The Test Engineering Development Programme

Developing Professional Test Engineers
Into Senior Test Engineers

Prepared for:	General Release
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1 Executive Summary

This document sets out a vision for developing professional Test Engineers into Senior Test Engineers/Test Team Leaders 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. **Senior Test Engineers** with at least 2 years' experience who are keen to develop their test capability further and to specialise in one or more test disciplines;

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 Test Engineers' into 'Senior Test Engineers';
- 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 are a further three 2-year development streams to progress through to Test Manager, Test Architect/Consultant and 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	Senior Test Engineer
Engineering at the heart of designing IT solutions	Responsible for Implementing demonstrable and measurable, structured design techniques appropriate to the technology under Test, aligned to the portfolio strategies
Execution excellence through engineering	Responsible for the Implementation of Right Testing approaches, utilising engineered design to enable automation first approaches using industry best practices leveraging test design approaches to maximise opportunity for automation
Velocity - Pinpoint accuracy at speed, enabled by technology	Is able to present testing best practice methods specific to the technology under Test and the benefits of using them, agnostic to specific toolsets. Has real world experience of implementing these practice
Culture, Collaboration and lifecycle continual improvement	Leads a team within multi skilled teams to discuss / challenge and inform approach for testable solutions and educating best practices in Testing and Quality

Figure 1 - Senior Test Engineering 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:
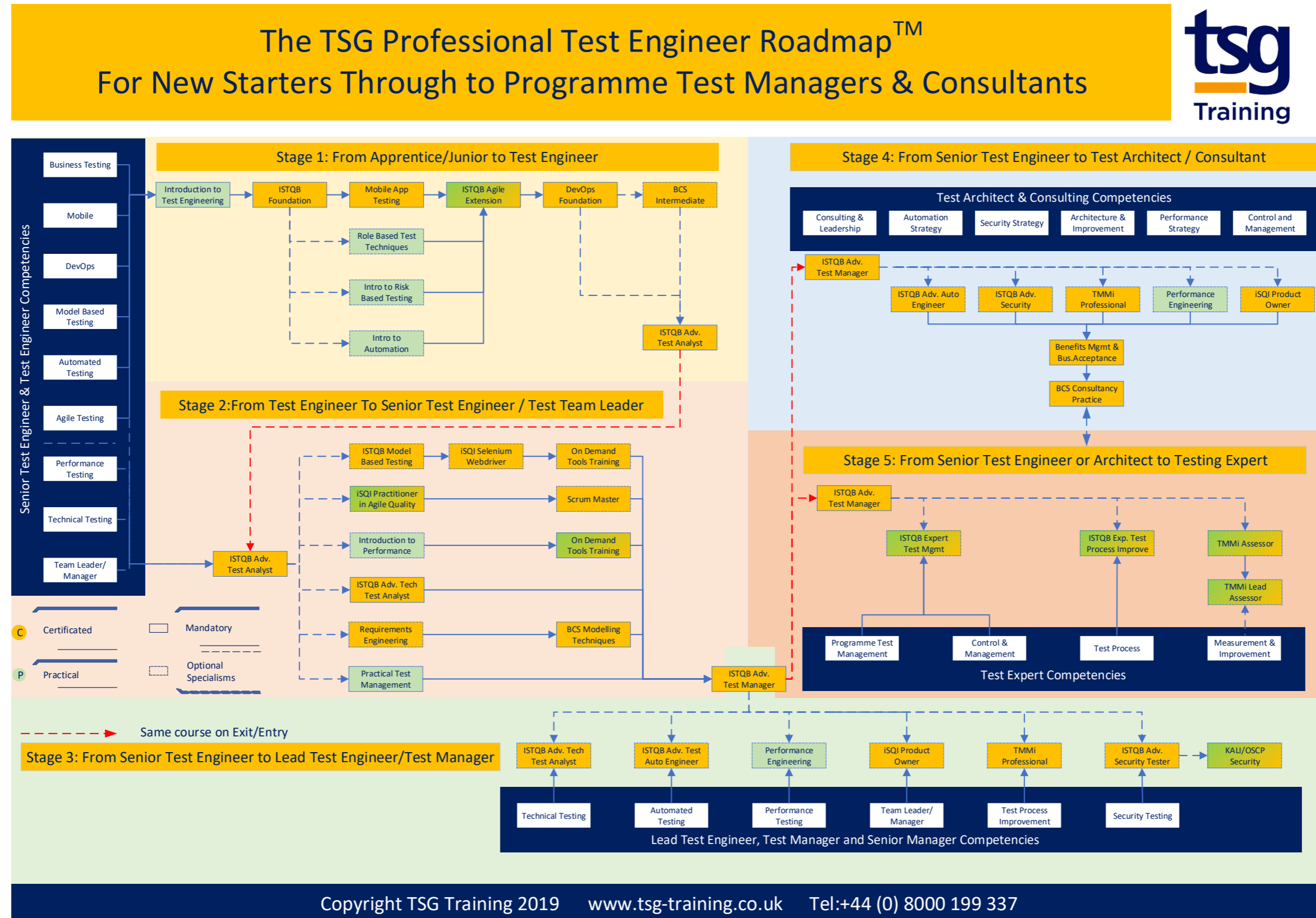

Figure 2 - The Long-Term Software Test Engineer Career Development Programme

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 Senior Test Engineer

The Senior Test Engineer stream is designed for people with at least two-years' software testing on projects and who have expressed a desire to make it their career goal and move up the ladder of seniority within a Test Practice.

Students graduating Stream 1, 'The 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 Senior Test Engineer Roadmap

Figure 3 - The Senior Test Engineer Capability Roadmap

Some courses in Stream 2 are repeated from Stream 1. However, this is only to ensure that everyone has the full skill set. If a course has been taken in Stream 1 then it need not be taken again here.

The stream supports the key competencies of:

- Advanced Agile Testing
- Performance Testing
- Automated Testing
- Model based Testing
- DevOps
- Business Testing
- Team Leaders and aspiring Test Managers
- Technical Testing, such as SI, Infrastructure, etc.

Supporting 8 key competencies, Stream 2 contains a mandatory course and 6-optional course paths that allow the Senior Test Engineer to specialise in key skills areas as they progress toward Lead Test Engineer or Test Architect. Whilst the paths are optional, we recommend that at least one be completed to graduate. Staff not taking ISTQB Test Manager in this stream will face it in the next

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   Senior Test Engineer Learning & Development Narrative

Senior Test Engineer L&D Programme	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
ISTQB Advanced Test Analyst with exam	Y	4	24-30	Must hold an ISTQB/ISEB Foundation certificate (from either the 2011 syllabus or the more recent 2018 syllabus) to sit the exam. At least 24-months solid testing experience using test design techniques, self-motivated, ability to analyse requirements. Ability to sit a multiple-choice exam lasting 3 hours. The course may be sat at 18-months for the high-flyer or those on accelerated learning.	This course is the natural route and progression for those who want to move up the ladder. It will increase knowledge and understanding of industry standard functional techniques and imbue the students with additional skills to take on more complex work.
iSQI Practitioner in Agile Quality with practical and written exams	Optional	3	36-42	ISTQB Foundation – Agile Extension would be beneficial (but not mandatory) as would 3-years of solid testing experience.	This new course teaches test engineers how to apply the skills they have acquired on non-Agile environments, new terms and processes and how to transition to and become a key player within an Agile team that delivers quality products
Introduction to Performance	Optional	1	24	No pre-requisites, although some testing experience and an ISTQB Foundation certificate would be beneficial to learning and outcomes	This hands-on course provides the basics of performance testing for those who wish to specialise in the subject and go on to specific tools-based training and strategy work

Senior Test Engineer L&D Programme	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
On-Demand Performance Tools	Optional	Variable	24	Some hands-on experience of performance testing would most definitely benefit learning and help facilitate desired outcomes	Specific tools-based training on request to meet client demand
Introduction to Automation	Optional	1	24	No pre-requisites, although some testing experience and an ISTQB Foundation certificate would be beneficial to learning and outcomes	This hands-on course provides the basics of automation testing for those who wish to specialise in the subject and go on to specific tools-based training and strategy work
iSQI Scrum Master	Optional	2	24-26	No pre-requisites, although some testing experience and an ISTQB Foundation Agile Extension and iSQI Practitioner in Agile Quality would be beneficial to learning and outcomes	This hands-on course provides the skills for a Lead Test Engineer to advance to Scrum Mater, lead sprints and run agile teams
On-Demand Automation Tools and/or iSQI Selenium Foundation with WebDriver and Exam	Optional	3/ Variable	24-36	Attendees should have general knowledge of basic programming and some knowledge of Python and a desire to embark on automation at a practical level.	This leading shareware tool has now become accepted as mainstream and is being used by more and more companies. The course provides people with the skills to develop, run and maintain automated test packs with Selenium at the heart. Other specific tools-based training on request to meet client demand

Senior Test Engineer L&D Programme	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
Model based Testing	Optional	2	24-36	ISTQB/ISEB Foundation certificate and an interest in learning about the use of models in testing.	Useful predominantly in manufacturing and non-service-based industries to generate test cases from models. Also used more and more in Automation, where it sits at the top-end of the approach.
BCS Requirements Engineering and Exam	Optional	3	24-36	Some practical experience of working with requirements or use cases would be beneficial, although not mandatory.	The course teaches the business Test Engineer how to ensure that requirements are correct and complete to fulfil the needs of the business and other stakeholders.
BCS Modelling Techniques and Exam	Optional	3	30-48	None	Teaches students how to work with systems modelling, static modelling, dynamic modelling and modelling in context in order to provide the right models on client programmes.

Senior Test Engineer L&D Programme	Mandatory	Days	Pre-Requisites		Rationale
			Months Exp.	Experience and Qualifications	
Practical Test Management	Optional	4	30-48	ISTQB/ISEB Foundation certificate and the will to learn the techniques and behavioural characteristics of a Team Leader or aspiring Test Manager. Note: This course was originally commissioned by IBM to help their team leaders and test managers to become consultants in the field.	This course is based around a detailed and realistic case study and follows this 'virtual' project from inception, risk analysis and the generation of the test plan, the application of this plan to perform the testing, and then considers the testing that needs to be performed once the application goes 'live' by reviewing the appropriate responses to both ongoing and new risks.
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 test policy, strategy and plans. This course is the last in the stream, but may optionally be sat at the beginning of Stream 3, Lead Test Engineer
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.

| Senior Test Engineer L&D Programme | Mandatory | Days | Pre-Requisites | | Rationale |
			Months Exp.	Experience and Qualifications	
Consultancy Skills	Optional	1	None	2-4 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 Senior Test Engineer

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 competency in:

- Advanced Agile Testing
- Performance Testing
- Automated Testing
- Model Based Testing
- DevOps
- Business Testing
- Test Team Leadership/Management
- Technical Testing.

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 , above.

The programme has been defined to turn out best-practice Senior 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.
- All courses are ready to go, except for ISTQB Certified Mobile App Tester.
- 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.

- o People are passing exams at the expected rate.
- o 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 2: Senior Test Engineer										
			ISTQB Advanced Test Analyst	ISTQB Model based Testing	iSQI Selenium WebDriver	On Demand Automation Tools Training	iSQI Practitioner in Agile Quality	iSQI Scrum Master	Introduction to Performance	On Demand Performance Tools Training	ISTQB Advanced Technical Test Analyst	BCS Requirements Engineering	BCS Modelling Techniques
Mandatory or Optional			M	O	O	O	O	O	O	O	O	O	O
Blooms Taxonomy		**Days**	4	2	3	4	3	2	1	5	3	3	3
K-Levels	6: Evaluate												
	5: Synthesis												
	4: Analyse		■	■	■	■	■	■		■	■		■
	3: Apply		■	■	■	■	■	■	■	■	■	■	■
	2: Understand		■	■	■	■	■	■	■	■	■	■	■
	1: Remember		■	■	■	■	■	■	■	■	■	■	■
SFIA Levels & Course	Strategy/Inspire *Head of Testing*	7											
	Initiate/Influence *Test Architect*	6											
	Ensure/Advise *Lead Test Engineer*	5				■		■		■			
	Enable *Senior Test Engineer*	4	■	■	■					■	■		■
	Apply / Assist *Test Engineer*	2/3	■	■	■		■		■		■	■	

Table 2 - SFIA Levels by Course and Role Type