Successful Test Engineering and The ISTQB Programme for Professional Capability Development

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0.1	May 13th, 2023	Bernard Melson	Initial Release
1.0	May 17th, 2023	Bernard Melson	Minor changes following internal review

1 Executive Summary

The role of the professional test engineer has developed over the past few years, with accountability, business importance and programme engagement having increased to the point where test engineering is considered an integral and vital component of IT development success and something that provides a return on business investment.

If we look at why test engineering has finally been integrated to organizations and their developmental programmes, we can identify three historical imperatives for change:

- Programmes overran, cost too much and failed to deliver required functionality;
- Testing didn't actually commence until development had completed; a point at which things were found to be missing and/or not working properly, so much pre-development was carried out with embedded faults;
- Testing was not valued, so investment in developing people and skills was missing.

Forward thinking organizations:

- Recognised these failings and impact on their business; and
- the consequential need for change in approach; and
- Engaged and invested in testing across the software development lifecycle (SDLC).

Such organizations found that proper testing by professionally trained test engineers throughout the entire SDLC actually saved them time and money by ensuring sure that:

- Programmes were specified and developed with test and risk management in a planned approach in line with specified and agreed business requirements and acceptance criteria;
- Defects were identified at the point of introduction, be that anywhere from the specification of requirements and acceptance criteria through to code development and delivery;
- Acceptance criteria provided a benchmark against which to specify and measure testing from the outset, with the risk of phase transition and implementation fully understood.

In a global survey of 1,750 companies by Capgemini for their 'World Quality Report,2022', CIO's and key leaders cited the following quality attributes of their development programmes as being of the most concern and biggest risk to their business over the coming 12-months.

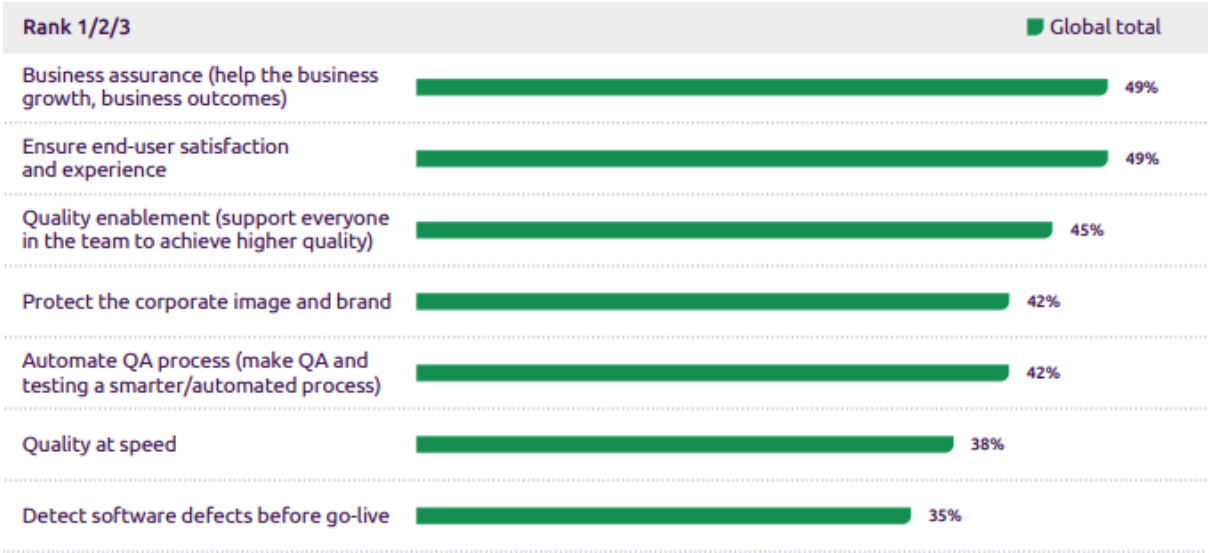


Figure 1 – Organizational objectives and risk mitigation for test engineering in 2023

Of these objectives, each can be positively achieved and risk mitigated through proper test planning and execution by professionally trained and experienced test engineers. Of further note from the same report over a number of years is that that successful IT programmes spend between 30% to 40% of their development and maintenance costs on testing and the prevention flaws and defects being built into software. In amongst such spend is Test Leadership and role specialisms, underpinned by more than thirty different types of testing, ranging from:

- Pre-development activity such as requirements validation and test planning;
- Post development activity that spans simple link testing, internal and external interface testing, data flows, user-acceptance, usability and other key types, to identify but a few;
- Test Automation.

Essentially, testing has evolved to become an engineering-based discipline that embraces the key skills and competencies needed for successful programme delivery in today's ever-increasing diversity of new and emerging technologies. In line with the development of test engineering as an integral part of the success of a development programme comes the need for people with the right skills to function and provide value in delivering IT systems that underpin their business.

In recognition of the growth of test engineering and the reliance placed upon it by business for a return on the substantial investment made in IT systems, the 'International Software Testing Qualifications Board (ISTQB)' was launched to define solid base for test engineering capability and its myriad roles. Since its original launch in 2001:

- ISTQB has developed its programme to embrace the skills and competencies to the emerging methods of delivery and technologies;
- Over 1,000,000 people have taken and passed professional exams from ISTQB that make them stand out from the crowd.

Consisting of 68 international board members around the world that deliver a programme of training, examinations and certification worldwide against a standard set of syllabi, processes and terms, ISTQB has been embraced on a wholesale basis and is now the De Facto standard for the development of test engineers who help deliver value in new and changing IT systems. Functioning in a number of streams, test capability has been defined over three different subject-matter categories with differing levels of skill, complication and business need. Each such stream contains a series of certifications designed to provide the right level of test engineering competence to enable delivery capability for organizations and growth for people, including:

1. **Core** is the primary category and includes certifications at Foundation, Advanced and Expert levels of people capability development and organizational excellence.
2. **Agile** for people and teams specializing in small to large agile projects, be they standard in nature, technical or distributed.
3. **Specialist** for people who need to develop specific skills that meet specific technical and non-functional requirements.

It doesn't matter what type of programmes you develop, be they Artificial Intelligence, Distributed Systems, Cloud or any other type, they all have one thing in common: they will need testing by professional test engineers before you launch them on your business and customers.

Organizations that are serious about getting a return on their investment in IT systems development and maintaining their marketplace image and competitive advantage are encouraged to consider embracing and making ISTQB an integral part of their own development and that of capability in their employees. Testing – it just needs to be done by the professionals.

2 About this Whitepaper

The paper provides a detailed look at the ISTQB Certification scheme and:

- The history behind it and its place in today's market to meet the ever-changing needs of evolving technologies and methods;
- What it sets out to achieve;
- How the Certification scheme is laid out into three different streams that address process, capability and competence improvement, both for organizations and individuals who seek career growth:
    - Core values and principles of testing at Foundation level, through Advanced and up to Expert;
    - Agile methods of delivery and how testing applies within them;
    - The specialist skills required to support specifics, such as non-functional testing, sector aligned testing, technical testing and testing that looks at legal requirements;
- How exams are structured;
- The dependencies between certifications and differing streams.

It provides an overview of each stream, within which each individual certification is addressed to:

- Outline what it sets out to achieve;
- Highlight business benefits;
- Provide a pictorial of the syllabus and a link to the actual syllabus on the ISTQB website.

An additional mapping of certifications, capability, competency and roles against the 'Skills Framework for the Information Age (SFIA)' is provided to help define and align training to organizational structures, roles and needs.

The paper does not serve to make recommendations, instead the reader is invited to visit the scheme to understand what it offers business and individuals so that:

- Needs can be mapped;
- A plan for training and expected benefits over time can be established;
- A benchmark for future measurement established;
- Meetings can be arranged with preferred training providers who can help plan and schedule a programme of training with ISTQB certifications that both meet business and individual objectives.

Further reference material is available at https://www.istqb.org, where the following can be found:

- Syllabi;
- Sample exam papers;
- Sample exam answers;
- Exam structures and rules;
- Release notes.

TSG Training acknowledge the use and copyright of information from ISTQB that is already in the public domain.

Comments or improvements are invited and should be submitted to the author, as noted on the cover page.

3 The Role of Test Engineering in Risk Mitigation

There are many reasons to test systems development activity, but three factors come to the fore:

- Testing plays a key role in identifying and managing risk and whether or not to implement a new or altered system;
- The cost of identifying a fault and associated rework goes up exponentially the further it is permitted to transition through the software development lifecycle and into production;
- Lack of testing and installation of faulty systems compromises brand and reputation.

We have come a long way since the days of look 'n' feel testing post-development and "we'll see how implementation goes and fix anything later." Such an approach is outmoded and just asks for trouble. Look at today's systems and applications that operate standalone or via a browser on tablets, phones or PC's, they are just so complex in construction and delivery – the opportunity for failure and public embarrassment has increased substantially.

To narrow down the concerns of the CIO's identified in Capgemini's report, we can reasonably say they are likely to have the following common, shared goals in that they will want:

- Systems delivered on time, cost and budget;
- Delivery of systems to the marketplace that operate as intended and which preserve and build their reputations and that of their companies;
- Cost effectivemaintainability through test automation against a soundly structured system.

These three things can only be achieved when testing is conducted and managed by professionally trained and certified engineers. With an average of 30-40% of a software development budget going on testing we should be entitled to expect a lot. It is a lot, but to guarantee a return on that spend requires that if be underpinned by test engineers who:

- Have a critical mindset;
- Are analytical thinkers;
- Are collaborative;
- Have independence from development;
- Work with quality in mind;
- Are team players;
- Are certified for the role and classes of testing they are trained for and are competent to perform with a return on investment.

The number of different classes of testing exceeds 30 different types, so people need training and different competencies to deliver on specific types of testing that are relevant to their role – and what is they are to achieve at any given a point in time. We cannot rely on the 'jack of all trades'.

My own experience as a consultant trouble shooting major projects in difficulty is that they:

- Spent an average of 150% of budget delivering 80% of functionality. Typically, this was brought around by untested and traceable requirements, which triggered much rework;
- Failed to engage test engineers in a project until post development;
- Had no overall strategy for testing and assurance and management of risk.

Risk management and mitigation will only work as needed with a proper test structure executed by trained professional test engineers. Indeed, successful systems delivery can only take place with these in place. Take a look at the ISTQB programme and see how it supports modern developments, methods, company and individual reputations and career growth.

4 The ISTQB Programme at a Glance

ISTQB has developed its Test Engineers development programme over a number of years, beginning originally with its Foundation and three Advanced level certifications. Over the years, the programme has successfully grown to embrace new technologies and methods that are used in the greater bulk of programme developments today. The programme now considers and values test engineering spanning the multiple skills and people needed to plan, execute and report on testing, to those who set testing standards and strategy and process for global organisations.

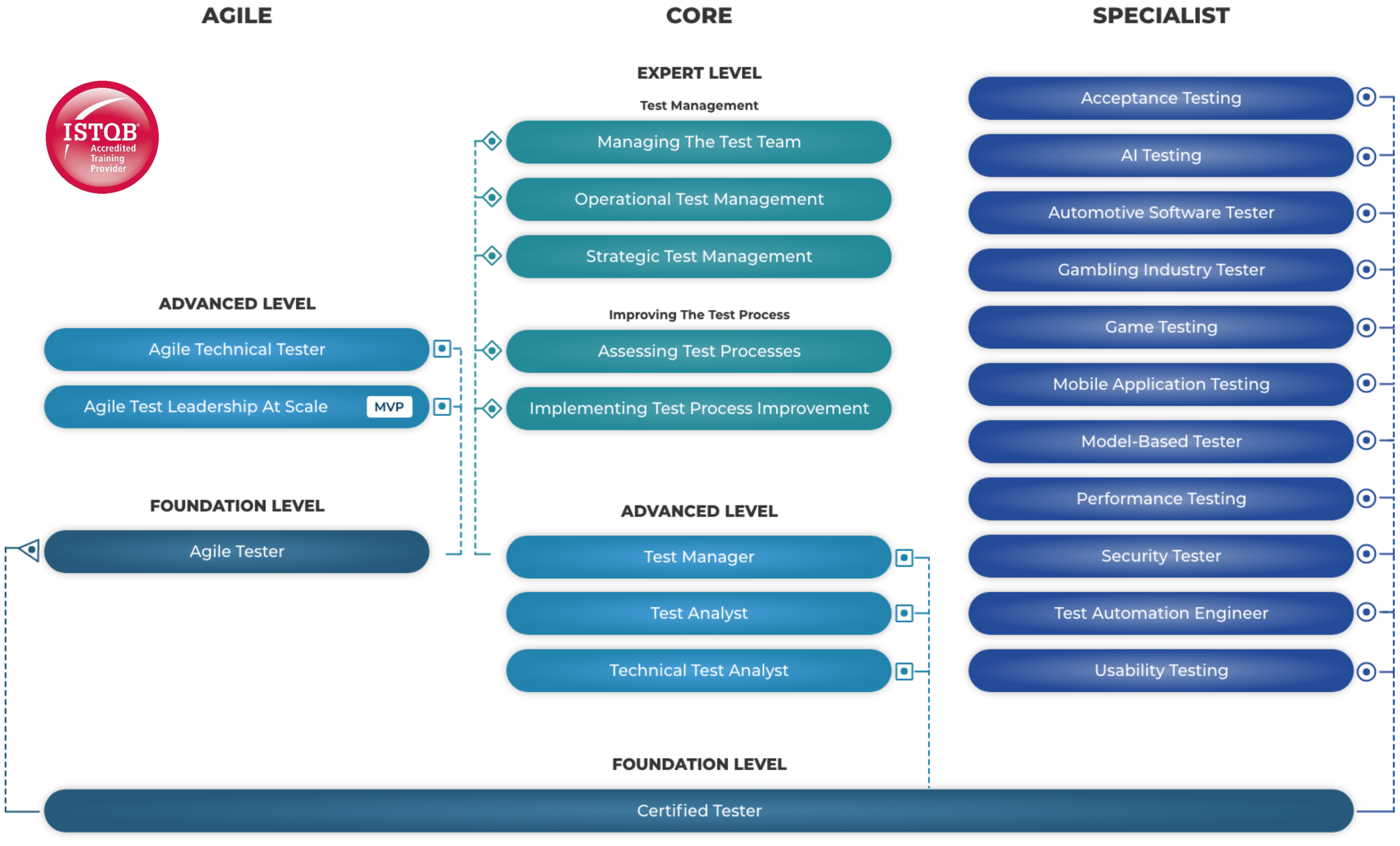


Figure 2 - The ISTQB Test Engineering Development Programme at a glance

This programme isn't about certification alone but is one that provides the right blend of theory and practical learning to develop consistently skilled professional test engineers who can deliver for their stakeholders.

5 The ISTQB Programme in Depth

The ISTQB programme has been developed with the needs of today's complex systems and delivery methods firmly in mind. With over one million certifications to date, it is, without doubt, the leading global certification scheme in the field of software testing.

ISTQB® established, and continues to evolve, the internationally recognized Certified Tester scheme, which is a portfolio of certifications that develop, extend, and validate testing skills. The scheme is built around syllabi created by a global network of experts, the ISTQB® Glossary, sample exams, and the Testing Body of Knowledge (TBOK).

The Certified Tester Foundation Level certification provides testing professionals with essential terminology and a breadth of knowledge. It is the prerequisite to the other modules within the scheme which offer depth and specialization.

1. The "Core" stream modules are valid for any technology/ methodology/ application domain and build on the Foundation Level.
2. The "Agile" stream focuses on testing practices specifically for the Agile methodology.
3. The "Specialist" stream provides a deep dive into areas which may be based on quality characteristics, specific test approaches and test activities, or which cluster testing know-how for certain industry domains.

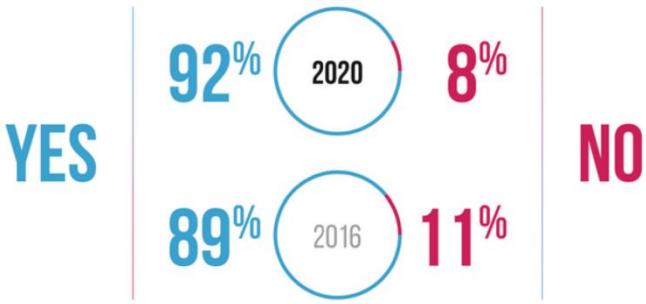
5.1 Benefits for Professionals

ISTQB® is the international standard in the field of software testing certification. Whether you are just getting started in a career in testing or have been in the field for a number of years, earning an ISTQB® certification offers significant benefits:

- An independent, internationally recognized validation of skills that employers trust;
- Portable proof of ability for both current and future employment;
- Career progression support through the advancement of testing skills;
- Enhanced professional credibility (certificate holders have authorized use of the applicable ISTQB® "Certified Tester" logo)

"Would you recommend ISTQB® certification to your colleagues?"

(Source: ISTQB® Effectiveness Survey 2020)



5.2 Benefits for Employers

ISTQB® certification offers significant benefits to employers by supporting recruitment, retention, and development of testing professionals within the organization:

- Competitive advantage by giving clients greater confidence in your business through a higher level of reliability of the applications being developed due to efficient and cost-effective testing practices;
- Consulting companies with certified staff can offer higher-level services to customers, increasing revenues and brand value;
- Common language and understanding of testing throughout the organization to improve collaboration and working practices;
- Access to the ISTQB® Partner Program.

5.3 The Core Stream

The 'Core Stream' is designed to reflect modern test engineering principles, coupled with competencies that meet the needs of a Test Practice and varying development models, supported by capability from competent, multi-skilled individuals. The Core Stream provides mainstream competencies associated with test engineering in three different levels:

1. Foundation – the 'get you going' level;
2. Advanced for role specific competencies;
3. Expert for those working at senior levels.

Figure 3 - ISTQB's Core Programme

5.3.1 The Foundation Level

The Foundation level is about getting people and organizations into the common language of test engineering. It is the qualification on which all ISTQB syllabi for every other certification in the programme is based. That is, it provides the common terms, terminology and processes for test engineering.

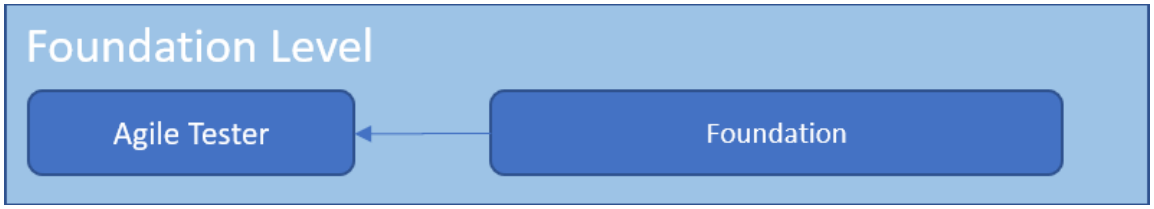


Figure 4 – ISTQB Foundation Level Basics

The Foundation level programme has traditionally been based upon two syllabi and qualifications:

1. Foundation Tester; and
2. Agile Tester.

5.3.1.1 Foundation Tester

Historically, this provided the basics of testing, processes, terms and terminology for projects that would typically be based around the waterfall, iterative and v-model life cycles. Holding this certificate allows people to progress to the Advanced and Specialist streams for further development.

However, the Foundation level has undergone a recent transformation with the release this year of a new syllabus at Version 4. It is a radical departure from the 2018 syllabus and now addresses much around agile testing. This is the course that provides students with the common terms and processes they will need through their careers, and which are industry-recognised as the de facto standard.

The syllabus addresses in detail:

- The Fundamentals of Testing;
- Testing Throughout the Software Development Lifecycle;
- Static Testing;
- Test Analysis and Design;
- Managing the Test Activities;
- Test Tools.

The syllabus and teaching in Foundation at version 4 is shown on page *13*. The exam is multiple choice, with at least 26 questions from 40 being answered correctly over 60-minutes. A copy of the syllabus can be downloaded here.

People sitting and passing an exam should expect the following business-based outcomes:

- Understand what testing is and why it is beneficial;
- Understand fundamental concepts of software testing;
- Identify the test approach and activities to be implemented depending on the context of testing;
- Assess and improve the quality of documentation;
- Increase the effectiveness and efficiency of testing;
- Align the test process with the software development lifecycle;
- Understand test management principles;
- Write and communicate clear and understandable defect reports;

- Understand the factors that influence the priorities and efforts related to testing;
- Work as part of a cross-functional team;
- Know risks and benefits related to test automation;
- Identify essential skills required for testing;
- Understand the impact of risk on testing;
- Effectively report on test progress and quality.

5.3.1.1.1 ISTQB Foundation, Version 4 Syllabus

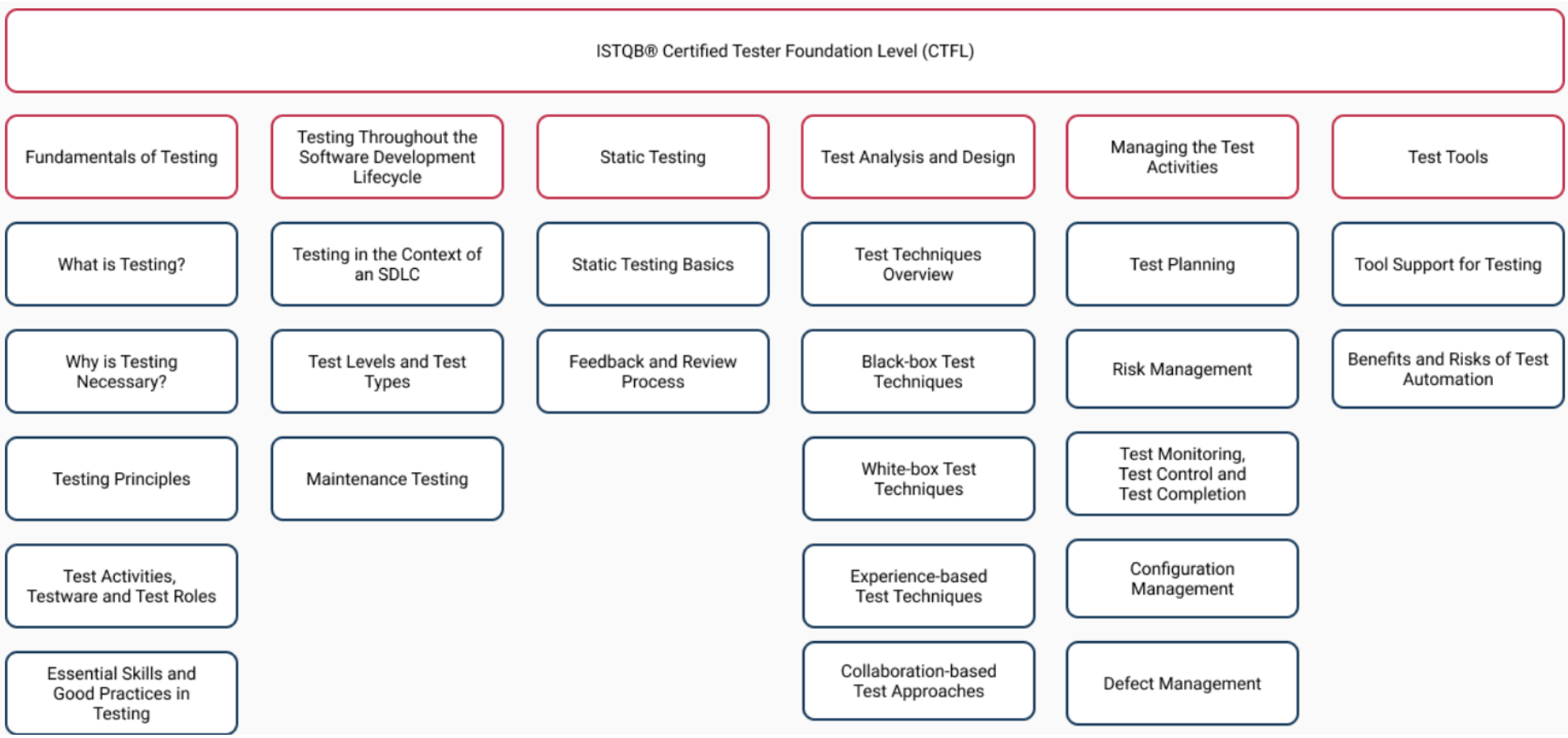


Figure 5 - ISTQB Foundation Syllabus

5.3.1.2 Agile Tester:

Agile is now mainstream, and students must be able to work within it. The course expands on the techniques and learning in the Foundation Course and the difference that Agile brings. This is an extension to the Foundation that addresses the needs of agile test engineers. People holding this certificate allows them to progress to the Agile stream for further development.

The syllabus addresses in detail:

- Agile Software Development;
- Findamental Agile Testing Principles & Processes;
- Agile Training Methods, Techniques & Tools.

The syllabus and teachings are shown on page *15*. The exam is multiple choice, with at least 26 questions from 40 being answered correctly over 60-minutes. A copy of the syllabus can be downloaded here.

People sitting and passing an exam should expect the following business-based outcomes:

- Collaborate in a cross-functional Agile team being familiar with principles and basic practices of Agile software development;
- Adapt existing testing experience and knowledge to Agile values and principles;
- Support the Agile team in planning test-related activities;
- Apply relevant methods and techniques for testing in an Agile project;
- Assist the Agile team in test automation activities;
- Assist business stakeholders in defining understandable and testable user stories, scenarios, requirements, and acceptance criteria as appropriate;
- Work and share information with other team members using effective communication styles and channels.

Important note for those wishing to progress to the Agile stream: People sitting a Foundation course and passing the exam at syllabus version 4 are now exempt from the requirement to sit an Agile Tester course and exam before advancing to the Agile stream. However, people who hold a Foundation certificate based upon the 2018 syllabus or earlier are required to sit the Agile Tester course or take a new foundation course at Version 4 before advancing to the Agile stream.

5.3.1.2.1 ISTQB Agile Tester Syllabus

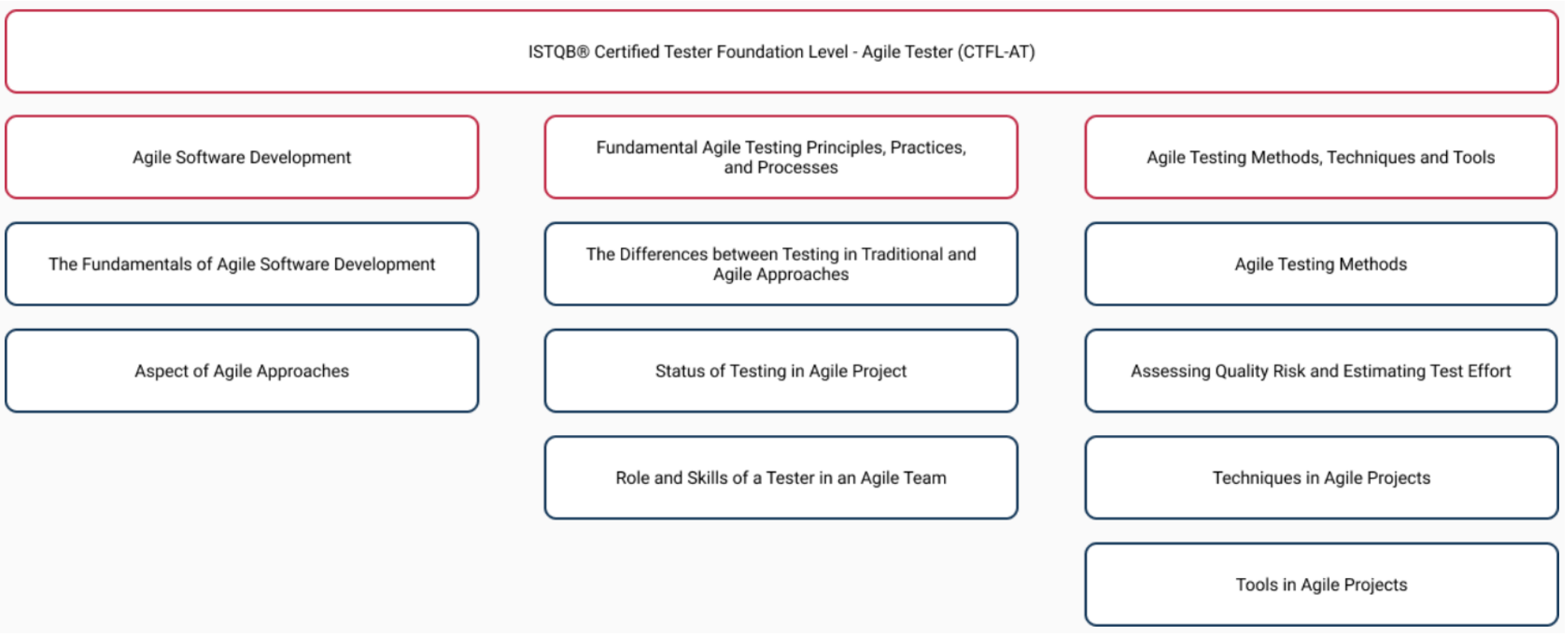


Figure 6 - ISTQB Foundation - Agile Tester Syllabus

5.3.2 The Advanced Level

The Advanced Level supports people and organizations by taking them beyond the basics and principles established at Foundation Level. It is specifically for those who want to develop and specialise in testing in one of three role-based competencies, including:

- Advanced Test Analyst;
- Advanced Technical Test Analyst;
- Advanced Test Manager.

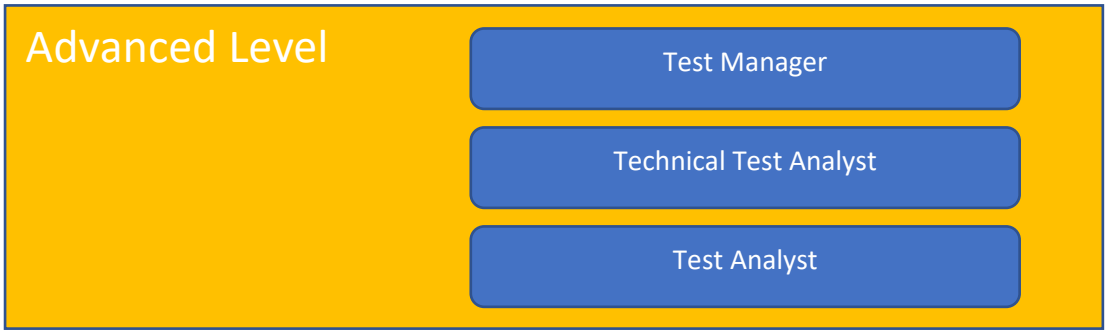


Figure 7 - ITSQB Advanced Level

There are significant business-based outcomes at this level (more later), but people entering this stream must first have sat and passed a Foundation Tester exam at Version 4 *or earlier*. There is no interdependency between the certificates; although one of the Analyst certificates is recommended prior to embarking on the Test Manager Certificate.

5.3.2.1 Advanced Test Analyst

The ISTQB® Advanced Level Test Analyst (CTAL-TA) certification provides the skills needed to perform structured and thorough software testing across the software development life cycle. It goes into detail about the test analyst's role and responsibilities in every step of a standard test process and expands on important test techniques.

The Advanced Level Test Analyst certification is aimed at people who wish to further develop their expertise in functional test analysis and test design techniques after 12-18 months of solid testing experience following passing Foundation. It addresses key subjects that include:

- The Test Analyst's Tasks in the Test Process;
- The Test Analyst's Taks in Risk-Based Testing;
- Test Techniques;
- Testing Software Quality Characteristics;
- Reviews;
- Test Tools & Automation.

The syllabus is shown pictorially on page *18* and a copy can be downloaded here. The exam is multiple choice, with 40 questions offering a combined value of 80 points. The point pass mark is set at 52 over 2-hours.

People sitting and passing an exam should expect the following business-based outcomes:

- Perform the appropriate testing activities based on the software development life cycle being used;
- Determine the proper prioritization of the testing activities based on the information provided by the risk analysis;

- Select and apply appropriate test techniques to ensure that tests provide an adequate level of confidence, based on defined coverage criteria;
- Provide the appropriate level of documentation relevant to their testing activities;
- Determine the appropriate types of functional testing to be performed;
- Work effectively in a usability testing team;
- Effectively participate in requirements / user story reviews with stakeholders, applying knowledge of typical mistakes made in work products;
- Improve the efficiency of the test process with the use of tools.

5.3.2.1.1 ISTQB Advanced Test Analyst Syllabus

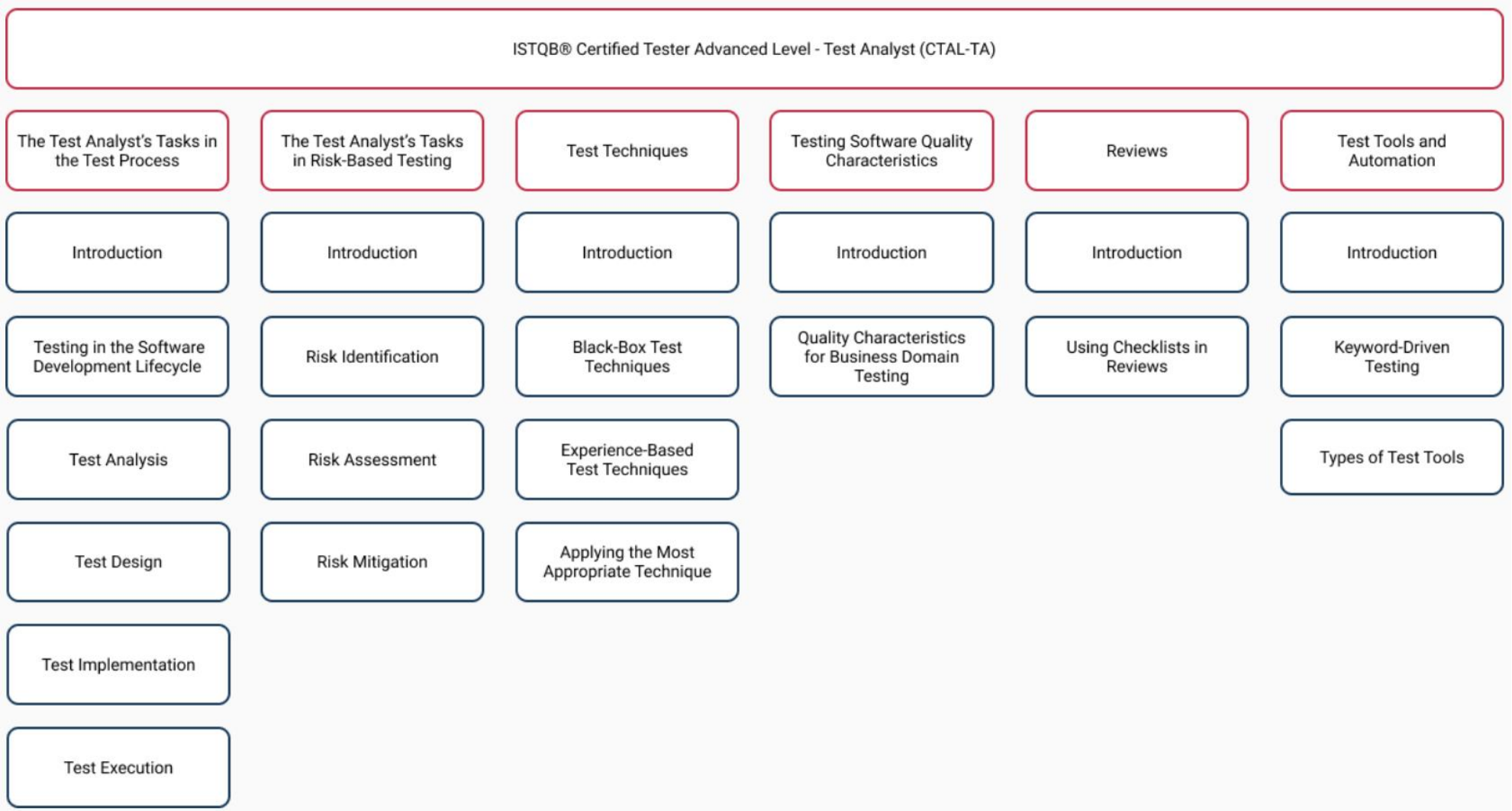


Figure 8 – ISTQB Advanced Test Analyst Syllabus

5.3.2.2 Advanced Technical Test Analyst

The ISTQB® Advanced Level Technical Test Analyst (CTAL-TTA) provides a thorough introduction to the technical testing skills which are fundamental in many organizations today. These skills include risk-based testing, white box testing, static and dynamic analysis, non-functional testing, and test automation. Essentially, Technical Test Analyst concentrates on classes of testing that are not specifically intended for deep functional testing, but more on the operability of a system and its workings.

The Advanced Level Technical Test Analyst certification is suitable for anyone who is involved in testing as well as anyone interested in further developing their software testing knowledge. This includes people performing activities such as test analysis, test consulting, and software development. It addresses key subjects that include:

- Technical Test Analyst Tasks in Risk-Based Testing;
- White-Box Techniques;
- Static and Dynamic Analysis;
- Quality Characteristics for Technical Testing;
- Reviews;
- Test Tools & Automation.

The syllabus is shown on page *20* and a copy can be downloaded here from the ISTQB website. The exam is multiple choice, with 45 questions of variable value that offer a combined value of 78 points. The point pass mark is set at 51 over 2-hours.

People sitting and passing an exam should expect the following business-based outcomes:

- Recognize and classify the typical risks associated with the performance, security, reliability, portability and maintainability of software systems;
- Provide technical elements to the planning, design and execution of tests for mitigating performance, security, reliability, portability and maintainability risks;
- Select and apply appropriate white-box test techniques to ensure that tests provide an adequate level of confidence, based on design coverage;
- Effectively participate in reviews with developers and software architects applying knowledge of typical defects in the code and architecture;
- Improve the quality characteristics of code and architecture by making use of different analysis techniques;
- Outline the costs and benefits to be expected from introducing particular types of test automation;
- Select appropriate tools to automate technical testing tasks;
- Understand the technical issues and concepts in applying test automation.

5.3.2.2.1 ISTQB Advanced Technical Test Analyst Syllabus

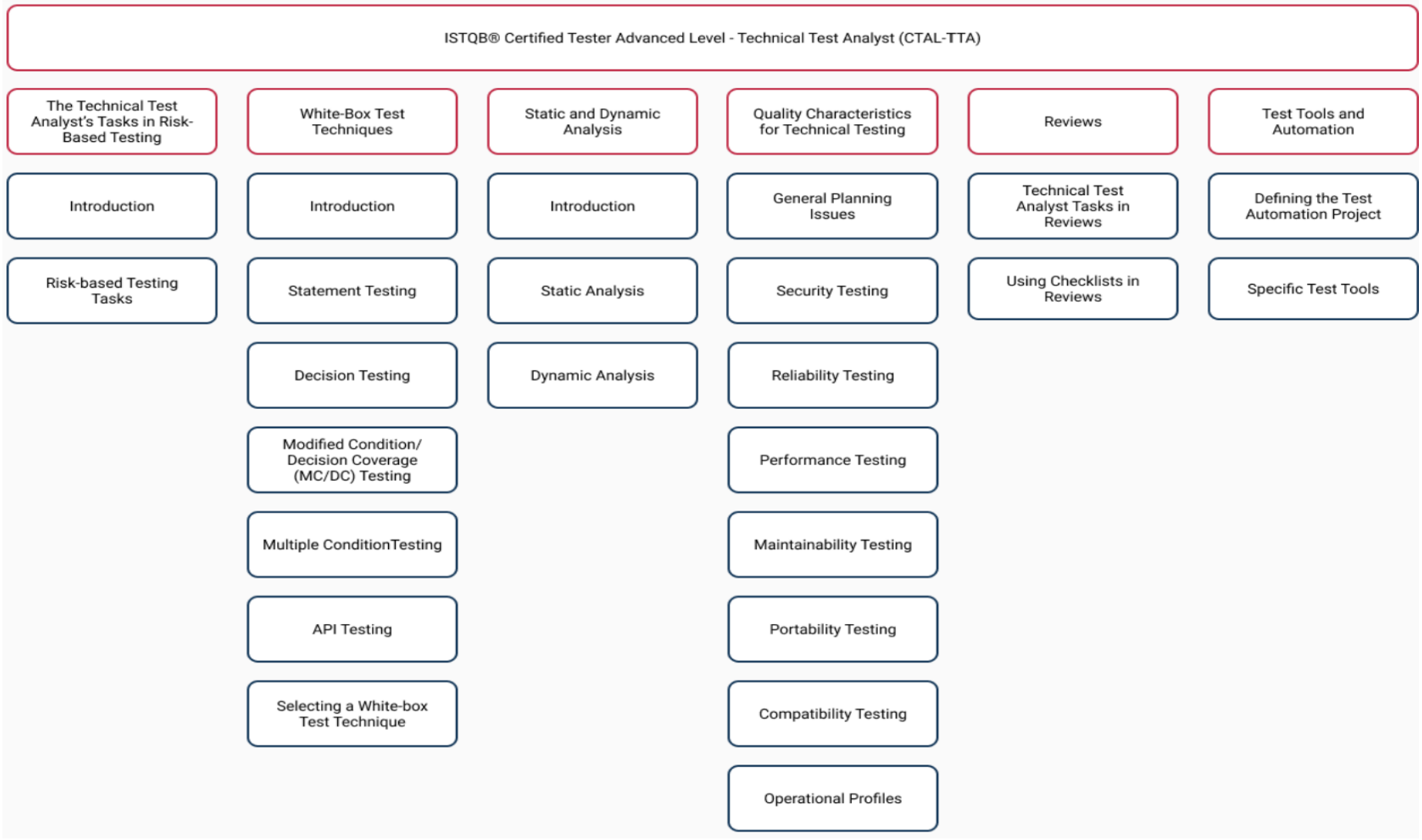


Figure 9 – ISTQB Advanced Technical Test Analyst Syllabus

5.3.2.3 Advanced Test Manager

The ISTQB® Advanced Level Test Manager (CTAL-TM) certification provides the knowledge and competencies to take responsibility for managing all the testing activities across the software development lifecycle. It covers everything from how to design a suitable test approach for the project based on the organizational test strategy to building a test team or testing competencies to complete the necessary testing.

The Advanced Level Test Manager certification is aimed at people who have already achieved an advanced point in their careers in software testing and wish to develop further their expertise in test management. It addresses key subjects that include:

- Testing Process;
- Test Management;
- Test Reviews;
- Defect Management;
- Improving the Test Process;
- Test Tools and Automation;
- People Skills & Team Composition.

The syllabus is shown on page *22* and a copy can be downloaded from the website here. The exam is multiple choice, with 65 questions of variable value that offer a combined value of 115 points. The point pass mark is set at 75 over 3-hours.

People sitting and passing an exam should expect the following business-based outcomes:

- Manage a testing project by implementing the mission, goals and testing processes established for the testing organization;
- Organize and lead risk identification and risk analysis sessions and use the results of such sessions for test estimation, planning, monitoring and control;
- Create and implement test plans consistent with organizational policies and test strategies;
- Continuously monitor and control the test activities to achieve project objectives;
- Assess and report relevant and timely test status to project stakeholders;
- Identify skills and resource gaps in their test team and participate in sourcing adequate resources;
- Identify and plan necessary skills development within their test team;
- Propose a business case for test activities which outlines the costs and benefits expected;
- Ensure proper communication within the test team and with other project stakeholders;
- Participate in and lead test process improvement initiatives.

5.3.2.3.1 ISTQB Advanced Test Manager Syllabus

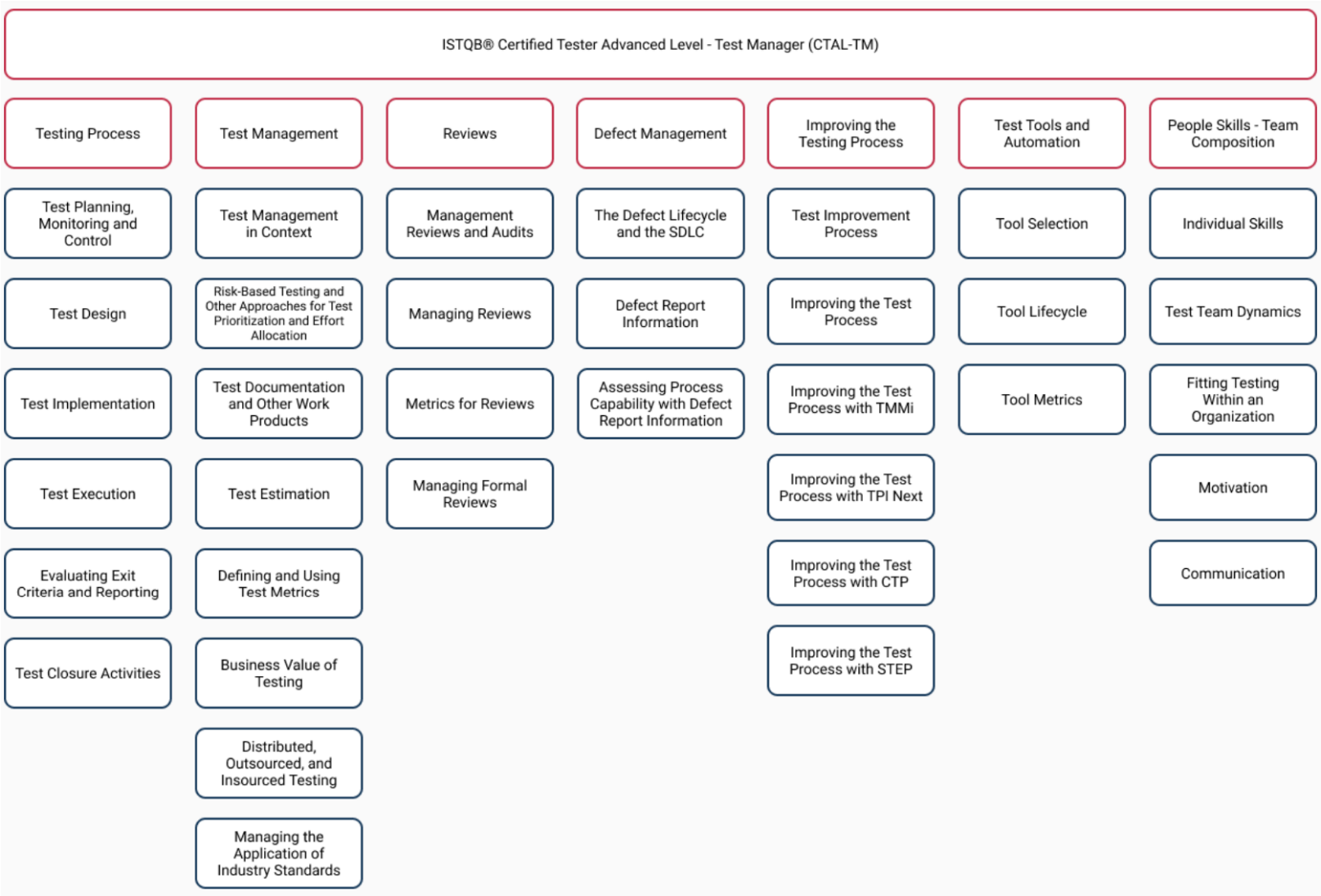


Figure 10 - ISTQB Advanced Test Manager Syllabus

5.3.3 The Expert Level

The Expert Level is aimed at the most senior test engineers who are tasked with operating strategically typically at group or organizational levels. They will be tasked with setting test engineering strategy, process, management and similar activities. People entering this stream will generally hold 10 or more years' experience as a test engineer, with at least 2-years in specialist roles, such as Test Management, Process Definition, Maturity Assessment and other key tasks.

Figure 11 - ISTQB Test Expert Level

This level is significant for organizations in that people who qualify from it will be able to undertake Test Assessments, Establish Maturity of People and Process against industrial models and, importantly, set the frameworks for the entire test engineering process and its operation. These are key assets for an organization that will pay dividends many times over the cost of investment.

The Expert level comprises two-key subjects:

1. **Test Management**, which involves passing all three management exams to be awarded an Expert Test Management certificate;
2. **Improving the Test Process**, which involves passing Assessing Test Process and Implementing Test Process Improvement exams to be awarded an Expert certificate in Improving the Test Process.

Certificates awarded are valid for a period of 7-years, following which an assessment must be undertaken to retain the certificate.

People attempting to obtain a certificate at this level must first have sat and passed an Advanced Test Manager exam.

5.3.3.1 The Expert Improving the Test Process

The 'Expert Improving the Test Process' consists of two modules, both of contribute to the overall 'Expert Improving the Test Process' certificate. That is, a certificate is awarded only once both modules have been sat and a successful exam sat.

5.3.3.1.1 Expert Assessing the Test Process

Assessing the Test Process (CTEL-ITP-ATP) certification helps prepare individuals to fulfil the specific expert role within their organization or project, and more specifically to assess and advise on test process improvement. It covers the context of improvement, recognized models for improvement, analytic approaches, selection of an approach, and initiation of the process.

It addresses key subjects that include:

- The Basic Context of Improvement;
- Model Based Improvement;
- Analytical Based Improvement;
- Selecting the Approach for Test Process Improvement;
- Process for Improvement.

The syllabus is shown on page 25 and can downloaded here. The pass mark is 65% for the exam, which has two parts:

- Multiple choice over 45 minutes;
- Written response over 90-munites;

People awarded an overall Expert Improving the Test Process certificate should expect the following business-based outcomes:

- Lead programs for improving the testing process within an organization or project and can identify and manage critical success factors;
- Take appropriate business-driven decisions on how to approach improvement to the test process;
- Assess the current status of a test process, propose stepwise improvements and show how these are linked to achieving business goals;
- Set up a strategic policy for improving the testing process and implement that policy;
- Analyze specific problems with the test process and propose effective solutions;
- Create a test improvement plan which meets business objectives;
- Develop organizational concepts for improvement of the test process which include required roles, skills and organizational structure;
- Establish a standard process for implementing improvement to the test process within an organization;
- Manage the introduction of changes to the test process, including co-operation with the sponsors of improvements;
- Understand and effectively manage the human issues associated with assessing the test process and implementing necessary changes.

This is part 1 of Improving the Test Process. For Part 2 of the CTEL-ITP certification, refer to *Expert Implementing Test Process.*

5.3.3.1.2 ISTQB Expert – Assessing the Test Process Syllabus

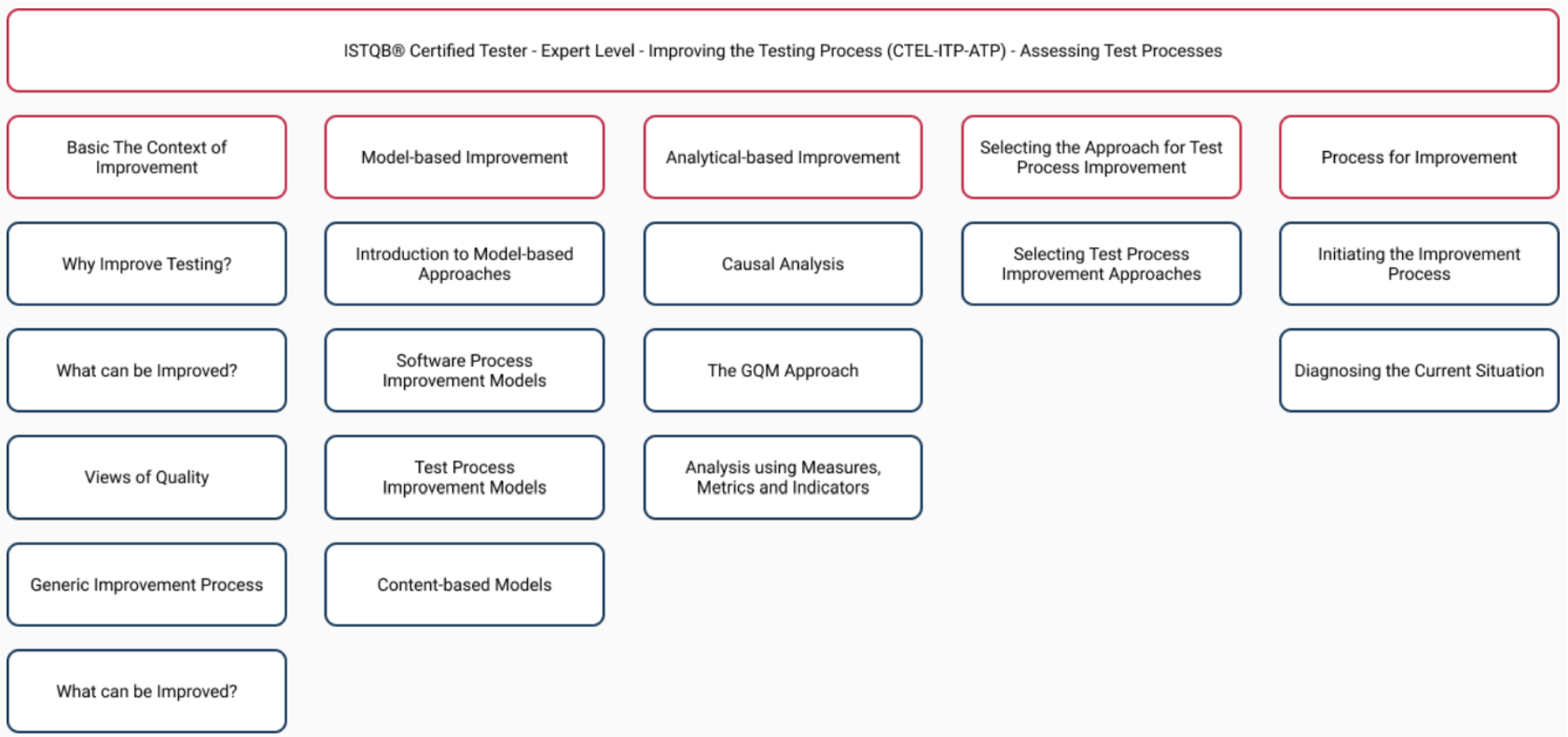


Figure 12 – ISTQB Expert: Assessing the Test Process Syllabus

5.3.3.1.3 Expert Implementing Test Process Improvement

Implementing Test Process Improvement helps prepare individuals to fulfil the specific expert role within their organization or project, and more specifically to ensure that the implementation of test process improvements within their organization or project takes place effectively and stands the best chance of success. It covers the improvement process, organization considerations, change management, and success factors.

It addresses key subjects that include:

- Process for Improvement;
- Organization, Roles & Skills;
- Managing Change;
- Critical Success Factors;
- Adapting to Different Life Cycle Models.

The syllabus is shown on page *27* and can be further downloaded here. The pass mark is 65% for the exam, which has two parts:

- Multiple choice over 45 minutes;
- Written response over 90-munites;

People awarded an overall Expert Improving the Test Process certificate should expect the following business-based outcomes:

- Lead programs for improving the testing process within an organization or project and can identify and manage critical success factors;
- Take appropriate business-driven decisions on how to approach improvement to the test process;
- Assess the current status of a test process, propose stepwise improvements and show how these are linked to achieving business goals;
- Set up a strategic policy for improving the testing process and implement that policy;
- Analyze specific problems with the test process and propose effective solutions;
- Create a test improvement plan which meets business objectives;
- Develop organizational concepts for improvement of the test process which include required roles, skills and organizational structure;
- Establish a standard process for implementing improvement to the test process within an organization;
- Manage the introduction of changes to the test process, including co-operation with the sponsors of improvements;
- Understand and effectively manage the human issues associated with assessing the test process and implementing necessary changes.

5.3.3.1.4 ISTQB Expert – Improving the Test Process Syllabus

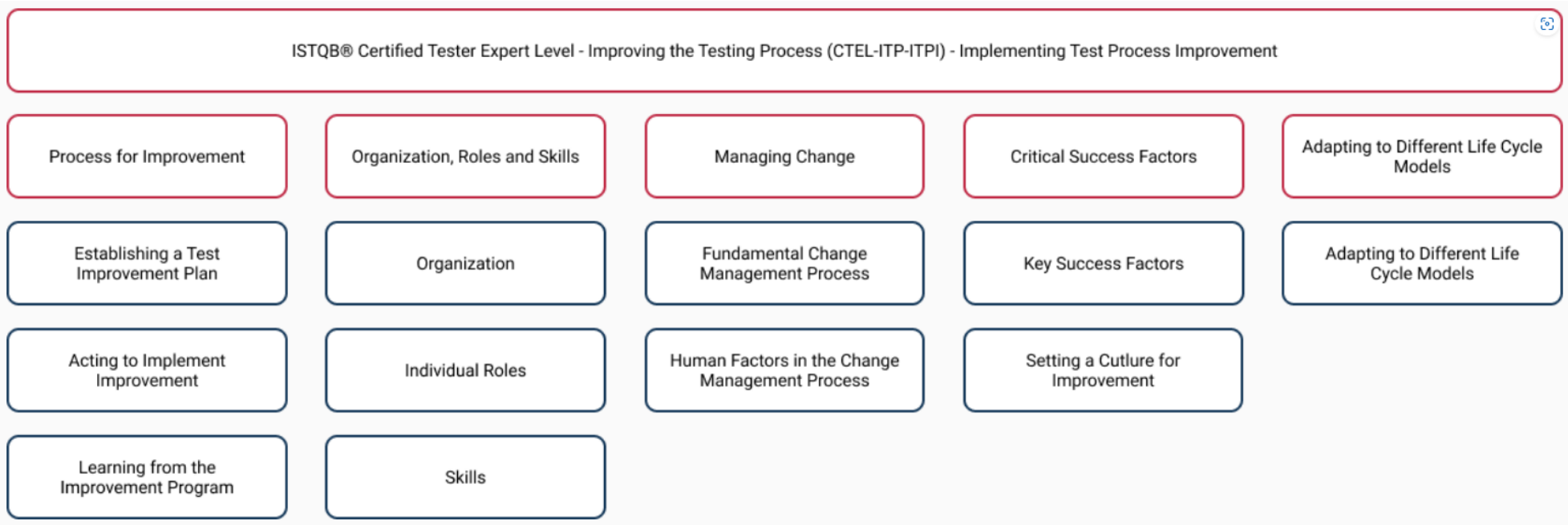


Figure 13 – ISTQB Expert: Improving the Test Process Syllabus

5.3.3.2 The Expert Test Management Certification

The 'Expert Test Management' consists of three modules, all of which contribute to the overall 'Expert Test Management' certificate. That is, a certificate is awarded only once all three modules have been sat and a successful exam sat.

It is a complex certificate that examines the Test Manager's capability to operate across the organizational spectrum to set:

- Frameworks for Test Management;
- Operating and executing large scale test programmes, such as major integrations following acquisitions, and similar;
- Managing the test team to meet organization needs and those of people in their teams to increase their knowledge, capability and competence to grow and climb their own career ladder.

People passing all three exams are awarded an Expert Test Certificate that will be valid for 7-years, following which a further assessment is mandated to continue holding the certificate.

5.3.3.2.1 Expert Strategic Test Management

The 'Strategic Test Management' content within the overall, 3-part Test Management syllabus considers the purpose of testing or the test mission, and the relation between the test policy, the test strategy, and the test objectives. It addresses the effectiveness, efficiency, and satisfaction metrics for the test policy objectives. Integrating tools across the organization and testing as part of a larger set of quality management activities necessary to deliver quality software products and services are included, as well as the management of external relationships, most especially the merging of test strategies with third party organizations. This element of the qualification also looks at the test management considerations for different project lifecycle models.

It addresses key subjects that include:

- Test Missions, Policies, Strategies and Goals;
- Managing External Relationships;
- Managing Across the Organization;
- Testing Considerations for Domain and Project Factors;
- Evaluating Effectiveness and Efficiency.

The syllabus is shown on page 30 and can be further downloaded here. The pass mark is 65% for the exam, which has two parts:

- Multiple choice over 45 minutes;
- Written response over 90-minutes;

People awarded an overall Expert Test Management certificate should expect the following business-based outcomes:

- Lead the test management within an organization, project or program to identify and manage critical success factors with management commitment at CEO/Board level;
- Take appropriate business-driven decisions on a test management strategy and implement organization wide commitment and compliance based on quality KPIs;
- Assess the current status of the test management, propose stepwise improvements and show how these are linked to achieving business goals within the organizational context of test management (organization or project/program);

- Set up a strategic policy for improving the test management and the testing, and implement that policy in an organization;
- Analyze specific problems with the test management and its alignment with other roles or management areas in the project/organization, and propose effective solutions;
- Create a master test plan with matching governance dashboard to meet or exceed the business objectives of the organization or a project/program;
- Develop innovative concepts for test management (project) organizations which include required roles, skills, methodologies (tools) and organizational structure;
- Establish a standard process for implementing test management in an organization (project/program) with standardized delivery based on quality KPIs;
- Lead an organization to improve the test management process and manage the introduction of changes;
- Understand and effectively manage the human issues associated with test-project management and implement necessary changes.

5.3.3.2.2 ISTQB Expert – Strategic Test Management Syllabus

Figure 14 – ISTQB Expert Strategic Test Management Syllabus

5.3.3.2.3 Expert Operational Test Management

The 'Operational Test Management' content within the overall, 3-part Test Management syllabus considers the skills needed for the Test Manager to manage third party relationships including contractual, communication, integration, and verification of quality aspects. It covers the ability to create, build, and maintain relationships with other managers and other teams, as well as project management skills, including project risk management, and organizing and moderating effective retrospective meetings. Reporting and interpreting test results by evaluation of exit criteria is elaborated upon, and metrics are described which play a crucial role in the management of the test process. Release considerations for the Test Manager are also highlighted.

It addresses key subjects that include:

- Managing External Relationships;
- Project Management Essentials;
- Test Project Evaluation and Reporting;
- Test Considerations for Domain and Project Factors;
- Evaluating Effectiveness and Efficiency.

The syllabus is shown on page *32* and can be further downloaded here. The pass mark is 65% for the exam, which has two parts:

- Multiple choice over 45 minutes;
- Written response over 90-minutes;

People awarded an overall Expert Test Management certificate should expect the following business-based outcomes:

- Lead the test management within an organization, project or program to identify and manage critical success factors with management commitment at CEO/Board level;
- Take appropriate business-driven decisions on a test management strategy and implement organization wide commitment and compliance based on quality KPIs;
- Assess the current status of the test management, propose stepwise improvements and show how these are linked to achieving business goals within the organizational context of test management (organization or project/program);
- Set up a strategic policy for improving the test management and the testing, and implement that policy in an organization;
- Analyze specific problems with the test management and its alignment with other roles or management areas in the project/organization, and propose effective solutions;
- Create a master test plan with matching governance dashboard to meet or exceed the business objectives of the organization or a project/program;
- Develop innovative concepts for test management (project) organizations which include required roles, skills, methodologies (tools) and organizational structure;
- Establish a standard process for implementing test management in an organization (project/program) with standardized delivery based on quality KPIs;
- Lead an organization to improve the test management process and manage the introduction of changes;
- Understand and effectively manage the human issues associated with test-project management and implement necessary changes.

5.3.3.2.4 ISTQB Expert – Operational Test Management Syllabus

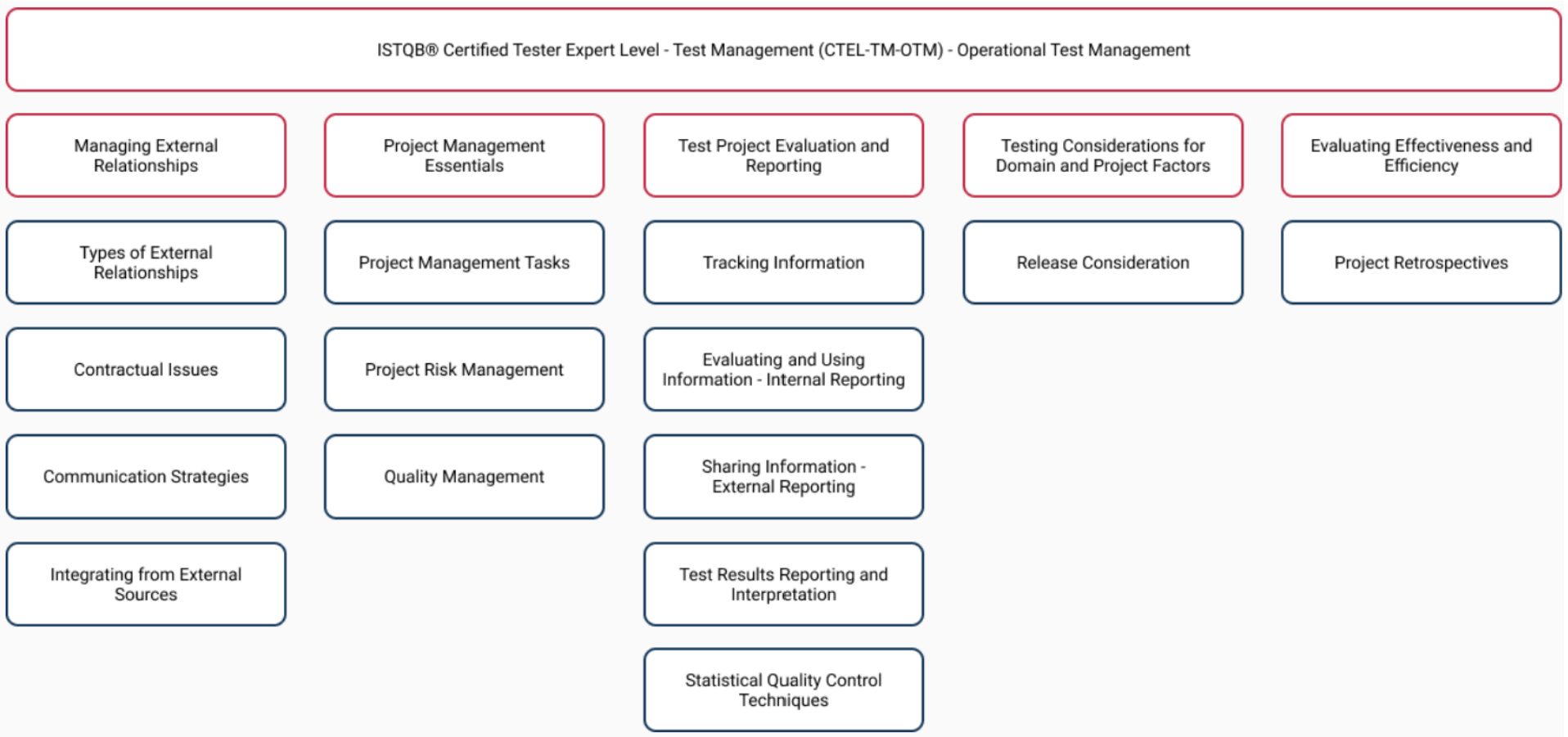


Figure 15 – ISTQB Expert Operational Test Management Syllabus

5.3.3.2.5 Expert Managing the Test Team

The 'Managing' content within the overall, 3-part Test Management syllabus considers the people management skills that are a critical part of the Test Manager's role and necessary to build, develop and lead test teams in organizations. This includes recruitment, setting goals and objectives, individual personalities and roles within teams, performance reviews, motivating and challenging the team and managing distributed teams. Being able to manage across the organization is another core part of the Test Manager's role including being able to advocate, defend and promote the test team and its contribution to the organization, being able to communicate with stakeholders, advocating quality across the organization and being able to manage ethical issues.

There are only two primary subjects, this part of the Test Management certification considers strategic subjects including:

- Managing the Test Team;
  - Building the Test Team;
  - Developing the Test Team;
  - Leading the Test Team.
- Managing Across the Organization.
  - Advocating the Test Team;
  - Placement of the Test Team;
  - Stakeholder Communication;
  - Managing Ethical Issues.

The syllabus is shown on page *35* and can be further downloaded here. The pass mark is 65% for the exam, which has two parts:

- Multiple choice over 45 minutes;
- Written response over 90-minutes;

People awarded an overall Expert Test Management certificate should expect the following business-based outcomes:

- Lead the test management within an organization, project or program to identify and manage critical success factors with management commitment at CEO/Board level;
- Take appropriate business-driven decisions on a test management strategy and implement organization wide commitment and compliance based on quality KPIs;
- Assess the current status of the test management, propose stepwise improvements and show how these are linked to achieving business goals within the organizational context of test management (organization or project/program);
- Set up a strategic policy for improving the test management and the testing, and implement that policy in an organization;
- Analyze specific problems with the test management and its alignment with other roles or management areas in the project/organization, and propose effective solutions;
- Create a master test plan with matching governance dashboard to meet or exceed the business objectives of the organization or a project/program;
- Develop innovative concepts for test management (project) organizations which include required roles, skills, methodologies (tools) and organizational structure;
- Establish a standard process for implementing test management in an organization (project/program) with standardized delivery based on quality KPIs;
- Lead an organization to improve the test management process and manage the introduction of changes;

- Understand and effectively manage the human issues associated with test-project management and implement necessary changes.

5.3.3.2.6 ISTQB Expert – Managing the Test Team Syllabus

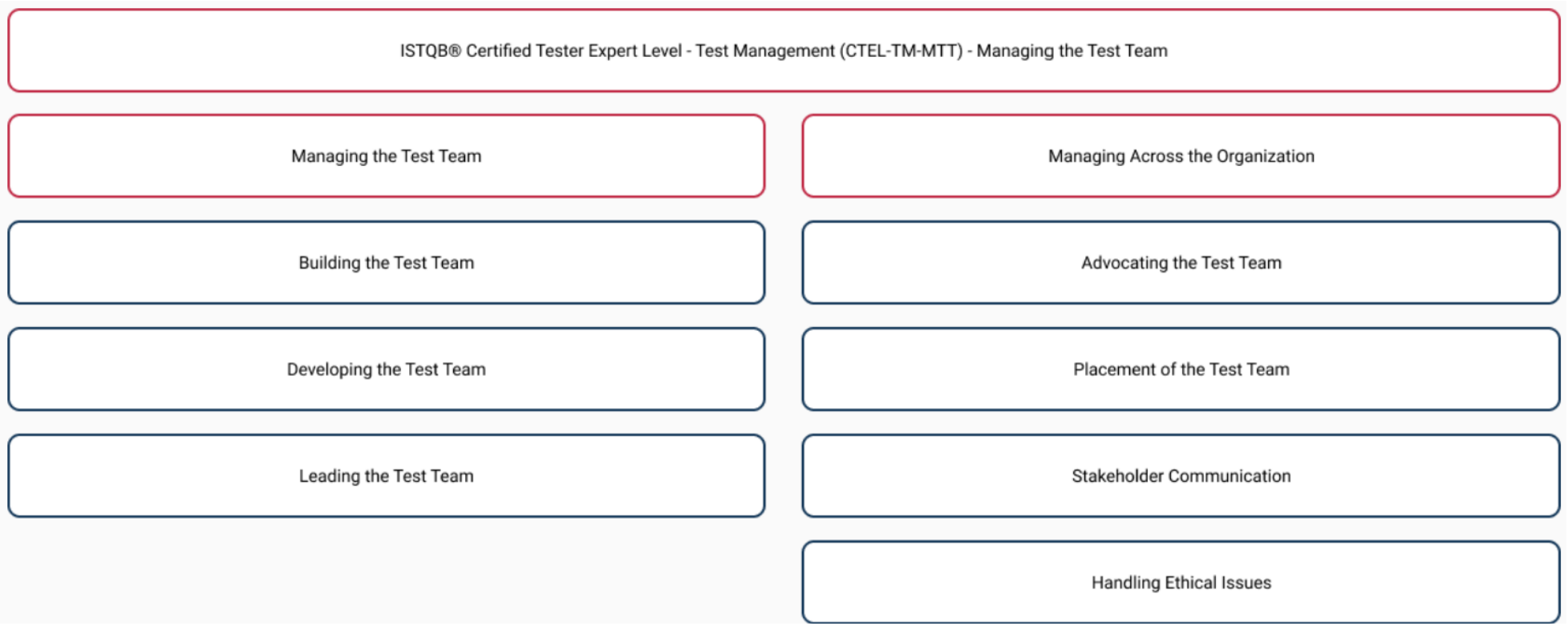


Figure 16 – ISTQB Expert Managing the Test Team Syllabus

5.4 The Agile Stream

The Agile stream contains only 3 units, but collectively they serve to fulfil the needs of foundation level agile testing through to the differing roles and aspects of a large, distributed agile project.

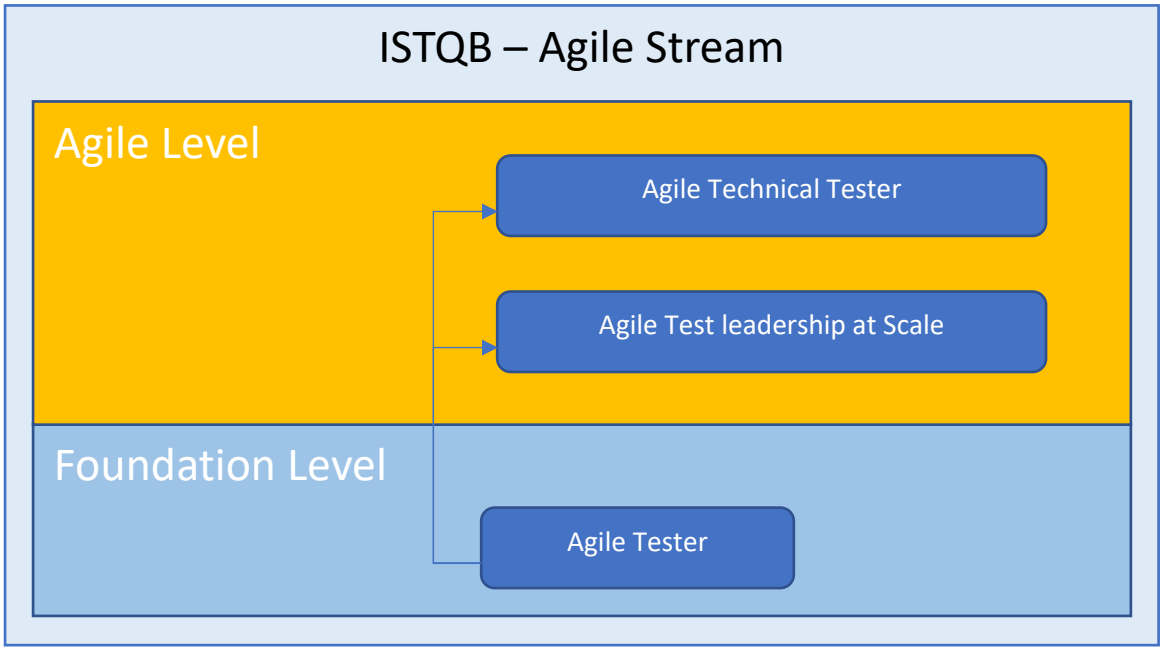


Figure 17 – ISTQB Agile Stream

Building on the principles taught at Foundation Level, the stream contains:

- **Agile Tester**, which must be passed before venturing in the either of the higher-level certifications within the stream. Note: Holders of an IISTQB Foundation certificate at Version 4 or later need not obtain an Agile Tester certification before embarking on the other certifications in this stream.
- **Agile Technical Tester** for those wishing to progress on a technical route, rather than management of larger agile projects.

There is no interdependency between the two Agile Level Certifications; although to attempt them requires a prior pass at Foundation Level – Agile Tester or Foundation Level (Version 4 or above).

5.4.1 The Agile Tester:

The syllabus addresses in detail:

- Agile Software Development;
- Findamental Agile Testing Principles & Processes;
- Agile Training Methods, Techniques & Tools.

The syllabus is shown on page *38*, and can be further downloaded here. The exam is multiple choice, with at least 26 questions from 40 being answered correctly over 60-minutes.

People sitting and passing an exam should expect the following business-based outcomes:

- Collaborate in a cross-functional Agile team being familiar with principles and basic practices of Agile software development;
- Adapt existing testing experience and knowledge to Agile values and principles;
- Support the Agile team in planning test-related activities;
- Apply relevant methods and techniques for testing in an Agile project;
- Assist the Agile team in test automation activities;

- Assist business stakeholders in defining understandable and testable user stories, scenarios, requirements, and acceptance criteria as appropriate;
- Work and share information with other team members using effective communication styles and channels.

5.4.1.1 ISTQB Agile Tester Syllabus

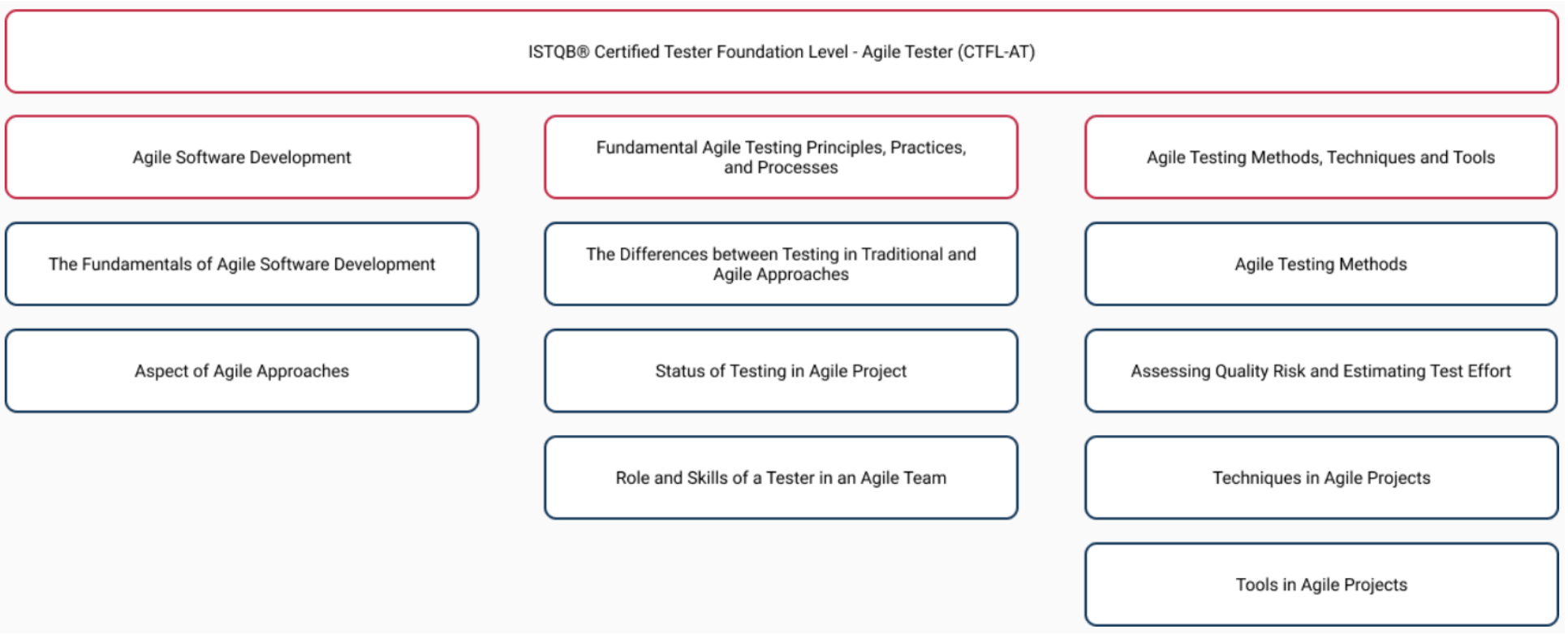


Figure 18 - ISTQB Foundation - Agile Tester Syllabus

5.4.2 Agile Technical Tester

The ISTQB® Advanced Level Agile Technical Tester (CTAL-ATT) certification provides a thorough introduction to the technical testing skills which are fundamental in organizations using an Agile development approach. These skills include testing and agile techniques, test automation approaches, and continuous deployment and delivery.

The syllabus addresses in detail:

- Agile Software Development;
- Findamental Agile Testing Principles & Processes;
- Agile Training Methods, Techniques & Tools.

The syllabus is shown on page *40*, and can be further downloaded here. The exam is multiple choice, with 40 questions of variable value that offer a combined value of 64 points. The point pass mark is set at 42 over 90-munites to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Apply Agile techniques to ensure tests that provide adequate coverage;
- Define testable requirements within Agile Team;
- Create and implement various Agile Test approaches using appropriate techniques;
- Support and contribute to test automation activities in an Agile project;
- Support continuous integration in an Agile Team;
- Support Agile Team in continuous delivery and deployment;
- Learn the service virtualization concepts;
- Work with, and share information with, other team members using effective communication styles and channels.

5.4.2.1 ISTQB Agile Technical Tester Syllabus

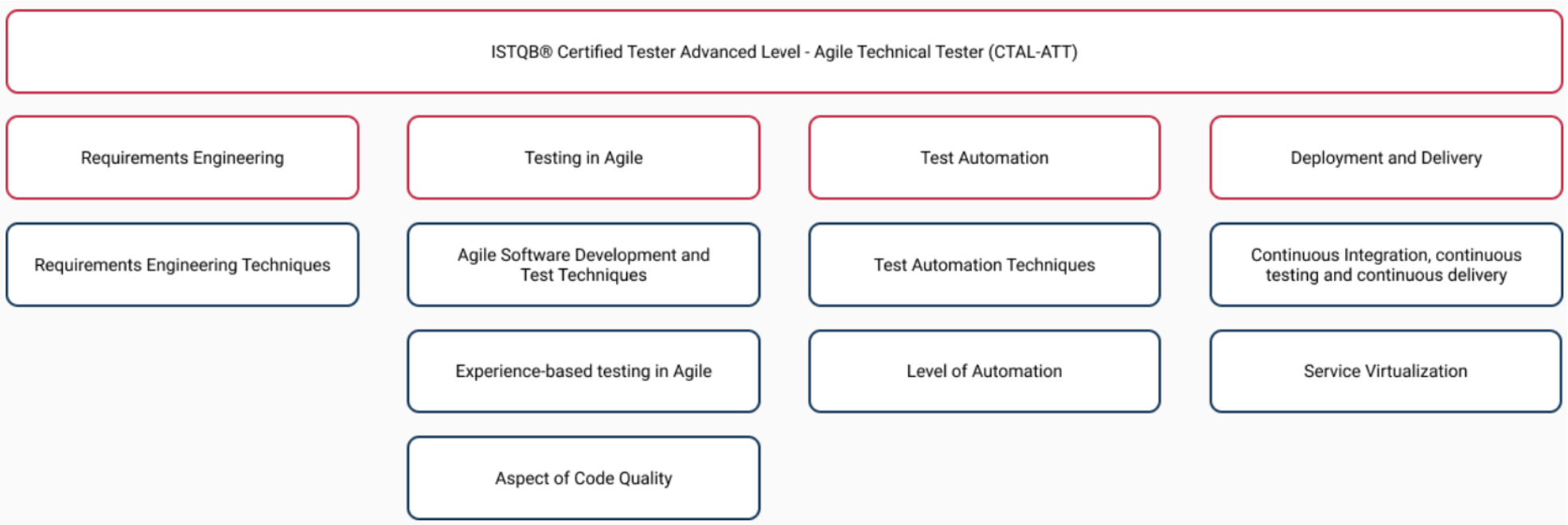


Figure 19 – ISTQB Agile Technical Tester Syllabus

5.4.3 Agile Test Leadership at Scale

The Agile Test Leadership at Scale (CTAL-ATLaS) certification focuses on how to organize and improve quality and testing across multiple teams in an agile organization. It also covers how to approach quality and testing at a strategic level in order to achieve higher business agility in an organization. CTAL-ATLaS covers how to scale testing and quality assurance efforts by fostering a quality mindset and culture across the organization. This includes shifting from a traditional test management approach typically used in sequential development models to a quality assistance approach which builds on Lean and Agile principles and values. It also includes how to adopt common Lean and Agile techniques and processes for analyzing and solving problems and how to use them to improve testing and quality in the organization.

At the time of writing, ATLaS is being developed as a series of certifications that build into an overall certificate. At this time, it is advertised as being a 'Minimal Viable Product (MVP)' of several components for which an exam is available. People passing the exam now will be granted the full certification. As further products are added to ATLAS so will exams, and candidates will need to pass them all to be awarded the certification.

The syllabus addresses in detail:

- Quality Assurance;
- Improve Quality and Flow in a Vlaue-Driven Organization;
- Continuous Improvement of Quality and Testing.

The syllabus is shown on page *42*, and can be further downloaded here. The ATLaS body of knowledge provides further reading here. The exam is multiple choice, with 15 questions of variable value that offer a combined value of 25 points. The point pass mark is set at 17 over 45-munites to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Foster a value-driven quality mindset and culture.

5.4.3.1 ISTQB Agile Test Leadership at Scale (ATLaS)l Tester Syllabus

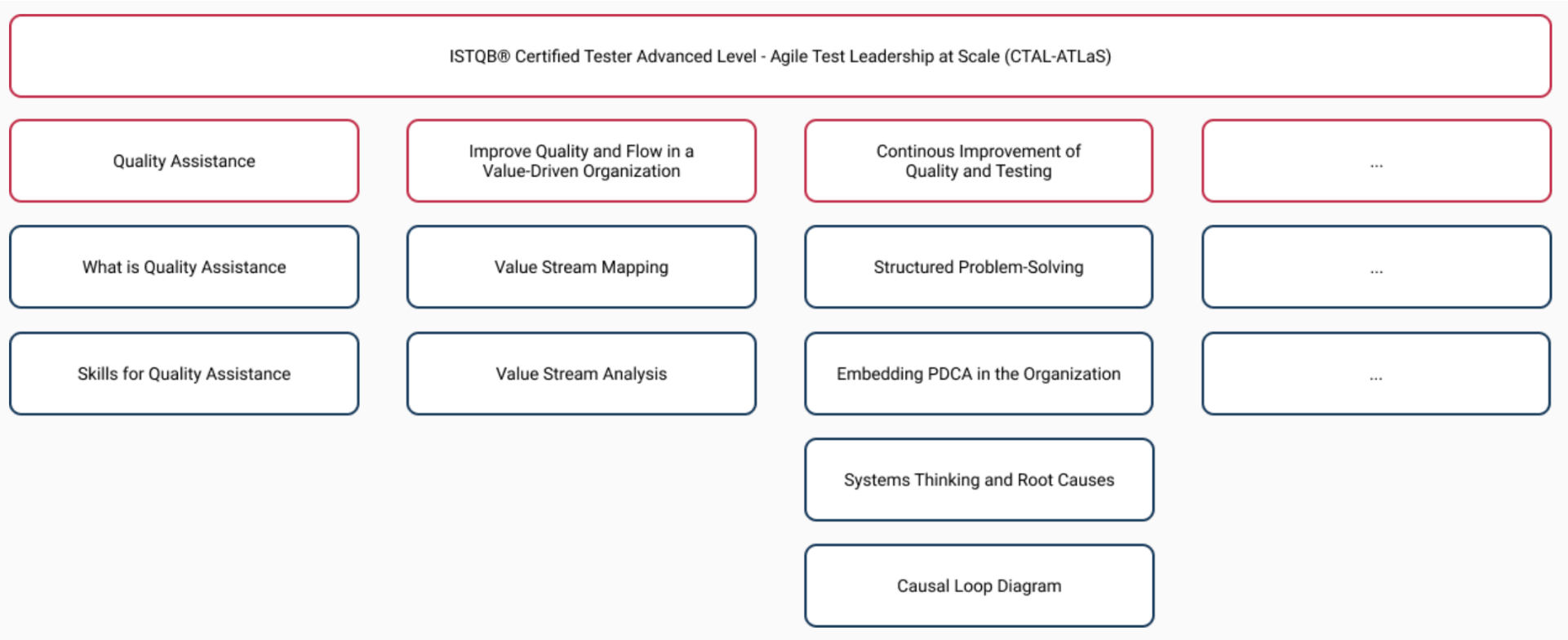


Figure 20 – ISTQB Agile Test Leadership at Scale (ATLaS) Syllabus

5.5 The Specialist Stream

The Specialist Stream contains a number of units that have been developed specifically to address:

- Non-functional Testing and its constituent parts;
- Industry specific requirements;
- Technical requirements.

It differs from the other streams in that it is boundless on what it can achieve as new qualifications are launched to expand upon the three-points immediately above, where the other qualifications specifically address the functional, strategic and management aspects of testing and test management.

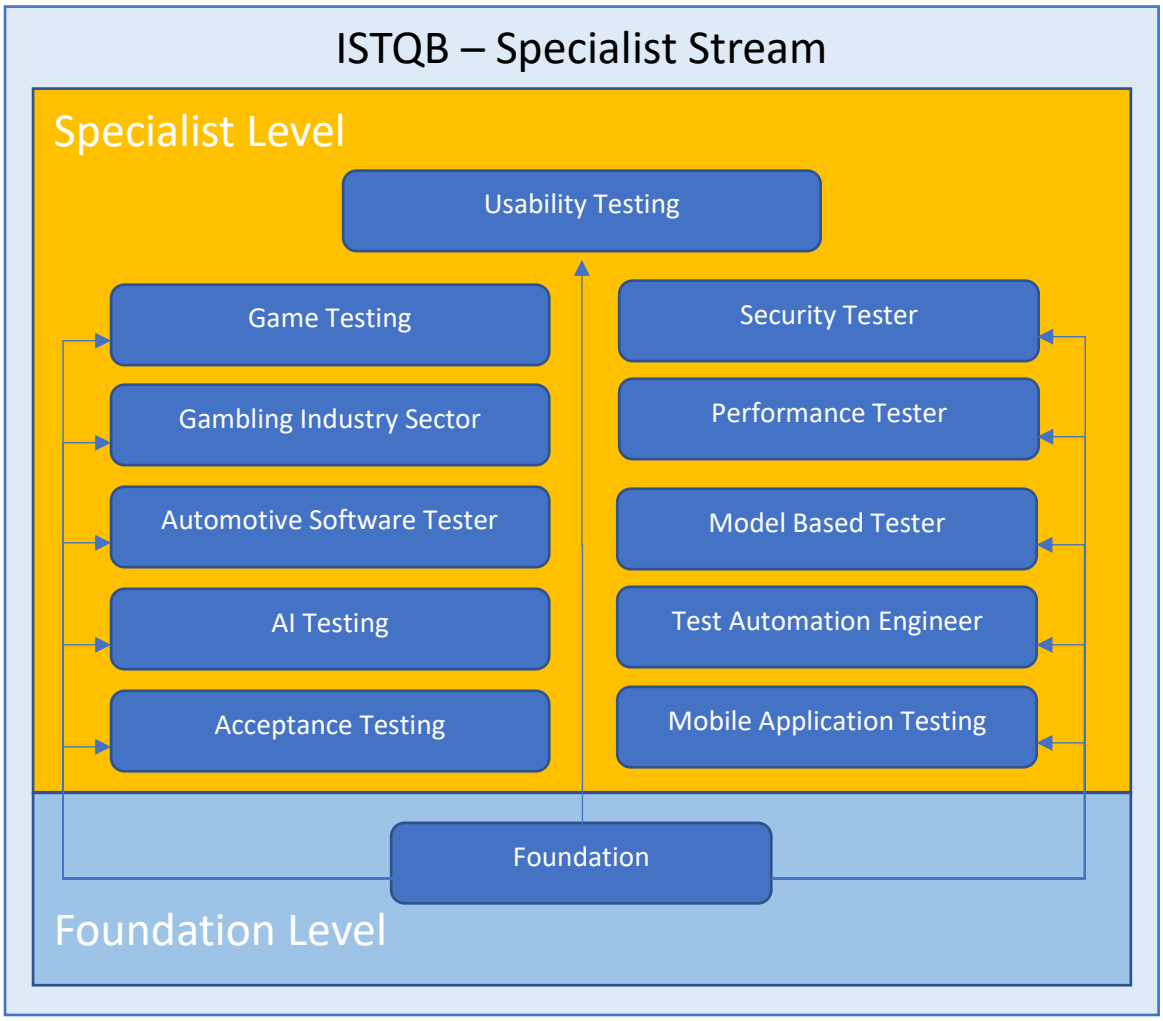


Figure 21 – ISTQB Specialist Stream

Building on the principles taught at Foundation Level, the Specialist stream contains 11 key syllabi, each constructed to meet specific requirements beyond the functional aspect options:

- **Usability Testing**, which looks at how systems are used, both in terms of flexibility and disability access.
- **Game Testing,** which has been developed to manage the complications of distributed games in real time**.**
- **Gambling Industry Sector**, developed specifically for organizations offering online betting, payment management, etc.

- **Automotive Software Tester,** developed specifically to manage the increasing complication of software in cards, such as satellite navigation, infotainment and internal systems management.
- **AI Testing,** developed to help testers plan and execute testing in the increasingly complex space of artificial Intelligence;
- **Acceptance Testing, addresses** User Acceptance, contractual & Regulatory Testing I.e., do systems meet all acceptance criteria in order for them to be made 'live.'
- **Security Tester**, an increasingly complex aspect of IT, the syllabus has bene developed to build security in, rather than afterwards;
- **Performance Tester,** which helps designers and specialists think about the performance of a system when made live and increased usage in the future;
- **Model Based Tester,** which helps develop models for te4sting, rather than a simple functional approach.
- **Test Automation Engineer** to help individuals build test automation strategies and frameworks.
- **Mobile Application Testing** for specifics to meet the needs of mobile and tablet-based applications.

People intending to sit and gain a certification in this stream will need to have obtained a certificate at Foundation level first.

There is no interdependency between the certifications in this stream; although to attempt them requires a prior pass at Foundation Level (at any Version level).

5.5.1 The Usability Tester

The Usability Tester focuses on usability testing methods and approaches. It covers set up procedures from a usability, user experience, and accessibility, as well as relevant standards and risks.

The syllabus addresses key subjects that include:

- Basic Concepts;
- Risks in Usability, User Experience and Accessibility;
- Usability and Accessibility Standards;
- Usability Reviews;
- Usability Testing;
- User Surveys;
- Selecting Appropriate Methods
- Summary of Roles and Responsibilities.

The syllabus is shown on page *46,* and can be further downloaded here. The exam is multiple choice, with 40 questions identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Understand the basic concepts of usability and usability testing;
- Identify and classify the severity of usability risks and potential accessibility violations in a given product at any stage of a development cycle;
- Cite relevant standards for usability, user experience, and accessibility and verify their implementation in a given product;

- Set up procedures so that stated usability, user experience and accessibility goals may be verified in practice for a given product;
- Design and monitor the implementation of a test plan for achieving stated usability, user experience and accessibility goals;
- Explain the rationale, process and results of usability, user experience and accessibility evaluations to non-specialist stakeholders.

5.5.1.1 ISTQB Usability Tester Syllabus

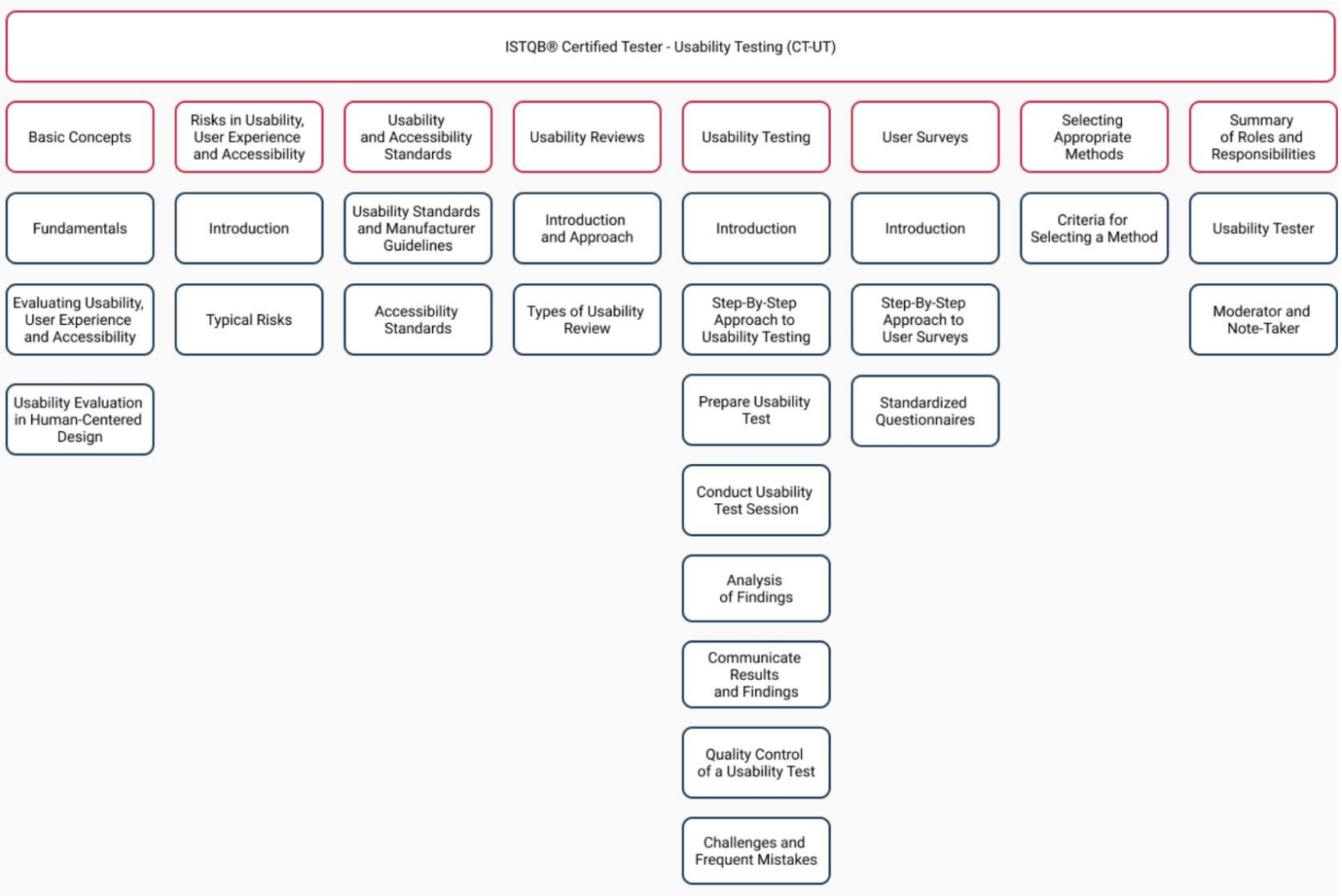


Figure 22 – ISTQB Usability Tester Syllabus

5.5.2 Game Testing

The Game Testing certification focusses on the understanding and skills needed to perform and manage testing on all levels in game projects. It covers the basic concepts of video and game testing as well as how to determine risks and goals for gaming software. It includes conceptually designing, implementing and executing game software tests, approaches to games testing (Game Testing Mechanics, Sound Testing, Graphics Testing and Localization) and recognizing games testing tools.

The syllabus addresses key subjects that include:

- Specificity of Game Testing;
- Testing Game Mechanics;
- Graphics Testing;
- Sound Testing;
- Game Level Testing;
- Game Controllers Testing;
- Localization Testing.

The syllabus is shown on page *48,* and can be further downloaded here. The exam is multiple choice, with 40 questions identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Describe basic concepts of video games and game software testing;
- Determine risks, goals and game software requirements under the needs and expectations of stakeholders;
- Conceptually design, implement and execute basic game software tests;
- Know the approaches to game software testing and their purpose;
- Recognize the tools supporting game testing;
- Determine how testing activities align with the software development lifecycle and reduce the cost of developing and publishing video games.

5.5.2.1 ISTQB Game Tester Syllabus

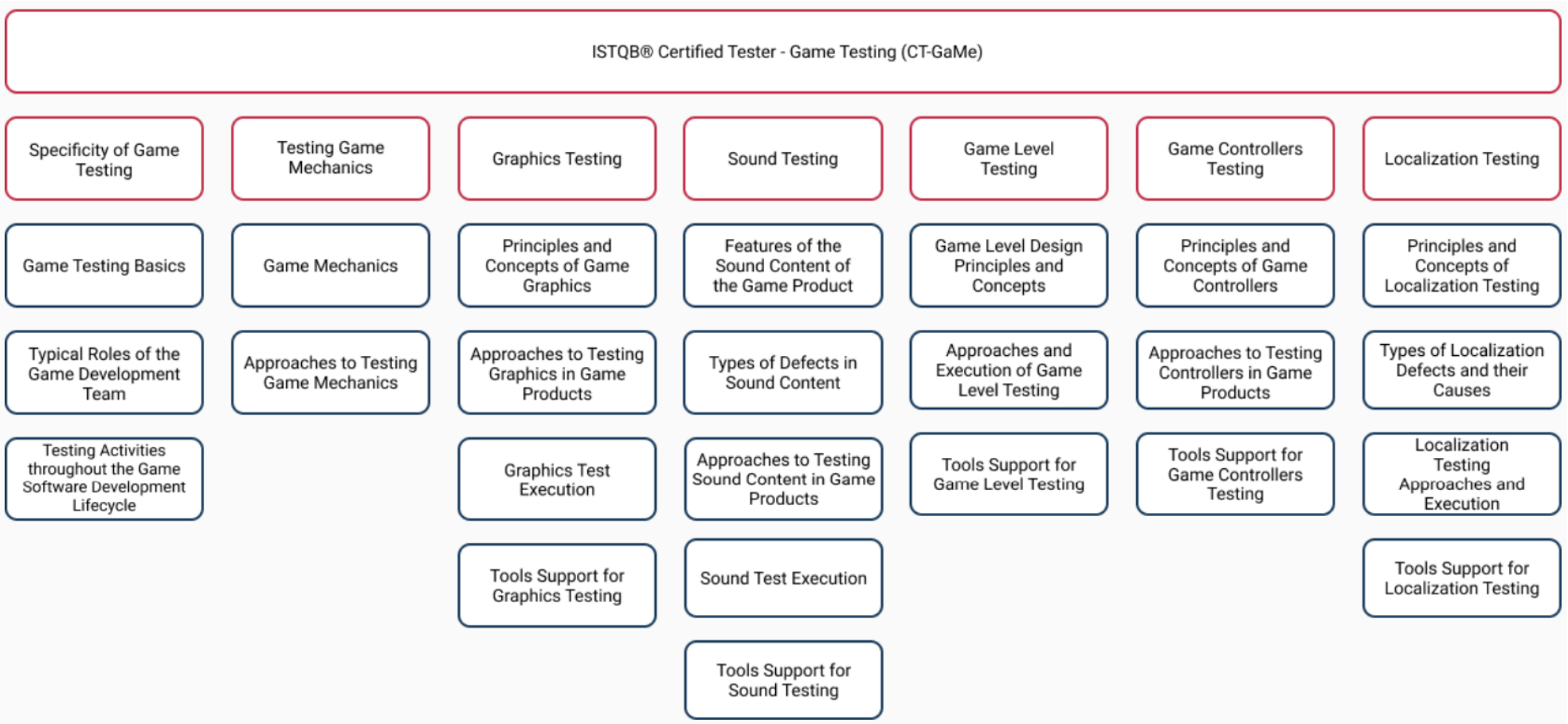


Figure 23 – ISTQB Game Tester Syllabus

5.5.3 Gambling Industry Sector

The Gambling Industry Tester (CT-GT) certification covers the key concepts in the gambling industry, the gambling industry ecosystem, and the different test types common to the gambling industry. It includes aspects such as gambling industry compliance testing, fun factor or player perspective testing, math testing, audio testing, multiplayer testing, and interoperability testing.

The syllabus addresses key subjects that include:

- Introduction to the Gambling Industry;
- The Gambling industry Ecosystems;
- Testing in the Gambling Industry.

The syllabus is shown on page *50,* and can be further downloaded here. The exam is multiple choice, with 40 questions identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Promote efficient and effective communication by using a common vocabulary inside the gambling industry;
- Understand specific quality attributes that require testing within the gambling industry;
- Understand typical test practices by describing the standard software development and testing methodologies within the gambling industry;
- Understand gambling hardware and software certification which is the main difference between the gambling industry and other industries;
- Use established techniques for designing tests aligned with gambling specific needs;
- Appreciate the importance of jurisdictions and regulatory bodies in the gambling industry.
- In general, a Certified Foundation Level Gambling Industry Tester Specialist is expected to have acquired the necessary skills to working effectively within a Gambling Industry testing team and environment.

5.5.3.1 ISTQB Gambling Industry Sector Syllabus

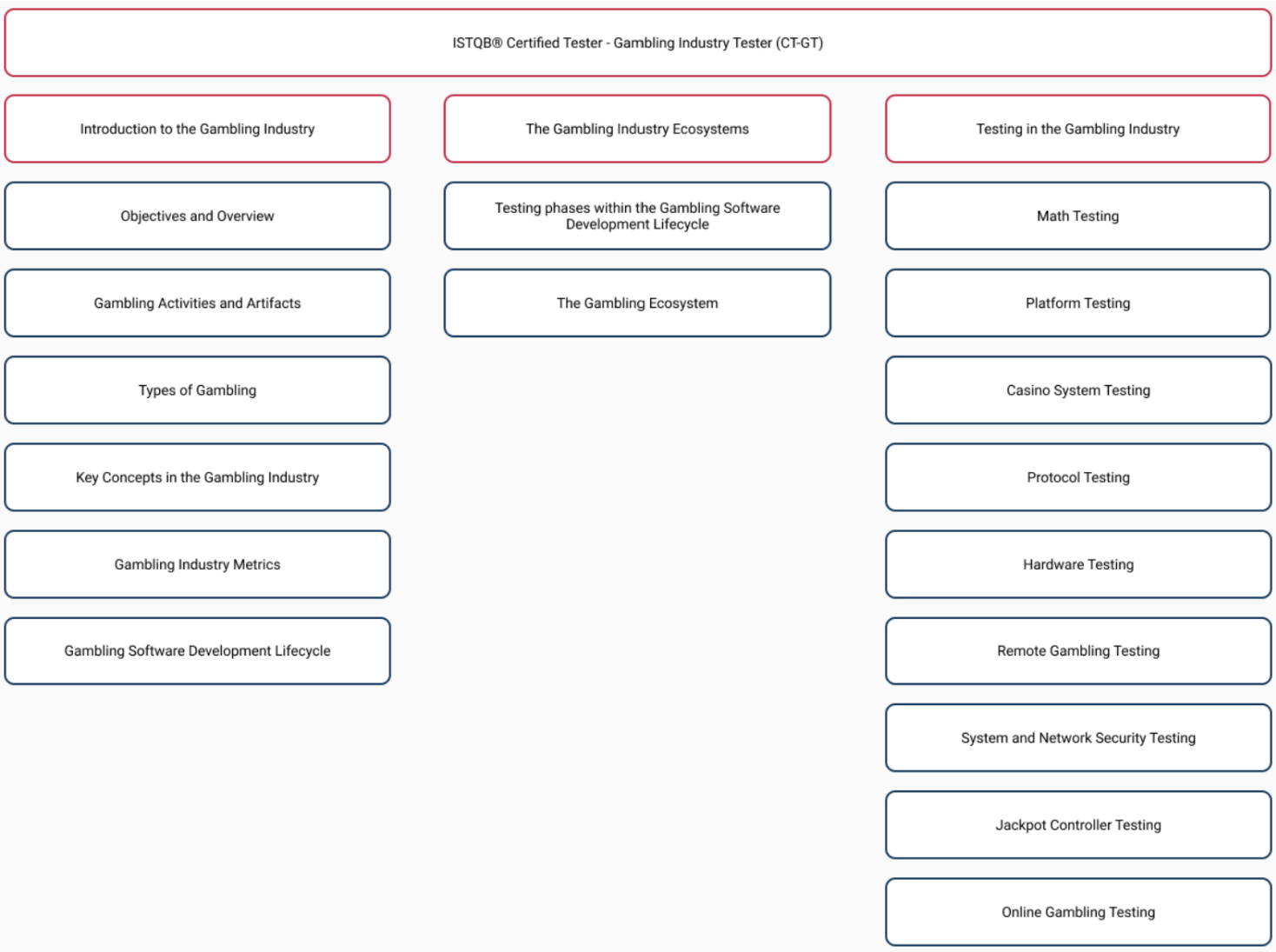


Figure 24 – ISTQB Gambling Industry Sector Syllabus

5.5.4 Automotive Software Tester

The Automotive Software Tester (CT-AuT) certification focuses on the specific requirements for "testing E/E systems" in the automotive environment on the basis of established standards (Automotive SPICE®, ISO 26262, AUTOSAR®, etc.). It also covers testing in virtual environments (including XiL), and automotive-specific static and dynamic test techniques.

The syllabus addresses key subjects that include:

- Introduction to Automotive Software Testing;
- Standards for the Testing of E/E Systems;
- Testing in a Virtual Environment;
- Automotive Specific Static and Dynamic Test Techniques.

The syllabus is shown on page *52*, and can be further downloaded here. The exam is multiple choice, with 40 questions identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Collaborate effectively in a test team;
- Adapt the test techniques known from the ISTQB® Certified Tester Foundation Level (CTFL®) to the specific automotive project requirements;
- Consider the basic requirements of the relevant automotive standards (Automotive SPICE®, ISO 26262, etc.) and select suitable test techniques;
- Apply the virtual test methods (e.g., HiL, SiL, MiL, etc.) in test environments.

5.5.4.1 ISTQB Automotive Tester Syllabus

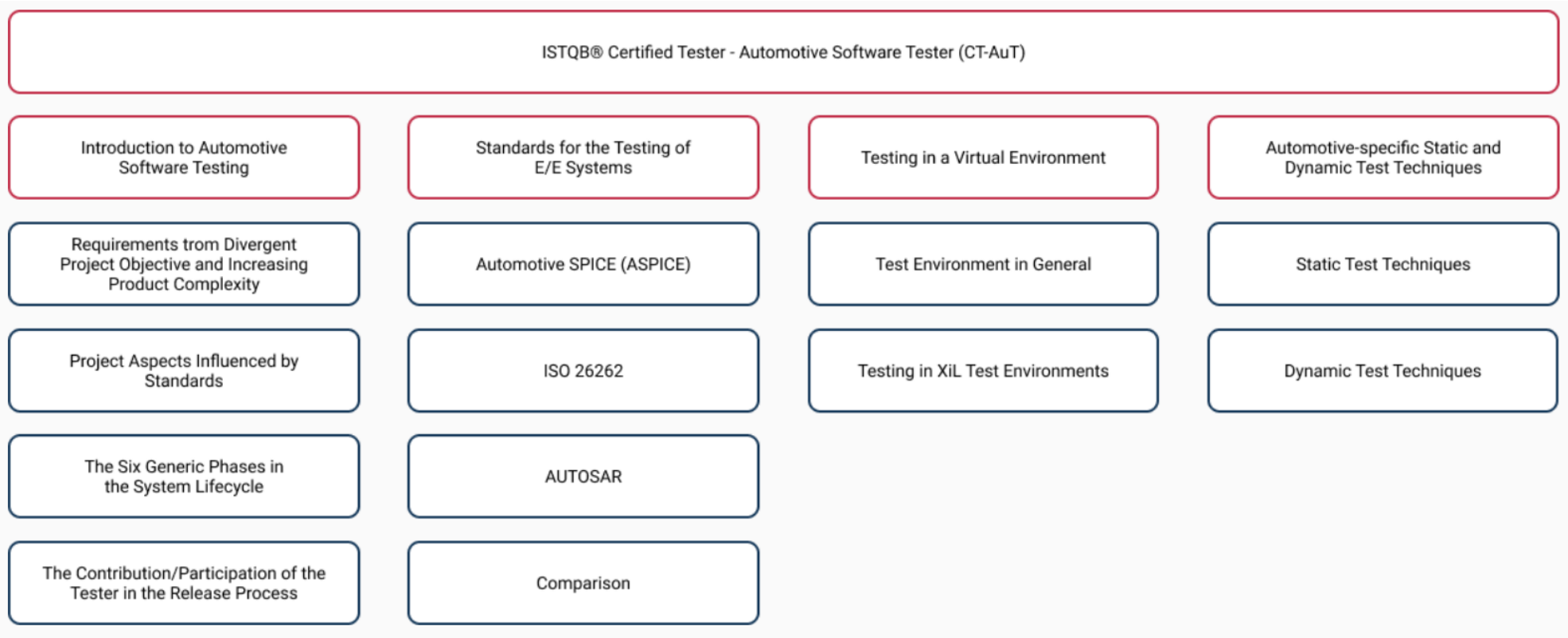


Figure 25 - ISTQB Automotive Tester Syllabus

5.5.5 Artificial Intelligence (AI) Testing

Increasingly in demand and growing in importance t out everyday lives, AI Testing (CT-AI) certification extends understanding of artificial intelligence and/or deep (machine) learning, most specifically testing AI-based systems and using AI in testing.

The syllabus addresses key subjects that include:

- Introduction to AI;
- Quality Characteristics for AI Based Systems;
- Machine Learning (ML) Overview;
- ML Data;
- ML Functional Performance Metrics;
- ML Neural Networks and Testing;
- Testing AI-Based Systems – Overview;
- Testing Ai Specific Quality Characteristics;
- Methods and Techniques for Testing of AI-Based Systems;
- Test Environments for AI-Based Systems;
- Using AI for Testing.

The syllabus is shown on page *54*, and can be further downloaded here. The exam is multiple choice, with 40 questions of varying value totalling 47 points. 31 points be gained in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Understand the current state and expected trends of AI;
- Experience the implementation and testing of a ML model and recognize where testers can best influence its quality;
- Understand the challenges associated with testing AI-Based systems, such as their self-learning capabilities, bias, ethics, complexity, non-determinism, transparency and explainability;
- Contribute to the test strategy for an AI-Based system;
- Design and execute test cases for AI-based systems;
- Recognize the special requirements for the test infrastructure to support the testing of AI-based systems;
- Understand how AI can be used to support software testing.

5.5.5.1 ISTQB Artificial Intelligence Tester Syllabus

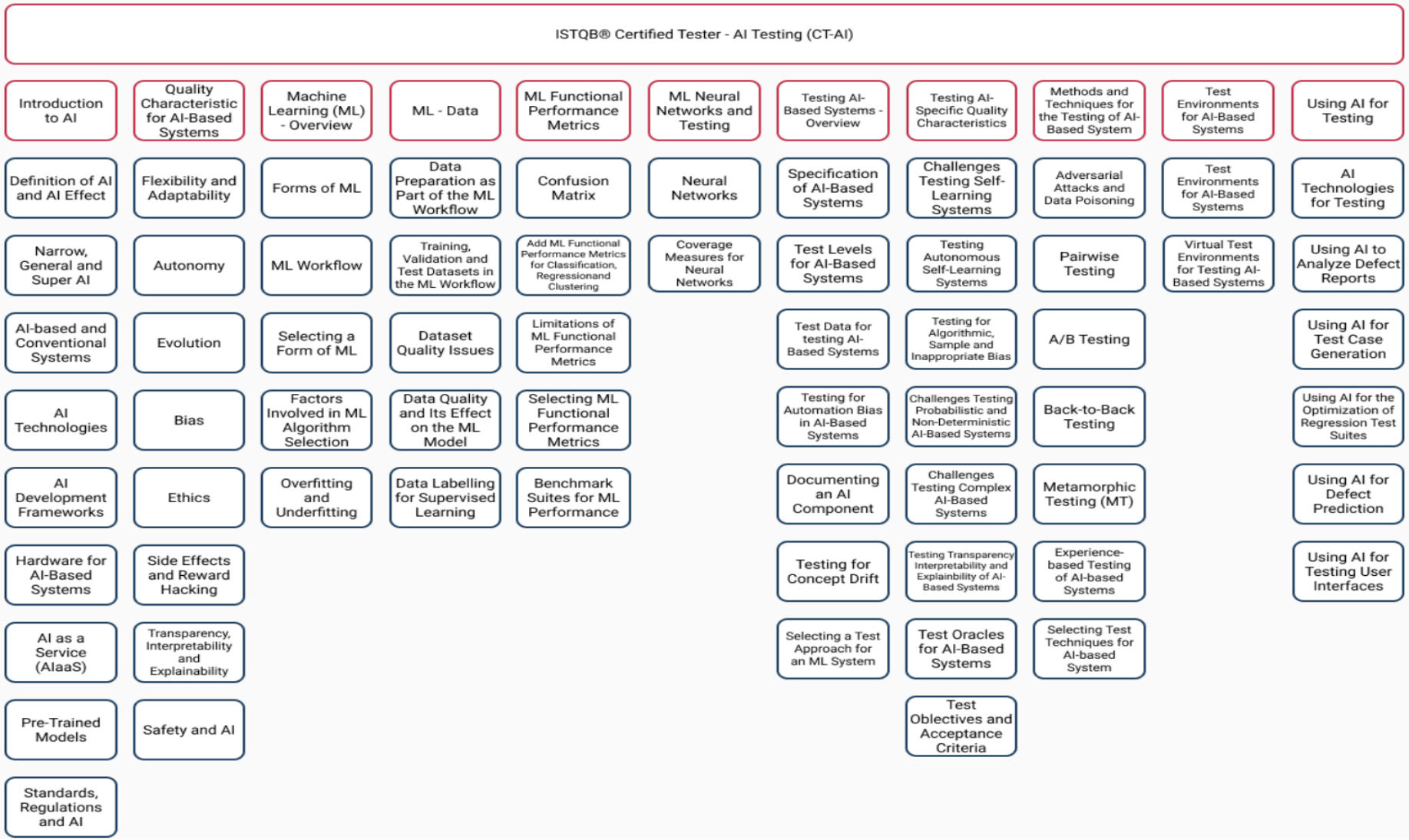


Figure 26 - ISTQB Artificial Intelligence Tester Syllabus

5.5.6 Acceptance Testing

The Acceptance Testing (CT-AcT) certification focuses on the concepts, methods, and practices of collaboration between product owners/business analysts and testers in acceptance testing. It covers user acceptance testing (UAT), contractual and regulatory acceptance testing, as well as alpha and beta testing.

The syllabus addresses key subjects that include:

- Introduction and Foundations;
- Acceptance Tests, Acceptance Criteria;
- Business Process and Business Rules Modelling;
- Acceptance Testing for Non-Functional Requirements.

The syllabus is shown on page *56* and can be further downloaded here. The exam is multiple choice, with 40 questions identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following outcomes:

For business analysts and product owners:

- Contribute to an organization's acceptance testing activities by participating in the acceptance test design phase and supporting the alignment of the product with the business requirements;
- Contribute to an organization's acceptance testing activities by participating in the acceptance test design phase and supporting the alignment of the product with the business requirements;
- Contribute to the quality of the acceptance testing process, including validation and verification of produced artifacts.

For testers:

- Contribute to the definition of acceptance criteria during the requirements definition phase;
- Collaborate efficiently with business analysts and other stakeholders during all acceptance testing activities:
- Understand the business objectives, communicate with business units, and share common objectives for acceptance testing.

5.5.6.1 ISTQB Acceptance Tester Syllabus

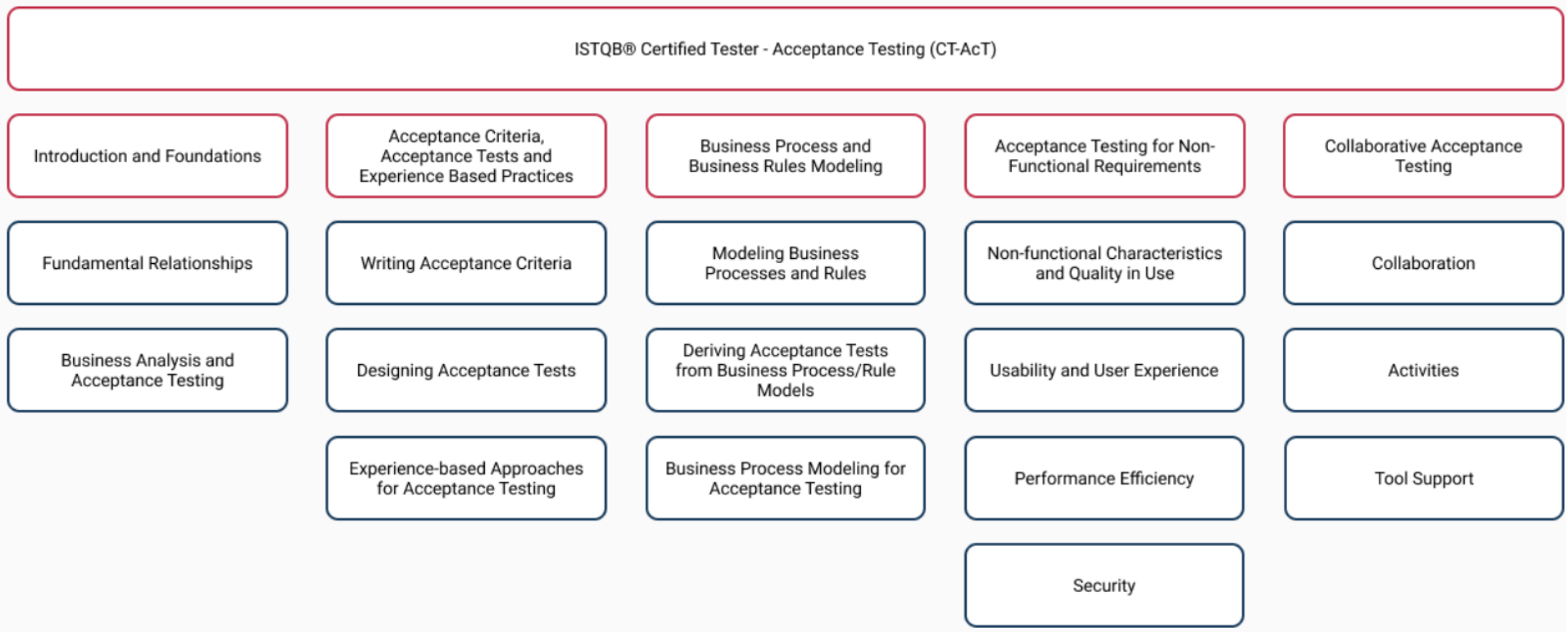


Figure 27 - ISTQB Acceptance Testing Syllabus

5.5.7 Security Tester

Increasingly important in today's world of widespread online fraud and hacking, the Security Tester (CT-SEC) certification focuses on planning, performing, and evaluating security tests from multiple perspectives including risk, requirements, vulnerability, and human factors. It also covers security testing tools and standards.

The syllabus addresses key subjects that include:

- The Basis of Security Testing;
- Security Testing Purpose, Strategy and Goals;
- Security Testing Processes;
- Security Testing Throughout the Software Lifecycle;
- Testing Security mechanisms;
- Human Factors in Security Testing;
- Security Test Evaluation and Reporting;
- Security Testing Tools;
- Standards and Industry Trends.

The syllabus is shown on page *58* and can be further downloaded here. The exam is multiple choice, with 48 questions of varying value totalling 80 points. 52 points need to be gained in 120-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Plan, perform and evaluate security tests from a variety of perspectives – policy-based, risk-based, standards-based, requirements-based and vulnerability-based.
- Align security test activities with project lifecycle activities.
- Analyze the effective use of risk assessment techniques in a given situation to identify current and future security threats and assess their severity levels.
- Evaluate the existing security test suite and identify any additional security tests.
- Analyze a given set of security policies and procedures, along with security test results, to determine effectiveness.
- For a given project scenario, identify security test objectives based on functionality, technology attributes and known vulnerabilities.
- Analyze a given situation and determine which security testing approaches are most likely to succeed in that situation.
- Identify areas where additional or enhanced security testing may be needed.
- Evaluate effectiveness of security mechanisms.
- Help the organization build information security awareness.
- Demonstrate the attacker mentality by discovering key information about a target, performing actions on a test application in a protected environment that a malicious person would perform, and understand how evidence of the attack could be deleted.
- Analyze a given interim security test status report to determine the level of accuracy, understandability, and stakeholder appropriateness.
- Analyze and document security test needs to be addressed by one or more tools.
- Analyze and select candidate security test tools for a given tool search based on specified needs.
- Understand the benefits of using security testing standards and where to find them.

5.5.7.1 ISTQB Security Tester Syllabus

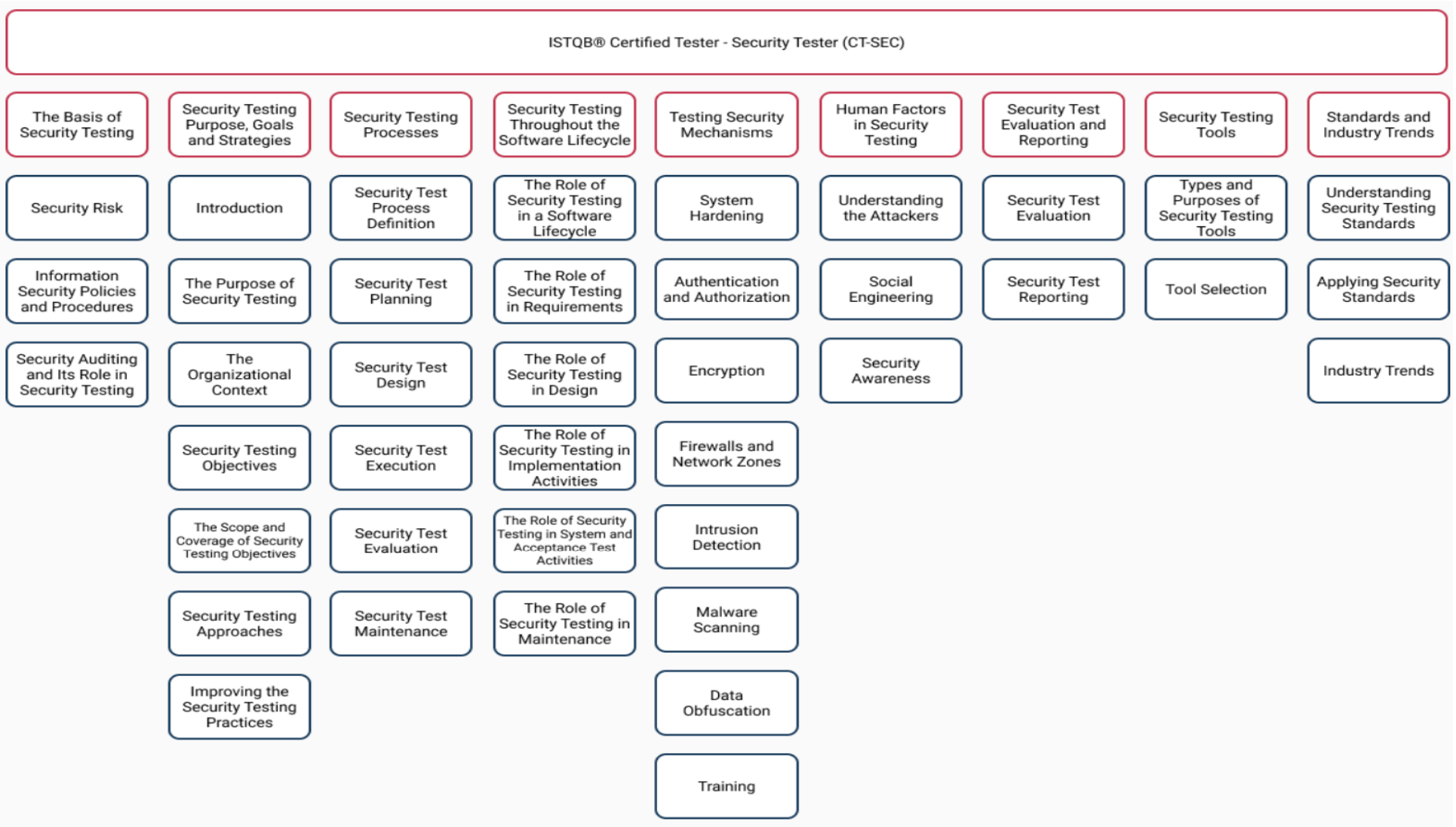


Figure 28 - ISTQB Security Tester Syllabus

5.5.8 Performance Tester

The Performance Testing (CT-PT) certification provides knowledge of the principal aspects of performance testing, including technical aspects, method-based aspects, and organizational aspects. Specifically pertaining to performance testing, it covers areas such as basic concepts, measurements, activities, tasks, and tools.

The syllabus addresses key subjects that include:

- Basic Concepts;
- Performance Measurement Fundamentals;
- Performance Testing in the Software Lifecycle;
- Performance Testing Tasks;
- Tools.

The syllabus is shown on page *60* and can be further downloaded here. The exam is multiple choice, with 40 questions identical value, of which 26 must be answered correctly in 90-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Understand the basic concepts of performance efficiency and performance testing;
- Define performance risks, goals, and requirements to meet stakeholder needs and expectations;
- Understand performance metrics and how to collect them;
- Develop a performance test plan for achieving stated goals and requirements;
- Conceptually design, implement, and execute basic performance tests;
- Analyze the results of a performance test and state implications to various stakeholders;
- Explain the process, rationale, results, and implications of performance testing to various stakeholders;
- Understand categories and uses for performance tools and criteria for their selection;
- Determine how performance testing activities align with the software lifecycle.

5.5.8.1 ISTQB Performance Tester Syllabus

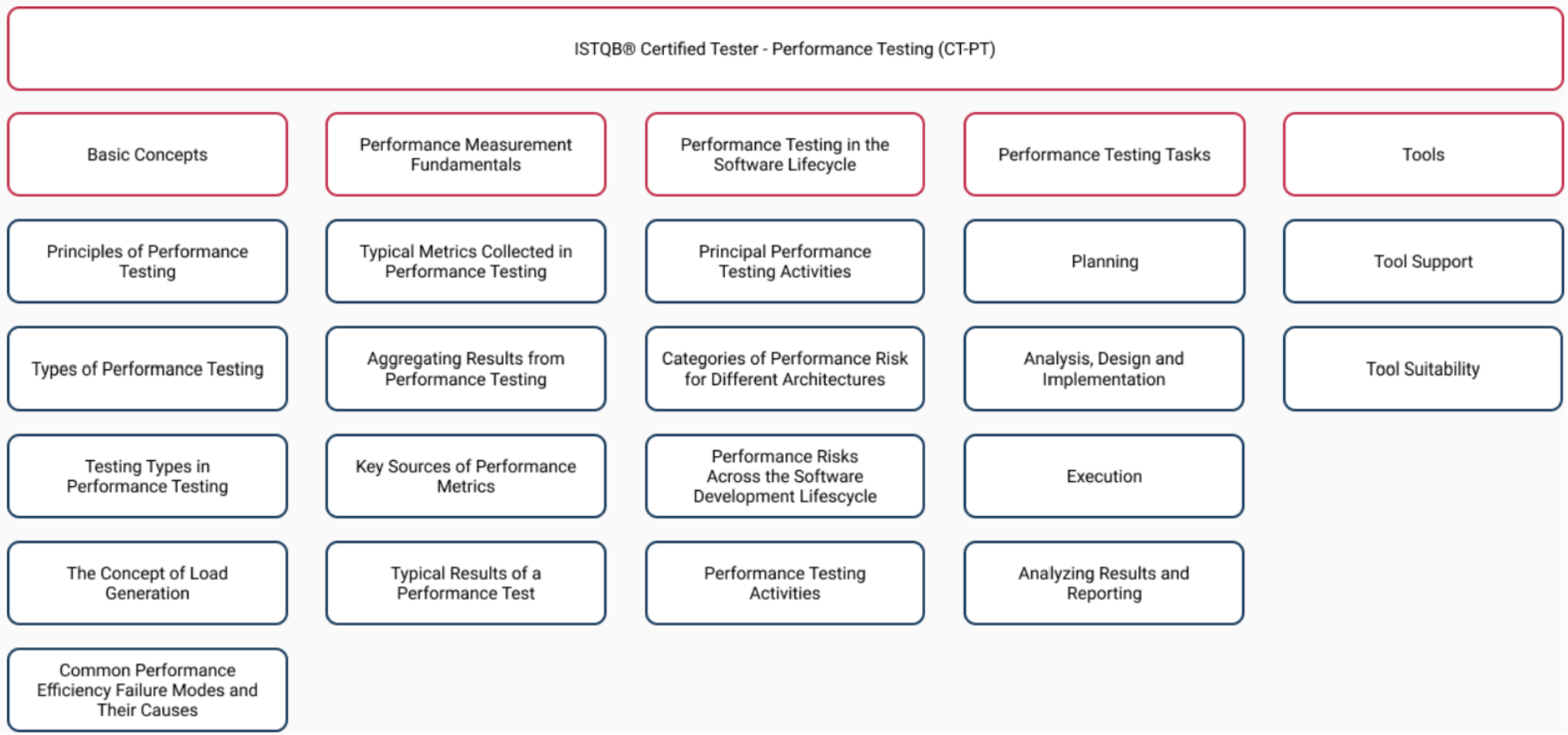


Figure 29 - ISTQB Performance Tester Syllabus

5.5.9 Model Based Tester

The Model-Based Testing (CT-MBT) certification focuses on an advanced test approach of using models for testing. It extends and supports classic test design techniques such as equivalence partitioning, boundary value analysis, decision table testing, state transition testing, and use case testing. It is an innovative approach to improve effectivity and efficiency of the test process.

The syllabus addresses key subjects that include:

- Introduction to Model Based Testing (MBT);
- MBT Modelling;
- Selection Criteria for Test Case Generation;
- MBT Test Implementation and Execution;
- Evaluating and Deploying an MBT Approach.

The syllabus is shown on page *62* and can be further downloaded here. The exam is multiple choice, with 40 questions of identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Collaborate in a model-based testing team using standard terminology and established MBT concepts, processes and techniques;
- Apply and integrate model-based testing in a test process;
- Effectively create and maintain MBT models using established techniques and best practices of model-based testing;
- Select, create and maintain test artifacts from MBT models considering risk and value of the features tested;
- Support the organization to improve its quality assurance process to be more constructive and efficient.
- In general, an ISTQB® Model-Based Tester has acquired the necessary skills to successfully contribute to MBT projects in a given context.

5.5.9.1 ISTQB Model Based Tester Syllabus

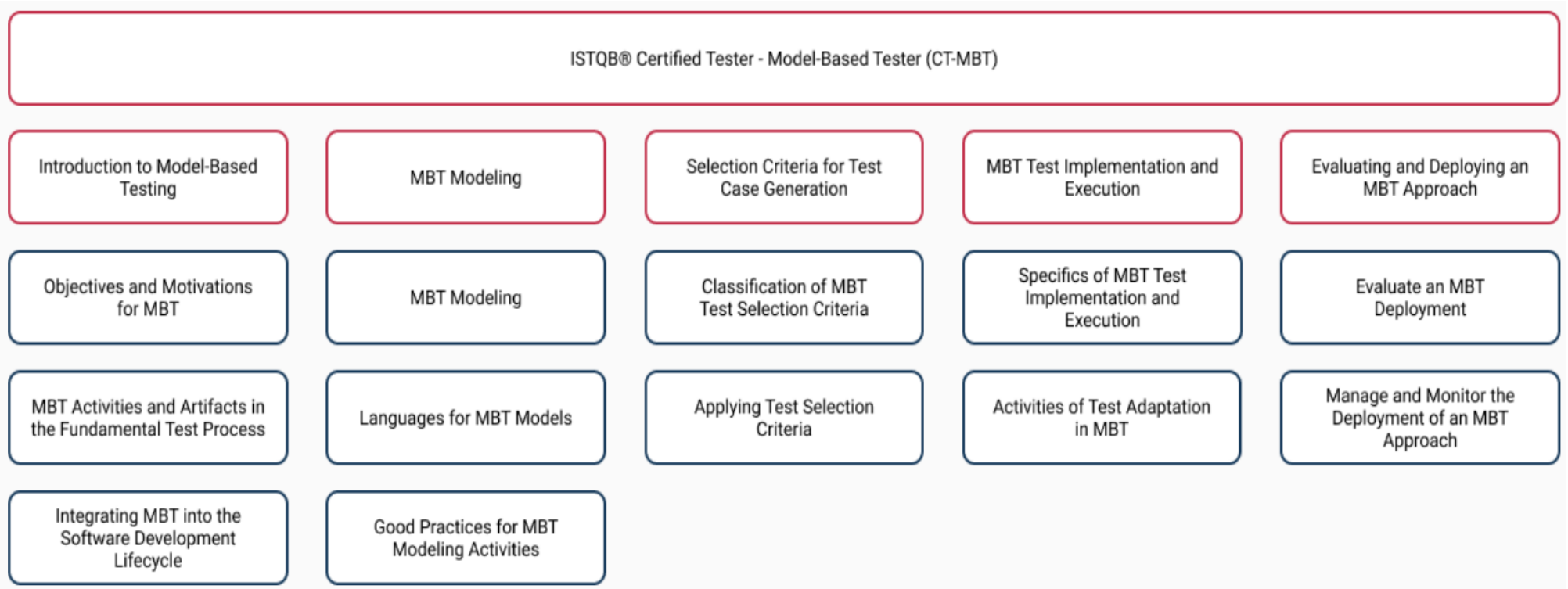


Figure 30 - ISTQB Model Based Tester Syllabus

5.5.10 Test Automation Engineer

The Test Automation Engineer (CT-TAE) certification focuses on the design, development, and maintenance of test automation solutions. It also covers the concepts, methods, tools, and processes for automating dynamic functional tests, and the relationship of those tests to test management, configuration management, defect management, software development processes, and quality assurance. Methods described are generally applicable across a variety of software life cycle approaches, types of software systems, and test types.

The syllabus addresses key subjects that include:

- Introduction and Objectives for Test Automation;
- Preparing for Test Automation;
- The Generic Test Automation Architecture;
- Deployment Risk and Contingencies;
- Test Automation Reporting and Metrics;
- Transitioning Manual Testing to an Automated Environment;
- Verifying the Test Automation Suite (TAS);
- Continuous Improvement.

The syllabus is shown on page *64* and can be further downloaded here. The exam is multiple choice, with 40 questions of varying value totalling 70 points. 49 points need to be gained in 90-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Contribute to the development of a plan to integrate automated testing within the testing process;
- Evaluate tools and technology for automation best fit to each project and organization;
- Create an approach and methodology for building a test automation architecture (TAA);
- Design and develop (new or modified) test automation solutions that meet the business needs;
- Enable the transition of testing from a manual to an automated approach;
- Create automated test reporting and metrics collection;
- Manage and optimize testing assets to facilitate maintainability and address evolving (test) systems.

5.5.10.1 ISTQB Test Automation Engineer Syllabus

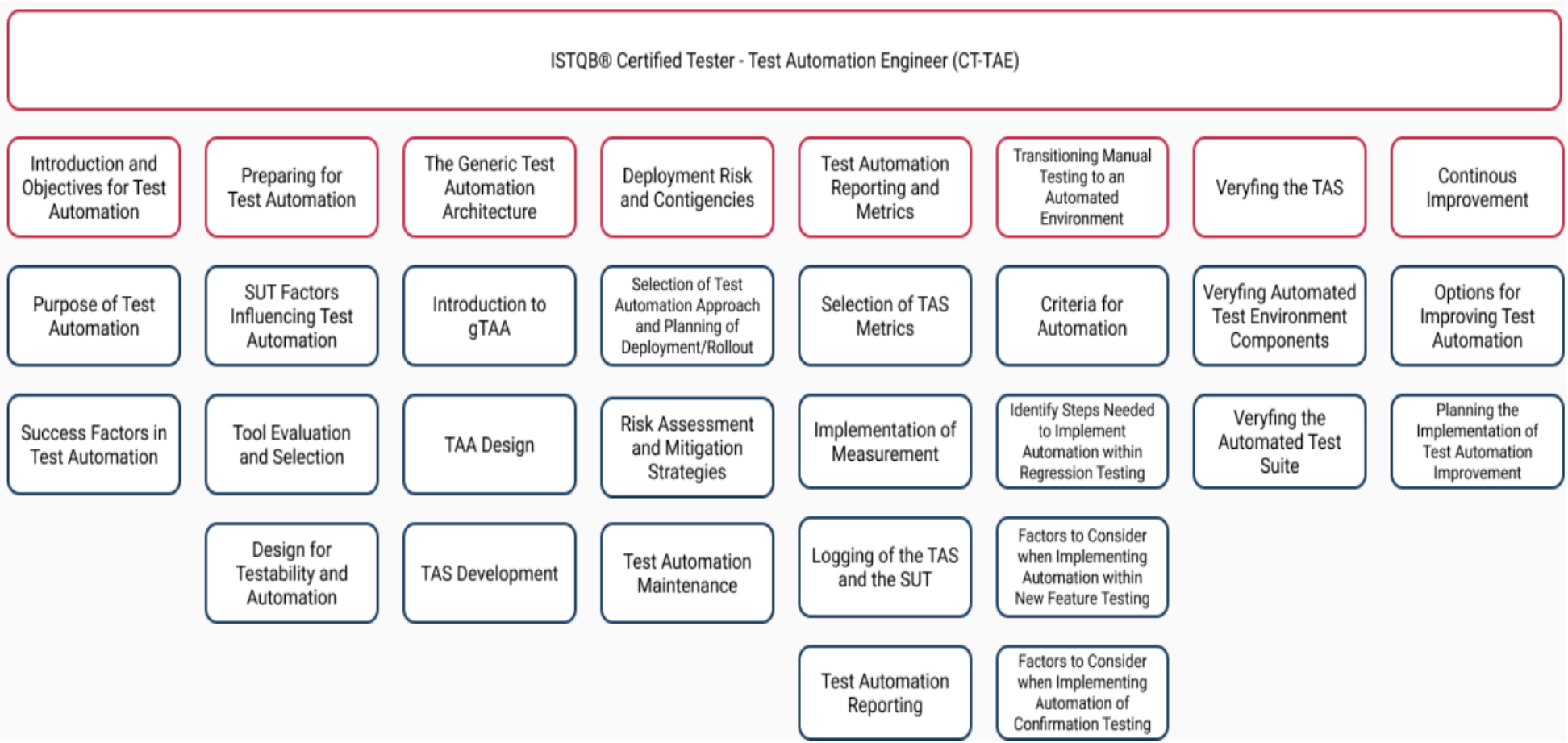


Figure 31 - ISTQB Test Automation Engineer Syllabus

5.5.11 Mobile Application Testing

The Mobile Application Testing (CT-MAT) certification provides an insight into methods, techniques, and tools a professional may use to test mobile applications. It covers the required mobile project activities, roles, methods, and methodologies.

The syllabus addresses key subjects that include:

- Mobile World – Business and Technology Drivers;
- Mobile Application Test Types;
- Common Test Types and Test Process for Mobile Application;
- Mobile Applications, Platforms, Tools and Environments;
- Automating the Test Execution.

The syllabus is shown on page *66* and can be further downloaded here. The exam is multiple choice, with 40 questions of identical value, of which 26 must be answered correctly in 60-minutes to be awarded a pass.

People sitting and passing an exam should expect the following business-based outcomes:

- Understand and review business and technology drivers for mobile apps in order to create a test strategy;
- Identify and understand the key challenges, risks and expectations associated with testing a mobile application;
- Apply test types and levels specific to mobile applications;
- Apply common test types, such as those mentioned in ISTQB® Certified Tester Foundation Level syllabus 2018, in the mobile specific context;
- Carry out the activities required specifically for mobile application testing as part of the main activities of the ISTQB® test process;
- Identify and use suitable environments and appropriate tools for mobile application testing;
- Understand methods and tools specifically to support mobile application test automation.

5.5.11.1 ISTQB Mobile Application Testing

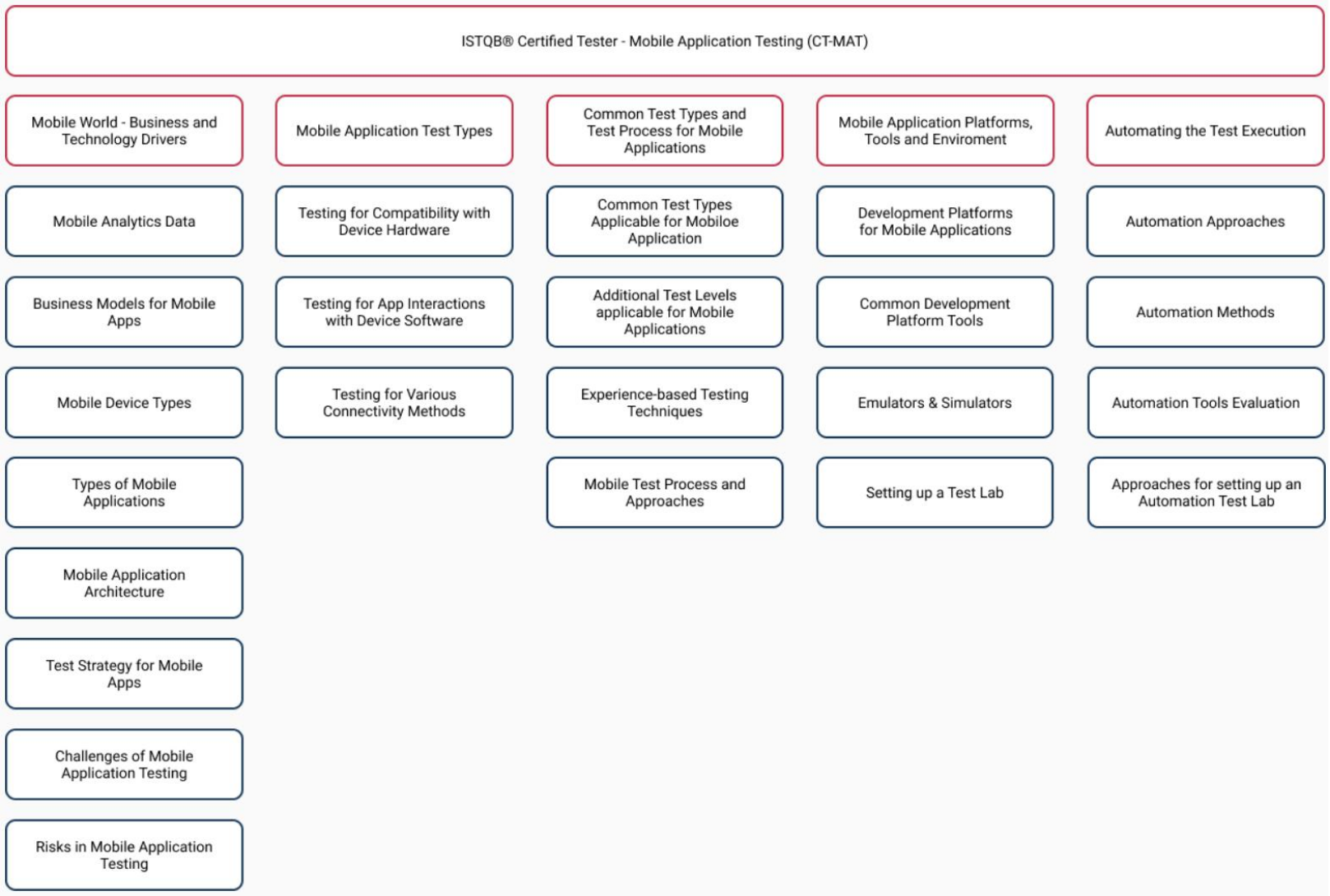


Figure 32 - ISTQB Mobile Application Testing Syllabus

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 industry standard role types.

Courses & SFIA Level Equivalences			Stream 1: Core										Stream 2: Agile			Stream3: Specialist											
			Foundation		Advanced			Expert																				
			ISTQB Foundation	ISTQB Foundation Level Agile Extension	ISTQB Advanced Test Analyst	ISTQB Advanced Technical Test Analyst	ISTQB Advanced Test Manager	ISTQB Expert Assessing Test Process	ISTQB Expert Implementing Test Process Improvement	ISTQB Expert Managing the Test Team	ISTQB Expert Operational Test Management	ISTQB Expert Strategic Test Management	ISTQB Foundation Level Agile Extension	ISTQB Advanced Technical Agile Tester	ISTQB Agile Test Leadership at Scale	ISTQB Usability Tester	ISTQB Game Testing	ISTQB Gambling Sector Industry	ISTQB Automotive Tester	ISTQB AI for Testers	ISTQB Acceptance Tester	ISTQB Advanced Security Tester	ISTQB Performance Tester	ISTQB Model Based Tester	ISTQB Test Automation Engineer	ISTQB Mobile Application Testing
Training Days			3	2	3	3	5	8		25		2	2	3	2	2	2	2	4	2	4	2	2	3	2
Blooms Taxonomy																									
K-Levels	6: Evaluate																								
	5: Synthesis																								
	4: Analyse																								
	3: Apply																								
	2: Understand																								
	1: Remember																								
SFIA Levels & Course	Strategy/Inspire	7																							
	Head of Testing																								
	Initiate/Influence	6																							
	Test Architect																								
	Ensure/Advise	5																							
	Lead Test Engineer																								
	Enable	4																							
	Senior Test Engineer																								
	Apply	2/3																							
	Assist																								
	Test Engineer																								

Table 1 - SFIA Levels by Course and Role Type