国外优秀信息科学与技术系列教学用书

测试过程改进

——结构化测试循序渐进实用指南

（影印版）

TEST PROCESS IMPROVEMENT

A Practical Step-by-Step Guide To Structured Testing

■ Tim Koomen
Martin Pol

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出 版 说 明

20 世纪末，以计算机和通信技术为代表的信息科学和技术对世界经济、科技、军事、教育和文化等产生了深刻影响。信息科学技术的迅速普及和应用，带动了世界范围信息产业的蓬勃发展，为许多国家带来了丰厚的回报。

进入 21 世纪，尤其随着我国加入 WTO，信息产业的国际竞争将更加激烈。我国信息产业虽然在 20 世纪末取得了迅猛发展，但与发达国家相比，甚至与印度、爱尔兰等国家相比，还有很大差距。国家信息化的发展速度和信息产业的国际竞争能力，最终都将取决于信息科学技术人才的质量和数量。引进国外信息科学和技术优秀教材，在有条件的学校推动开展英语授课或双语教学，是教育部为加快培养大批高质量的信息技术人才采取的一项重要举措。

为此，教育部要求由高等教育出版社首先开展信息科学和技术教材的引进试点工作。同时提出了两点要求，一是要高水平，二是要低价格。在高等教育出版社和信息科学技术引进教材专家组的努力下，经过比较短的时间，第一批由教育部高等教育司推荐的 20 多种引进教材已经陆续出版。这套教材出版后受到了广泛的好评，其中有不少是世界信息科学技术领域著名专家、教授的经典之作和反映信息科学技术最新进展的优秀作品，代表了目前世界信息科学技术教育的一流水平，而且价格也是最优惠的，与国内同类自编教材相当。这套教材基本覆盖了计算机科学与技术专业的课程体系，体现了权威性、系统性、先进性和经济性等特点。

目前，教育部正在全国 35 所高校推动示范性软件学院的建设，这也是加快培养信息科学技术人才的重要举措之一。为配合软件学院的教学工作，结合各软件学院的教学计划和课程设置，高等教育出版社近期聘请有关专家和软件学院的教师遴选推荐了一批相应的原版教学用书，正陆续组织出版，以方便各软件学院开展双语教学。

我们希望这些教学用书的引进出版，对于提高我国高等学校信息科学技术的教学水平，缩小与国际先进水平的差距，加快培养一大批具有国际竞争力的高质量信息技术人才，起到积极的推动作用。同时我们也欢迎广大教师和专家们对我们的教材引进工作提出宝贵的意见和建议。联系方式：hep.cs@263.net。

高等教育出版社

二〇〇二年九月

Foreword

by Henk W. Broeders, CAP Gemini NV

Those readers who have been working in IT for a long period of time will remember the days when testing was the task of the most junior person on the team. Since then, testing has come a long way – to the point where it is recognized now as a real profession. Testing indeed has developed into a specialization, and not because the most junior person on the team gained seniority. With the growing complexity of IT systems, the need for more thorough testing became evident. The overall goal of testing became not just to identify errors in a single program, but to validate the correct functioning of a large number of integrated IT components.

This wider challenge could no longer be faced with the techniques the junior programmer had available, and more sophisticated testing techniques and approaches developed over the years. Sogeti's method TMap is an excellent example of these.

Now we are at a third stage. The importance of IT has grown dramatically: IT is no longer just a tool for efficiency improvement, but has become the key to new markets and improved competitiveness. It will add more and more to the effectiveness of organizations.

Organizations all over the world are searching for the best IT solutions in their marketplace. And very often they find the answer in complex sets of packaged applications. Packages that are supplemented with unique bespoke software are the core of competitive advantage creation for many organizations. It is my conviction that these sets of applications will come from various sources – that multiple vendors will provide a blend of tailor made software and existing packages to the corporate consumer. The complexity of software integration will grow very rapidly, and as the need for robustness of these systems will not diminish, testing will become more important. And its importance will continue to grow.

The practice-based Test Process Improvement model will prove to be the key to robustness and to the use of the complex systems that are needed to deal with the changed role of IT in business.

In other words, if competitiveness is an issue in your market, IT will be vital, and this book will help you to deal with the problems it will bring along.

Henk W. Broeders
Member of the Executive Board of CAP Gemini NV
President of Fenit – the Federation of Dutch IT companies
Utrecht, January 1999

Foreword

by Dr Hans Voorthuyzen, Baan Company

Once upon a time, in an earlier era of software engineering, it was possible that after a long period of designing and coding, a short, ad-hoc test would be organized to assess and validate a final product, just prior to its launch to the market.

Today, more and more people are involved professionally in the fascinating field of testing. New IT products flood the marketplace at an unexpectedly high and still increasing frequency, and as a consequence, no modern software engineering organization with any degree of self-esteem can continue to follow the mythical approach of ad-hoc and unprepared testing.

What is more, the intelligence and complexity of new software products is booming. So creating a professional testing regime, which is fully embedded in the product development cycle and synchronized with all related processes, has become a must. This may seem obvious to the reader, but many organizations are still working on the basics of testing. Is it not remarkable that this year only the sixth European conference on software testing, EuroSTAR, will be organized, while Software Engineering Conferences have a much longer and older tradition?

Learning from one another is a self-evident characteristic of the young discipline of software testing. Unfortunately, most of the knowledge and experience is not, however, available explicitly. For that reason it was a pleasure to learn several months ago that the research and development department of Software Control Testen (a specialized testing department of Sogeti Informatica B.V.) was working on a new initiative, TPI: Test Process Improvement.

I am very proud to be able to say that before TPI was launched officially and presented to the press, Baan Development was allowed to run a pilot. I am also glad to state here that TPI has been 'tested' by our Product Testing

Group on locations in India, USA and the Netherlands, and that we could give TPI the green light.

The application of TPI in our 100-plus sized department enables us to raise our global testing organization to the next professional level. I am absolutely convinced that everybody using TPI in a similar way will experience the same added value.

Finally, I congratulate Sogeti with the presentation of TPI.

Dr Hans Voorthuyzen
Global Manager Product Testing Group
Baan Development, Baan Company
Barneveld, August 1998

Foreword

by Stephen K. Allott, Imago^{QA} Limited

Many companies recognize the need to improve the quality of their testing effort. Reduced development timeframes and increasing application complexity have highlighted poor quality testing in many organizations. Test and QA departments are being stretched as never before. Improving time to market due to competitive pressures has never been more important but the customer, quite rightly, still expects a high quality product.

Often the first thing that companies do to solve the problem is to buy an automated testing tool. Why not? – after all, that's what I did, twice, and it didn't help as much as I had expected.

When I was responsible for performance and stress testing for a major UK Bank some years ago we tried to introduce the latest automated testing tools. Trying to develop a new test process for the QA and testing department to help them use the new tools proved more difficult than I imagined, but I did not know why at the time. Implementation of the tool was only partially successful.

More recently, as a test manager for a small yet growing software house, I again tried to introduce improvements to the test process. This time I focused on test planning and test techniques. However, I still believed that test automation was the way forward, especially with the ever increasing number of databases and operating systems in use by the customers of the products. Developing a new test process and trying to introduce test automation proved time consuming and difficult, and again I could not understand the reason.

Finally, at a testing conference in 1997, I was introduced to TPI and suddenly the penny dropped. As soon as I got back to the office I quickly answered all of the questions in the TPI model. This was quite a revelation. When I joined the company, a year earlier, the key areas of Test tools and

Key area	Scale 0	1	2	3	4	5	6	7	8	9	10	11	12	13
Test strategy		A					B				C		D	
Life-cycle model		A			B									
Moment of involvement			A				B				C		D	
Estimating and planning				A							B			
Test specification techniques		A		B										
Static test techniques					A		B							
Metrics						A			B			C		D
Test tools					A			B			C			
Test environment				A				B						C
Office environment				A										
Commitment and motivation		A				B						C		
Test functions and training				A			B				C			
Scope of methodology					A						B			C
Communication			A		B							C		
Reporting		A			B		C					D		
Defect management		A				B		C						
Testware management			A			B				C				D
Test process management		A		B								C		
Evaluation							A			B				
Low-level testing					A		B		C					

Moment of involvement were well established (both at level A on the TPI matrix), as was Reporting and Defect management. But none of the other key areas had been given any attention. By the end of 1997 we had the situation shown in the above table.

I began to understand that a test manager has to give attention to several of the key areas at once. Following this analysis carried out with the help of the TPI model, we focused our next attention on:

- **Test environment** We built a test lab with several servers, PCs, modems etc.;
- **Communication** We held regular weekly meetings involving both testers and developers;
- **Metrics** We maintained and published weekly numbers of bugs, outstanding time to fix and so on.

Another useful aspect of the TPI method is its visual impact on senior management. You can prepare a simple, one-page chart every 3 months, say,

with the key areas highlighted. They can easily see your progress throughout the year on how you are improving your test process. And when asked why you need more office space for example, or why you need to buy a testware management tool, you can drill down into the detailed questions and explain the reasons with increased confidence.

I recommend that you try the ideas suggested in this book. Try not to get bogged down by interpreting the questions too literally. If you need to add a question, or reword one to fit your particular environment, then by all means do so but please feed back your experiences to the authors. And do not try to tell your management that you are at a particular level; simply show them the diagram and explain where you are with each of your key areas. Please use the TPI method to improve your test process. And when you're successful, why not present a paper at a testing conference and share your success with the testing community?

Stephen K. Allott BSc(Hons) MBCS
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Chelmsford, January 1999

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It goes without saying that the development of the TPI model and this book would not have been possible without the input of a large number of co-workers. In view of the importance we attach to this input, we would like to thank the following people:

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Contents

CHAPTER ONE

Introduction

Testing is a must! Testing is a necessary prerequisite for successfully building and implementing information technology (IT) systems. But often testing is regarded as a necessary evil: it is looked upon as a difficult and uncontrollable process, which takes too much time and money and will usually not result in an IT system that can be implemented without any problems.

Unfortunately, in many cases this opinion is justified. Although testing accounts for between 25 and 50% of the total project budget, in only a few organizations does management spend the appropriate amount of time needed to manage such a large sub-process in the correct manner.

Structuring the test process can solve many of the problems related to testing. Structured testing means that a (documented) set of activities, procedures, and techniques is used, covering all aspects of the test process. In practice, however, it seems to be difficult to determine which steps have to be taken in which order to improve this process.

1.1 The TPI model

For controlled and gradual improvement of testing, we have defined a Test Process Improvement (TPI) model, based on the knowledge and experience of the company Sogeti . The TPI model offers a frame of reference for determining the strong and weak points of an organization's current test process. Also, the model supports the setting up of specific and realistic proposals for the improvement of this test process in terms of lead time, costs, and quality. The model is based on the structured test approach TMap (Pol *et al.*, 1995) but can be used in almost any test process.