The Future of Software Testing

Over the next five years

Version 1.00

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White Paper – Future of S/W Testing

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White Paper – Future of S/W Testing

1   Document Information

1.1   Authorisation

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Security Innovation Library	Wilmington, MA	1.0	3

1.5   Document History

Date	Version	Author	Description
30/5/06	0.01	Stewart Noakes	First Draft – basic framework
01/06/06	0.02	Stewart Noakes	Addition of key stats from StarEAST 2006 presentation.
20/06/06	0.03	Ed Adams	Additional of key stats re. security and other Ed-isms

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Date	Version	Author	Description
21/06/06	0.04	Stewart Noakes	Review and polish to all sections before submission for peer review.
03/07/06	1.00	Stewart Noakes	Move to issue subsequent to approval from SI and TCL marketing managers.

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2   Introduction

We live in a fast changing industry that is experiencing global influence and trends as it starts to grow up from being a toddler to a teenager in terms of its maturity. There are many exciting developments on the horizon in terms of techniques, methodologies, economics and academia but how can any of us predict what they will be?

Transition Consulting Limited (TCL) and Security Innovation (SI) see a great deal of testing environments, specialists and projects around the globe and have teamed up to pool this knowledge and speculate about what the next 5 years might mean to our industry and our community.

2.1 Purpose

The purpose of this white paper is to provide the audience with an insight into the strategic value that testing might bring over the next five years.

It has a target audience of senior business managers and testing professionals.

2.2 Scope

The scope of this document is limited to:

- The opinions and speculation of Transition Consulting Limited and Security Innovation on the development of software testing over the next 5 years.

The document does not intend to explain in any detail the existing TCL or SI solutions, but further information can be obtained from our websites (www.TransitionConsulting.co.uk, www.SecurityInnovation.com) or by contacting Steven Field (Steve.Field@TransitionConsulting.co.uk).

2.3 Terminology

Terminology	Definition
ROI	Return on Investment
SDLC	Software Development Lifecycle
SI	Security Innovation Incorporated – www.SecurityInnovation.com
SMaRT	The TCL test methodology. Acronym stands for: Structured, Managed and Realistic Testing.
TCL	Transition Consulting Limited – www.TransitionConsulting.co.uk

2.4 References

Reference	Name	Author	Version	Location/Filename

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Reference	Name	Author	Version	Location/Filename
1.	Will benefits based testing help achieve early ROI?	Barry Weston	N/A	TCL Library, Exeter
2.	SMaRT – TCL Test Management Methodology	TCL	Baseline 4	TCL Library, Exeter
3.	Strategic Value of Testing	Barry Weston	1.00	Strategic Value of Testing V1.00 SDN 110406

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3   What is the future of software testing?

3.1   Where are we now

Software Testing is in a very exciting period of change at the moment. After more than 30 years of evolution the testing area of the development lifecycle is starting be appreciated on a much wider scale for its value and is being seen as a professional career in its own right.

At the Florida Institute of Technology (FIT) there are Masters courses in software testing and progressive universities are starting to use industry developed text books as required reading in their computer science (or equivalent) courses. But running counter to this trend is the fact that enrolment in Computer Science as a major has declined from 3.7% in the US to only 1.1%. This is largely because of outsourcing to other countries, a trend that is not a problem in itself, as long as companies retain in house qualified testing and assessment capabilities when development is outsourced.

We see certification courses and development programmes established in many countries and we see skills such as time management, team development, line management and communication all being part of the effective testers repertoire.

We still see many familiar problems repeatedly causing issues at organisations. In a great many environments there is:

- Late lifecycle testing – finding the majority of bugs late in the day

- Circa 80% of all testing still being manually performed

- Poor quality requirements being utilised to drive a project, and thus the testing.

From academic studies and reports at conferences such as StarEAST we also know that:

- A recent study has highlighted that only circa 40% of a typical software product is utilised by its users

- Multiple studies have shown that around 65% of defects in a software project can be directly linked back to discrepancies, ambiguities and errors in the requirements.

But in software testing we have not been able to find solutions for the business and development environments within which we work. Other engineering disciplines solved these types of problem long ago. Most have a rigid process for specifying, building, and testing designs and applications, for example a seasoned electrical engineer might approach software as follows:

1. Meticulously define the requirement of the application, including problem to be solved and detailed functionality and security constraints
2. Model the application and create a descriptive design of the intended product
3. Test the design. This is where you make sure there are no functional, safety or security flaws before you start construction.
4. Analyze test results and make any needed design changes. Note: you are changing the _design_ here and haven't yet started construction. This also means that you need to have defined test cases in advance of actual construction (i.e., before you write any code).

5. Feed the improved design back into the test workflow and assess the new design.

6. Repeat this process on the model until it passes the requirements – both functional and safety/security.

7. Start building the design (in software terms, start writing the code!)

Only after they had tested the model and verified that the design was architecturally sound and safe would engineers from other disciplines start building the prototype, or the Beta, to follow the analogy into the software world.

Within our community we also see that a classic struggle between a process based view of software testing and the more agile/exploratory approach. Both have their place, but the extremes of each approach are only viable within certain environments.

3.2 What next

The next big sea change to hit software testing will be the unrelenting need to build quality in from the start. Not just to develop code with less defects in, but code that aligns with business need and engineering necessity from the beginning.

A push back into the requirements efficacy and the very business case for the new product will lead the way. Questions such as 'what is it for' and 'what tangible value will that requirement bring' will be at the heart of the changes. From this position testing will help to refine and hone the very project and product lifecycle, creating a need for only code that has direct purpose and value.

Approaches such as benefits based testing will bring about a skew from the purely engineering approaches, past the blended approach of a Risk Based view to an extreme position where development is solely driven by the business benefits it is expected to achieve.

Staged approaches whereby partial platforms might be laced together to deliver tangible business benefit, which then delivers funding for the next stages and then the total business solution will be common place –but at this time may seem quite counter intuitive from an engineering perspective.

Threat modelling also has the potential to have a massive impact on testing throughout the SDLC. Many organizations incorporate it today as part of their risk management/assessment profile and it will continue to become a standard practice early in the SDLC, with the aid of business analysts or product managers allowing companies to get a full picture of their software problems.

Threat models provide a fast view to the biggest threats, but even more valuably, they can be re-used as new defects become known. Pump a new bug into the model, and you can instantly determine if there is a risk for your specific context, or block to certain quality gates in your application. Validations and checks against the threat model can be peppered throughout the SDLC, becoming a process much like requirements are today. To develop software that really works, threat models will need to be tightly coupled to the SDLC – not just bolted on to an existing test process.

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From here we will start to see software testing creating value (not just adding it) through appropriate shaping to the project. Testing will be a sound challenge to the business case and requirements as well as the developed code.

3.3 Over the next five years

Within the next five years we perceive that we will see global unified standards take over the training and measurement of software testing proficiency. As the profession develops we will see institutional alignment at University and College level and the unification of assessment board and interest groups across the world to foster a global sharing of information. This will reduce the current geographical and efficiency barriers between development onshore, offshore and nearshore.

The cost of software testing will significantly reduce, because the defects will be found earlier in the lifecycle and require less overall effort to identify and resolve. There will also be a high premium on experienced testers who can see the wider picture, relate closely to development and who can deliver significant value in highly specialist skill areas such as automation, performance testing and Security Testing.

New security requirements and strategic test planning will require a new set of test knowledge and need to be dedicated to activities throughout the SDLC to be effective. There will still be plenty of "legacy code" (i.e., anything 5+ years old) that needs to be validated and tested; fortunately, a lot of that can be automated with proper education and tool usage. But the role of Specialist for test security or strategy will require a keenly focussed mind and the dedication of an individual who thinks like an attacker or hacker and perpetually tries to compromise the application and plan for test cases well in advance of execution.

Through the economics of these changes we will also see the development of 5 or 6 huge development organisations which will be served by probably the same number of huge testing practices. These will be part of larger, independent consultancies which cover a range of business solutions and see software testing as significant a value add as business transformation or programme management.

We will then see the full drive to build in value from the very start of each product development, and the inclusion of process integration, six sigma and regulatory compliance requirements will ensure the necessity of this approach.

Within five years we expect to see software testing being aligned closer to that of an architect view, looking to create alignment, quantification and explicit value add at every stage of the Software Development Lifecycle. Software testing will no longer remain focussed on simply the developed code, but will have extended to be a joined up, full lifecycle exercise.

Additional technical advances in the testing discipline will yield more exercise of error-handling code (often missed in today's testing) through the use of fault simulation and file or input corruption. With the advent of new distributed application development models and technologies, e.g., SOA, web services, AJAX, interoperability and boundary-condition testing will become even more important, as the line between your code and leveraged code is greyed.

The watchwords of the next five years will be:

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- Efficiency

- Value creation

- Quality built in from the start.

4 About Transition Consulting Limited (TCL)

Transition Consulting Limited (TCL) is a specialist consultancy in software testing. As a consultancy, our core purpose is to Deliver World Class Solutions in Software Testing that are Innovative, Structured and Professional – we are geared to deliver in all areas of software testing, from Unit Testing to Performance Testing, and everything in between.

Our competencies are best displayed in shaping test activities to the benefit of our clients, and assuring that the products are successfully implemented - not just tested. Our experience, and delivery process, has been repeatedly proven and reinforced in many challenging environments.

We provide strategic consultancy to organisations looking to establish mature practice and to measure the effectiveness of the testing approaches they are using. Through the provision of training services we are also able to share the knowledge and experience we have gained and provide support in the implementation of these concepts at our clients. Our training solutions include:

- All aspects of testing and test management
- ISEB Qualification courses
- Bespoke courses constructed to meet our clients' specific needs
- Coaching and mentoring
- Security Testing
- Automated and performance testing.

Through a network of specialist partners we are able to provide a comprehensive testing solution for clients of any size.

4.1 Contact for Further information

Further information on TCL can be found at our website (www.TransitionConsulting.co.uk) or by contacting Steven Field (Steve.Field@TransitionConsulting.co.uk).

5   About Security Innovation

Security Innovation, Inc. is the authority on application security and leading independent provider of assessment and training services.

Companies including Adobe, Cisco, Fidelity, Harris Corporation, IBM, ING, HP, Microsoft, VISA, SAP, Symantec, VeriSign and a number of government agencies rely on Security Innovation's expertise in application security testing and training to develop, evaluate and deploy more secure applications.

More than 60 percent of the Company's staff holds advanced degrees in computer science with 30 percent at the Ph.D. level. The Company is headquartered in Wilmington, Mass., with offices in Amsterdam, The Netherlands; Seattle, Wash.; and Melbourne, Fla.

5.1   Contact for Further Information

For more information about Security Innovation, visit www.securityinnovation.com or call +31 (0) 20 799 7611

More information on Security Innovation can be found at www.SecurityInnovation.com.

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