

The Test Engineering Development Programme

Developing Professional Lead Test Engineers Into Test Architects/Consultants

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Prepared by:	TSG Training, 150, Minorities London EC3N 1LS
Tel:	020 7264 2185
Author:	Bernard Melson
Email:	b.melson@tsg-training.co.uk
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1 Executive Summary

This document sets out a vision for developing professional Lead Test Engineers into Test Architect and Consultants through a targeted learning and development programme. People passing through the programme will increase their own skills and competencies in multiple disciplines and, importantly, organisational capability to help deliver systems solutions that underpin day to day business operations.

The programme has been developed in concert with (and rolled out to) a major systems integration company that was prepared to invest significantly in training to increase capability and extend its value proposition to new and existing clients alike.

The days of people having a single skill have long gone, so this cogent learning and development programme is based upon achieving multi-skilled competencies for people and organisations in order to maximise staff utilisation and reduce operational costs and staff attrition rates.

The programme comprises five learning and development streams, each of which seeks to imbue people with multi-layered competencies that are relevant to their experience and which provide extended capability within organisational teams – regardless of the development method they employ. The first stream defines a programme for apprentices and people new to testing, with the remaining four streams providing learning matched to career growth and the needs of a modern Test Practice. Each course within a stream has been mapped to SFIA, industry-accepted core principles, competencies and role types, as follows:

1. **Test Architects and Consultants** who will be setting out the stall for major test programmes and influencing decision makers and stakeholders.

This stream will imbue staff with the skills they need to manage and ensure the right approach to:

- Develop test architectures for major programmes
- Act as a consultant to both programmes and business sponsors
- Act in the capacity of Product Owner for major programmes
- Assess and mature test process, measurably and demonstrably
- Influence corporate strategy.

We recommend that the programme of learning be scheduled to run for around 2 years in order to allow students time to use their learning through classroom and on the job training to give them solid learning opportunities as the progress toward graduation. Within the stream is:

- Further details are available on request.
- The following pages contain the training and support details for developing 'Professional Lead Test Engineers' into 'Professional Test Architects and Consultants' who are competent to develop architecture for major programmes and the business case to support it
- A targeted learning & development programme that provides the necessary foundation for each person to take as part of building their general test capability and career growth;
- A series of optional developmental paths and routes to allow a Test Practice to fulfil its specialist technical needs by developing staff with cross-functional competencies.

For reference only, beyond the stream of learning defined here, there is a further 2-year development stream to help test Architects and Consultant to progress through to Test Expert.

2 Principles and Competencies of the Programme

Following our experience of learning and development programmes and research into what companies require of testing in the future, we have defined a series of ‘Principles and Competencies’ that fit the gamut and need of corporate skills required to deliver first-class systems that help underpin business operations, ranging from raw intake through to experienced Lead Engineers, Architects, and Experts as follows:

Principles	Test Architect and Consultant
Engineering at the heart of designing IT solutions	Accountable for strategies to allow for demonstrable and measurable, implementation of structured design techniques across the NBS IT estate
Execution excellence through engineering	Responsible for the Implementation of Right Testing Approaches utilising automation first approaches using industry best practices Set Test Engineering principles & patterns
Velocity - Pinpoint accuracy at speed, enabled by technology	Is able to present to all levels the benefits, both tangible & non-tangible, best practice methods and the benefits of using them, agnostic to toolset. As well as experience of leading teams, in implementing these best practices
Culture, Collaboration and lifecycle continual improvement	Works across the organisation to influence strategy for engineering to challenge and inform approach for testable solutions and educating best practices in Testing and Quality

Figure 1 – Test Architect and Consultant Principles

3 The 5-Stream Programme

The professional Test Engineer career development programme contains five key streams, with each being rigorously designed and tested to reflect the principles and competencies that are key to success and growing capability within a Test Practice. Each stream interfaces seamlessly to the next to provide continuous investment in people and career growth:

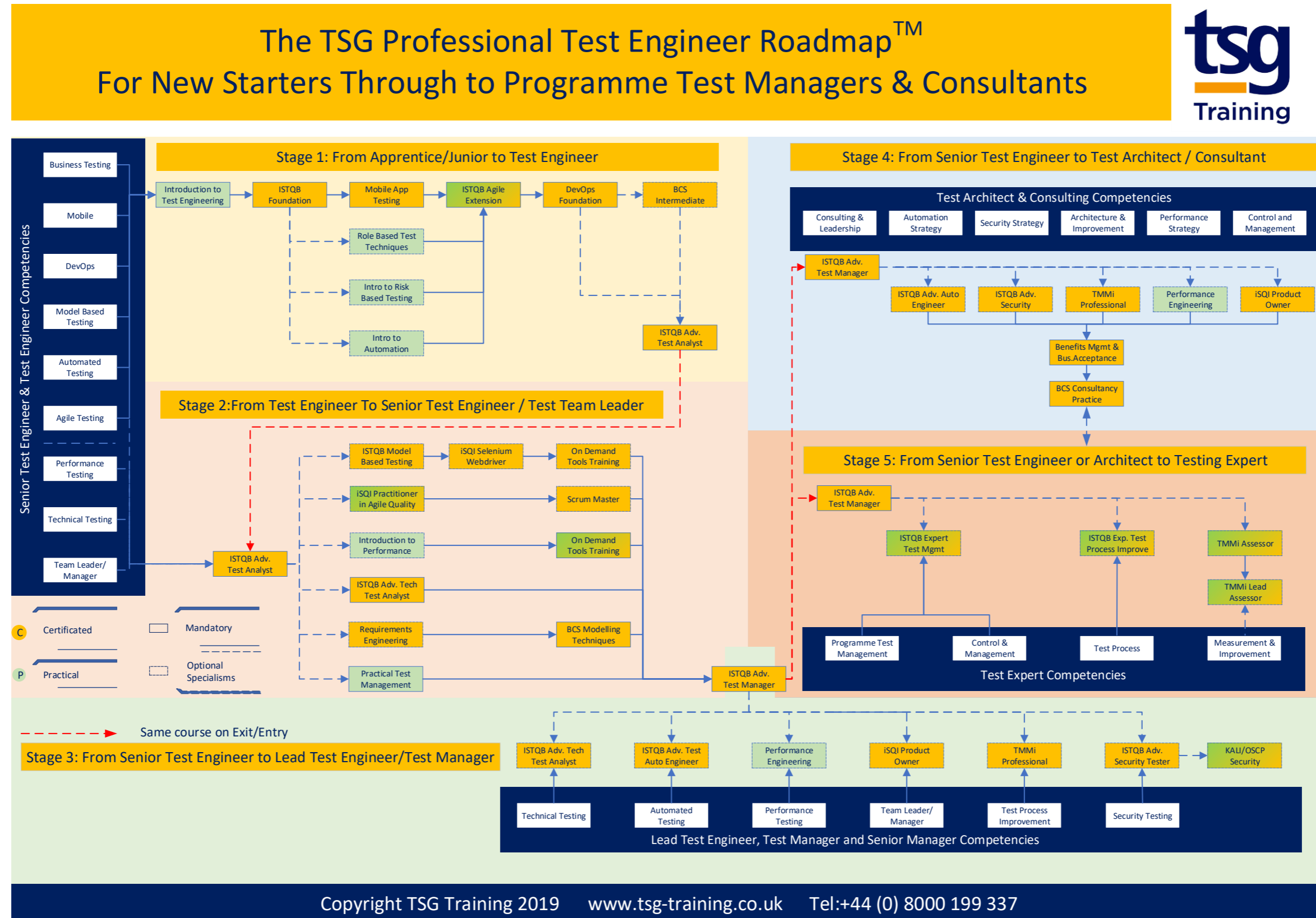


Figure 2 - The Long-Term Software Test Engineer Career Development Programme

3.1 The Five Key Streams

At the broadest level, each stream is designed to reflect modern test engineering principles, coupled with competencies that meet the needs of a Test Practice using varying development models, supported by capability from competent, multi-skilled individuals.

1. **The Test Engineer** for apprentices and entry level staff embarking on a career in software testing, and for experienced staff from other disciplines who may be transferring in.
2. **The Senior Test Engineer** with at least two years' experience, who is ready to step up to using more advanced techniques, choosing to specialise or move to the early stages of team leadership.
3. **The Lead Test Engineer** with at least four years' experience, already specialising and needing to be ready for the demands of test management or increasingly complex technical roles.
4. **The Test Architect** with at least five years' experience, ready to make the jump to the business-critical role of defining and building test architectures for major programmes.
5. **The Test Expert** who has at least 10-years' experience of leading major programme delivery and organisational change and benefit.

3.2 The Test Architect and Consultant

The Test and Architect stream is designed for people with at least eight-years' software testing on projects and who have expressed a desire to make it their next career goal of test manager or technical specialist and move up the ladder of seniority within a Test Practice.

Students graduating Stream 4, 'The Lead Test Engineer Stream', are expected to join this stream at the beginning, whereas others with relevant experience can join at any point.

3.2.1 The Test Architect and Consultant Roadmap

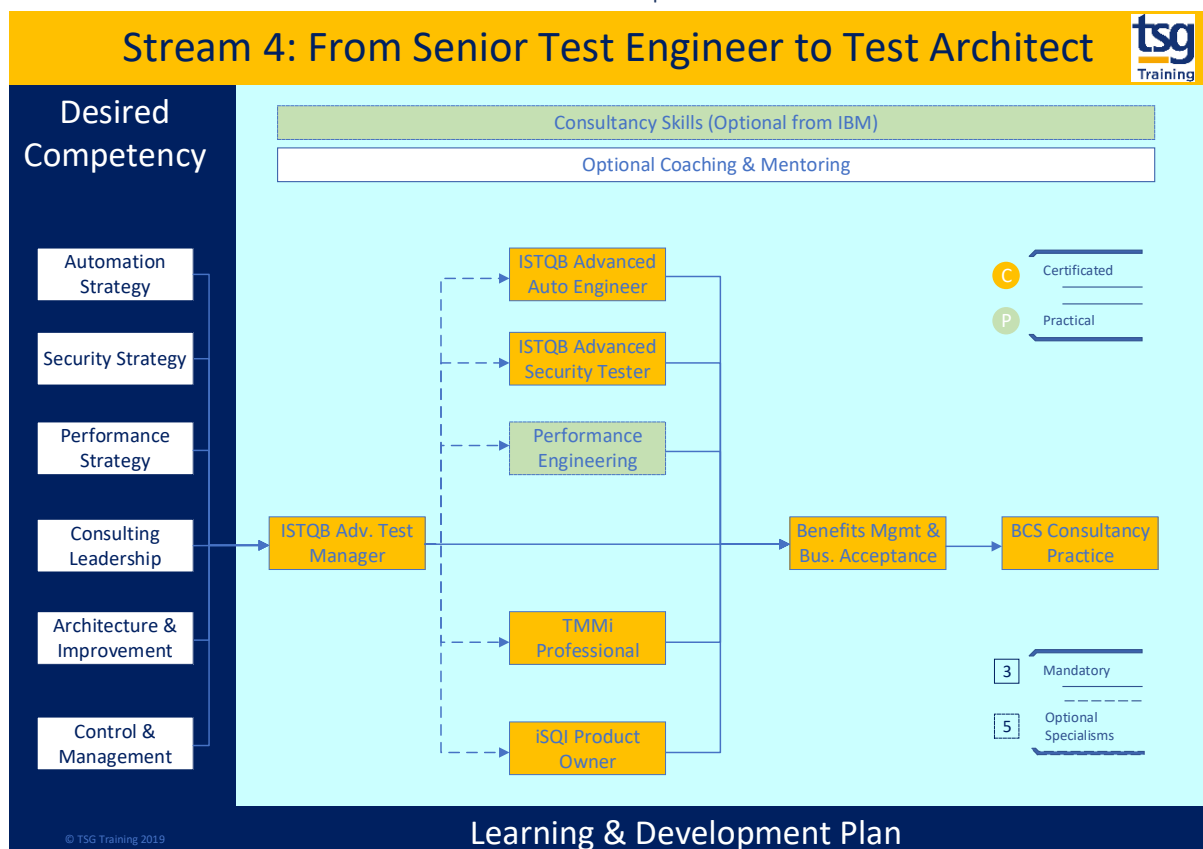


Figure 3 - The Test Architect and Consultant Capability Roadmap

Some courses in Stream 4 are repeated from Stream 3. However, this is only to ensure that everyone has the full skill set. If a course has been taken in Stream 3 then it need not be taken again here.

The stream supports the key competencies of:

- Automation Strategy
- Security Strategy
- Performance Strategy
- Architecture and Improvement
- Control and Management.

Supporting 6 strategic, key competencies, Stream 4 contains three mandatory course and 5-optional course paths that allow the Test Architect or Consultant to specialise in key skills areas as they progress toward Test Expert. Whilst the paths are optional, we recommend that at least one be completed to graduate.

It is the stream where consultancies and systems integration companies can be confident that the key staff have sufficient learning and capability to act as client facing consultant who can lead projects.

It is not envisaged that any of the courses in this stream will be eligible for 'Government Apprenticeship Funding' unless someone is transferring into a role where there is a requirement to learn at least 51% of new skills to fulfil it.

3.2.2 Test Architect and Consultant Courses Narrative

Test Architect and Consultant Learning & Development	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
ISTQB Advanced Test Manager and Exam	Yes	5	36-48	ISTQB/ISEB Foundation Certificate and at least 36 months testing experience. Some team management experience helpful. Interest in setting the direction of testing. Familiarity with the challenges facing test teams in projects. Willingness to sit a multiple-choice exam lasting 3 hours. High flyers or those on accelerated learning may be ready to take this course at 24-months.	To provide the industry view of test management practices and principles to set tests policy, strategy and plans.
ISTQB Advanced Test Automation Engineer and Exam	Optional	3	36-48	ISTQB/ISEB Foundation certificate, introduction to automation and, ideally, the Selenium Foundation course, at least 36 months testing experience or some real hands-on experience of the different test models that can be applied to reusable frameworks. Interest in test automation practices and procedures. Leadership skills needed to influence the test automation strategy and approaches for programmes. Significant analysis and evaluation and skills in a technical setting.	To develop a deeper understanding of designing, developing, and maintaining the correct frameworks and techniques for test automation solutions.

Test Architect and Consultant Learning & Development	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
ISTQB Advanced Security Tester and Exam	Optional	4	36-48	ISTQB/ISEB Foundation certificate, at least 36 months testing experience Interest in security practices and procedures. Leadership skills needed to influence the security testing strategy and approaches for programmes. Significant analysis and evaluation and skills in a technical setting.	To develop a deeper understanding of issues and how to build in security to systems and complex solutions that risk being compromised, either internally or from external threats.
Performance Engineering	Optional	5	36-48	Experience of performance tools-based training is required to attend this proprietary, practical and non-certificated IBM course.	To enable effective performance engineering that goes beyond simple testing. Provides for strategy and plan development, profiling processes and analysis and usage of outputs to identify problems and correct them across the life cycle
TMMi Professional and Exam	Optional	2	36-48	No qualifications are required to embark on the TMMi Professional course. However, it is recommended that students have some good test management and 'lessons learned' experience.	This course teaches people to assess the test maturity of organisations and to put in place plans and actions to increase it. TMMi is now the most used improvement method worldwide.

Test Architect and Consultant Learning & Development	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
BCS Benefits Management & Business Acceptance and Exam	Yes	3	36-48	The are no qualifications as pre-requisites to take this course. However, it is strongly recommended that delegates have a good understanding of business analysis, have led major programmes and want to provide additional benefits to help drive projects forward from inception.	<p>The course explores how systems are tested for business acceptance and cover other areas such as user acceptance testing, test design and planning, and delivery of business benefits.</p> <p>The course reinforces theoretical concepts by using realistic, practical case studies, to gain experience of applying benefits management and business acceptance techniques.</p>
BCS Consultancy Practice and Exam	Yes	5	42-48	The are no qualifications as pre-requisites to take this course. However, it is strongly recommended that delegates can demonstrate good consultancy practices, have led major programmes and are interested in business environment analysis, defining cogent solutions to tricky problems, writing bids and proposals, measuring and managing solutions and change.	This provides consultants with the skills beyond testing to help them become more rounded individuals who can lead programmes effectively from a business and management perspective.

Test Architect and Consultant Learning & Development	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
iSQI Product Owner	Optional	2	36-48	2-years agile testing and test management are recommended to step up to the role of Product Owner in an agile environment	When an organization makes the decision to adopt agile, it takes much more than pulling together a development team and allowing them to work in an iterative manner. Agile is a true shift in how individuals collaborate, communicate and operate. Agile requires an "all in" mindset from both business and technology where all individuals work together to deliver business value in the form of working software.
Coaching and Mentoring	Y	Ongoing	Ongoing	None	Floor walking, telephone or mail support to help apply skills learned and with solution developed to solve client requirements.
Consultancy Skills	Optional	1	None	4-6 years testing experience for those expected to be deployed on client site as a fee-earning consultant.	Provides students with the behavioural and communication skills they will be expected to display to both internal and external stakeholders.

Table 1 - Senior Test Engineer Courses, Pre-Requisites and Rationale

4 Meeting the Needs of the Test Architect and Consultant

The programme has been designed to meet the skills of multiple business sectors and companies . It is composed of industry-accepted and proven courses to deliver best-practice training for Senior Test Engineers. The programme provides professional training that will allow Test Engineers to learn and develop on the job as they exercise acquired skills and increase strategic competency in:

- Automation Strategy
- Security Strategy
- Performance Strategy
- Architecture and Improvement
- Control and Management.

Training shall be delivered in the classroom with:

- An experienced trainer who has real coal face experience;
- A complete course manual and examples on which students can make their own notes;
- Support from the trainer via email for life.

5 Meeting the Needs of the Employer

The programme is based upon industry best practice and support a series of different development methods that are used in the market today.

TSG can work with the employer to define the most suitable work for students to undertake based upon each course. Work is expected to be exercised aligned with the skills learned in Section 4, Meeting the Needs of the Test Architect and Consultant, above.

The programme has been defined to turn out best-practice Lead Test Engineers, but it can be modified in technical content to meet the specific needs of any particular methods, environments, skills and architectures as the employer may rely upon to underpin their business systems.

6 Benefits of the Approach

In helping to meet the requirements of building capability within a modern Test Practice we have clearly delineated the roles and mapped them to training functions to be supported, aligned with stated principles and competencies:

- Courses will be delivered by experienced staff who have at least 20-years' experience gained from training and programme delivery at the sharp-end.
- The experience the trainers bring will allow them to offer the ever-important analogies and war-stories to make training relevant and accessible.
- Courses can be tailored to meet specific requirements; although for ISTQB courses we are limited to 10% variation without having to reaccredit.
- We can provide private training courses anywhere or staff can attend any of the courses that we run on our public schedule.
- We will agree and put in place a monitoring and measurement system to make sure that:
 - The delegate experience is rich.
 - People are passing exams at the expected rate.
 - The overall programme is delivering against its aims.

A. Training & SFIA Cross Reference

The following table identifies:

- The Knowledge Levels (K) that each course and exam is aimed at:
- The SFIA Levels and the suitability of courses by the identified role types.

Courses & SFIA Levels		Stream 4: Test Architect								
		ISTQB Advanced Test Manager	ISTQB Advanced Security Tester	ISTQB Advanced Test Automation Engineer	Performance Engineering	BCS Benefits Management & Business Acceptance	BCS Consultancy Practice	TMMi Professional	iSQI Product Owner	
Mandatory or Optional		M	O	O	O	M	M	O	O	
Blooms Taxonomy		Days	5	4	3	5	3	5	2	2
K-Levels	6: Evaluate									
	5: Synthesis									
	4: Analyse									
	3: Apply									
	2: Understand									
1: Remember										
SFIA Levels & Course	Strategy/Inspire	7								
	<i>Head of Testing</i>									
	Initiate/Influence	6								
	<i>Test Architect</i>									
	Ensure/Advise	5								
	<i>Lead Test Engineer</i>									
	Enable	4								
<i>Senior Test Engineer</i>										
Apply	2/3									
Assist										
<i>Test Engineer</i>										

Table 2 - SFIA Levels by Course and Role Type