priorities within that scope are expected to change as the project moves through its various phases. The important thing is to ensure that the project team, the testing group, and the organization as a whole clearly understands and agrees to what will be included in the test effort and what will not be included at each point. Gaining and maintaining this agreement between the stakeholders for the duration of the project will enable the testing group to appropriately prioritize and manage its efforts so as to successfully test the right things at the right time within the project constraints.

Multicast Your Message

Testing can collect and produce a large amount of data that gives a variety of insights into the health of the project and the quality of the product under test. This data can be used by each stakeholder to refine and improve their respective strategies, processes, schedule/milestones, and resource allocations. However, quality is inherently difficult to evaluate and tracking one-dimensional metrics such as test coverage, how many test cases have been executed a day, or how many defects are still open won't, by themselves, provide a strong correlation to the degree of quality of the product.

The biggest challenge in establishing a set of useful metrics is not the formulas, statistics, and complex analysis that are often associated with metrics. Rather, the difficulty lies in determining which metrics provide valuable information to the project and/or organization, and which procedures are most efficient for collecting and applying these metrics.

To help in selecting these metrics, first decide what types of decisions you want to support (e.g.: Is the product ready for release?). Then, for each stakeholder determine what data or metrics you need to collect to qualify and quantify the answers, in order to make sure the right information is getting to the right people.

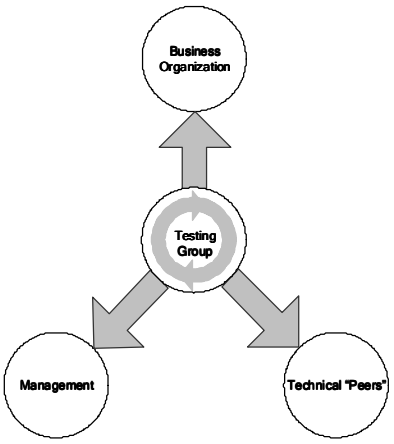

Figure 5: Targeted Communications to Stakeholders

With this approach you will be able to report on progress and quality in terms of meeting milestones, estimates versus actuals, and being able to support specific quality-related decision-making.

! Classify the impacts, costs, and improvement benefits into the four categories of the Total Cost of Quality:
*** Prevention** - Costs of activities that are specifically designed to prevent poor quality including coding errors, design errors, mistakes in the user manuals, as well as badly documented or unmaintainable code.
*** Appraisal** - Costs of activities designed to find quality problems, such as code inspections and any type of testing.
*** Internal Failure** - Failure costs that arise before your company supplies its product to the customer. E.g.: a bug blocks someone in your company from doing their job,
*** External Failure** - Failure costs that arise after your company supplies the product to the customer, such as customer service costs, or the cost of patching a released product and distributing the patch.
- Adapted from "Quality Cost Analysis: Benefits and Risks" by Cem Kaner

Conclusion

Testing is a strategic component of any software development process, but typically faces serious challenges both within the project and at the organizational level. To help take control of these challenges, the testing group can implement certain improvements around data collection and communication that allow a visible quantification of the value generated by the test efforts and a subsequent increase in understanding among the stakeholders.

Some tangible suggestions that would embody the ideas discussed above include:

- Including stakeholders in the agreement of quality requirements and scope of the test effort for given product release via a test strategy
- Creation of a communication plan to identify who needs what information/metrics when, how it will be given to them, and by whom
- Implementation of a quality dashboard that allows roll-up and drill-down on project and organizational quality information depending on the viewing stakeholders' needs

Increasing the visibility into the quality and readiness of the product under test is necessary to enable effective decision-making. Likewise, providing greater visibility around the value created by the testing group to corporate management is required to enable the review and improvement of this strategic element of the business organization.

When it comes to the bottom line, making more money while spending less is the continual goal in business. An effective and efficient testing group will no doubt increase revenue and decrease costs, but can they prove it? In the attempt to do so, you may even discover that, business-wise, quality can be free after all.

About the Author

Trevor Atkins is Principal Consultant with Silverpath Technologies (www.silverpath.com). Most recently he was a Regional Director of Quality Services with UST Global and before that he was a founder and the Vice-President Operations of QA Labs, the largest independent software testing company in Canada.

After obtaining a degree of Applied Science in Electrical Engineering from the University of British Columbia, Trevor has been involved in all aspects of hundreds of successful software projects for the last 12+ years, and is dedicated to the design and improvement of quality processes for use across projects and organizations.

About Silverpath Technologies Inc.

Silverpath Technologies provides results-centric testing, consulting and training services, where the focus of each engagement is driven by the emphasis on improving the effectiveness and efficiency of the customer's quality and testing activities across the software development lifecycle. Visit http://www.silverpath.com for more information.