Sample Exam
ISTQB® Expert Level
Improving the Test Process
Part 1: Assessing Test Processes
2015

Version 1.0

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Table of Contents

0. Introduction

0.1 Purpose of this document

This document contains a the justifications for the full sample exam for the expert level module Improving the Test Process, part 1: Assessing Test Processes, following the rules described in the ISTQB Expert Level Exam Structure and Rules document.

The justifications in this document have been created by a team of subject matter experts and experienced question writers with the aim of assisting ISTQB® member boards and exam boards in their question writing activities as well as people planning to take the ISTQB Expert Level Improving the Test Process, module Assessing Test Processes examination.

These questions cannot be used as-is in any official examination, but they should serve as guidance for question writers. Given the wide variety of formats and subjects, these sample questions should offer many ideas for the individual Member Boards on how to create good questions and appropriate answer sets for their examinations. Furthermore training providers can use these questions as part of their training to prepare participants for the examination.

0.2 Instructions

The justifications in this document are organized in the following way:
- Question number
- Learning Objective and K-level
- Indication of correct answer
- Justifications of correctness or incorrectness per answer
- Point value of question

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Expert Level Improving the Test Process

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1. Part 1: Assessing Test Processes - Sample Questions

Question 1

EITP 2.1.1   (K2) Give examples of the typical reasons for test improvement

Justification:
   A. Incorrect. Option ii, Increasing the efficiency of writing software programs will have no real impact on testing.
   B. Incorrect. Option iv, Testing is not directly related to sales objectives.
   C. Correct. As stated in syllabus, option iii, the requirement for organizations that provide third party support to meet client requirements for their suppliers to be at a particular capability level, option v, the desire to reduce the costs of failure by improving testing and option i, the need to show compliance to applicable standards.
   D. Incorrect. See A and B.

Point Value: 1

Question 2

EITP 2.2.1   (K2) Understand the different aspects of testing, and related aspects, that can be improved

Justification:
   A. Incorrect. These aspects are recommended, but part of the development process. Besides this, the aspects mentioned are processes themselves.
   B. Incorrect. Dynamic and static testing can be performed at various test levels, however this is largely still based on processes. It does not take into account infrastructure, organization and people issues as stated in answer C.
   C. Correct. As stated in syllabus par. 2.2., during test improvement, processes, infrastructure, organization and people issues (tester's skills) can be addressed.
   D. Incorrect. Risks are a main on how to run a test project, they can also as part of lessons learned influence test process improvement. However, they are not as such an aspect that needs to be part of a test process improvement project

Point Value: 1

Question 3

EITL 2.4.2   (K2) Compare two generic methods (Deming Cycle and IDEAL framework) for improving processes

Justification:
   A. Incorrect - Both models can be broadly applied for process improvement, although the IDEAL framework was initially developed by the SEI to focus especially on software process improvement. IDEAL can also be applied to test process improvement but is not specifically focused on test process improvement.

   B. Correct - The PDCA method states that management is involved in defining targets, but does not have a detailed management phase such as the IDEAL phase "Initiating" which addresses for example build sponsorship or setting up a project board.

   C. Incorrect - Within the PDCA method after finishing the Act-phase the Plan-phase is re-entered. During this step feedback has to be gathered from the stakeholders and thus the evaluation of improvement steps takes place.

   D. Incorrect - Only in the PDCA method the use of statistical methods plays a role, there is no mentioning of statistical method within the IDEAL framework

Point Value: 1

Question 4

EITP-2.5.1   (K2) Compare the characteristics of a model-based approach with analytical and hybrid approaches

Justification:
   A. Incorrect – Not so effective in this case. Model-based approach is effective when identifying improvements to a test process should take place. The approach itself is much more generic.

   B. Correct - Analytical-based improvement provide more focused approach for helping specific problems; in this case it will be possible to analyze the defects being found during system testing and do a causal analysis to identify root causes.

   C. Incorrect – Not so effective in this case. A hybrid approach can be applied in projects which have already been developed to a higher level of process maturity.

   D. Incorrect – Not so effective in this case. The STEP methodology is based upon the idea that testing is a lifecycle activity that begins during requirements formulation and continues until retirement of the system.

Point Value: 1

Question 5

EITP-2.5.4   (K2) Understand how the introduction of test tools can improve different parts of the test process

Justification:
   A. Incorrect – see (C) for justification
   B. Incorrect – see (C) for justification
   C. Correct –
   (1) (syllabus); Test tools are implemented with the intention of increasing test efficiency, increasing control over testing or increasing quality of deliverables
   (1) (syllabus); The process improver can use tools to aid in gathering, analyzing and reporting data, including performing statistical analysis and process modeling
   (2) (syllabus); Improvement of the tool selection and implementation process, for example following the causal analysis for problems during a tool implementation pilot"
   (3) (syllabus) for example test management tools align working practices regarding the documentation of test cases and logging defects.
   (4) (syllabus) The test improver can improve the tool selection and implementation process, for example following the causal analysis for problems during a tool implementation pilot .
   (5) is false because there is no absolute need for the use of any tool in improvement activities.
   D. Incorrect – see (C) for justification

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Point Value: 1

Question 6

EITP-2.5.5   (K2) Understand how improvements may be approached in other ways, for example, by the use of periodic reviews during the software life cycle, by the use of test approaches that include improvement cycles (e.g., project retrospectives in SCRUM), by the adoption of standards, and by focusing on resources such as test environments and test data

Justification:
A. Correct – Per syllabus: iterative life cycle models such as SCRUM expect a continuous improvement loop as part of the normal project process input, with a project retrospective and improvement of processes (including the test process) at the end of each iteration.
B. Incorrect – Tools can indeed make the test process more efficient (when used and implemented appropriately), but are not specific only to the iterative life cycle.
C. Incorrect – Standards can of course help, but again are not specific to an iterative life cycle. Some iterative life cycle models, e.g., Agile, are even standard adverse.
D. Incorrect – Some iterative life cycle strongly advocate unit testing, but of course unit testing should also be performed with other life cycle models and is not specific to iterative life cycle models.

Point Value: 1

Question 7

EITP-3.1.4   (K2) Compare the specific advantages of using a model-based approach with their disadvantages

Justification:
A. Incorrect - This is much more the focus of analytical approaches, specifically causal analysis.
B. Incorrect – This is a risk of model-bases approaches, where people start following models without further thinking, so-called "model blindness"..
C. Correct – In syllabus.
D. Incorrect –This is typical for analytical approaches and specifically when using the GQM method

Point Value: 1

Question 8

EITP-3.3.1   (K2) Summarize the background and structure of the TPI Next test process improvement model

Justification:
A. Incorrect – TPI Next uses the term key area not process to cover specific aspects of testing processes. There is no grouping of those, but a clustering of checkpoints according to the business goals of the assessed organizational unit. Moreover TPI Next uses a continuous not

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a staging representation, therefore the maturity of any key area can be achieved at several increasing levels.

B. Incorrect – TPI Next uses different checkpoints for each key area that are clustered to ensure a balanced process improvement. Maturity levels are a rating of each key area and an overall maturity level may also be attributed to the whole test process after the assessment. Planning, Acquisition and Measurements are the three groups of testing activities in STEP.

C. Incorrect – Generic and specific goals are terms from TMMi (or CMMI likewise). TPI Next uses the term key area to cover specific aspects of testing processes. There is no grouping of those, but a clustering of checkpoints according to the business goals of the assessed organizational unit.

D. Correct – TPI Next uses the term key area to cover specific aspects of testing processes. Maturity levels are a rating of each key area and an overall maturity level may also be attributed to the whole test process after the assessment.

Point Value: 1

Question 9

EITP-3.3.4   (K2) Summarize the TMMi level 2 process areas and goals

Justification:
  A. Incorrect – This is a TMMi level 3 process area.
  B. Incorrect – This is a TMMi level 3 process area.
  C. Correct – This is a TMMi level 2 process.
  D. Incorrect – This is a TMMi level 4 process area.

Point Value: 1

Question 10

EITP-3.3.8   (K3) Carry out an informal assessment using the TPI Next test process improvement model

Justification:
  A. Incorrect – the model is intended to be used as a whole; the various key areas are not totally independent of others.
  B. Incorrect – the idea is first to assess the current state and only then possibly use improvements implicit in checkpoints (or explicit in improvement suggestions).
  C. Incorrect – TPI Next gives opportunity to weigh your approach towards your needs, so you should use the opportunity.
  D. Correct – here you recognize that you might not understand your problems fully, and use the TPI Next model as it is meant to be used.

Point Value: 2

Question 11

EITP-3.3.8   (K3) Carry out an informal assessment using the TPI Next test process improvement model

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Justification:
   A. Incorrect - This is a quite a formal assessment, interviewing other project members and stakeholders, assessing all key areas, and also having a look at previous releases.
   B. Incorrect -TPI Next offers the opportunity to choose the key areas based on the business drivers, so based on the problem described you can use the clusters for improving only the key areas needed for solving the problem. However, the approach taken here to also do document study involve stakeholders outside the test team is too formal for the assignment.
   C. Incorrect - Based on business drivers and clusters it is possible not to assess all key areas but still do a formal assessment. Again the approach taken seems to more reflect a formal assessment than an informal low-cost assessment.
   D. Correct - This is an informal low-cost approach that can be done using the TPI Next model.

Point Value: 2

Question 12

EITP-3.3.9   (K3) Carry out an informal assessment using the TMMi test process improvement model

Justification:

SG 1 Establish a Test Policy   Score: 33% (Party Achieved)
SP1.1 Define and maintain test goals based on business needs and objectives
       Ok: Yes
       Justification: Test goals to be achieved are defined in cooperation with the business stakeholders.
SP1.2 A test policy, aligned with the business (quality) policy is defined based on the test goals and agreed upon by the stakeholders
       Ok: No
       Justification: Defined by test manager but not agreed with stakeholders
SP1.3 The test policy and test goals are presented and explained to stakeholders inside and outside of testing
       OK: No
       Justification: Only explained to the test team

SG 2 Establish a Test Strategy   Score: 100% (Fully Achieved)
SP2.1 A generic product risk assessment is performed to identify the critical areas for testing
       Ok: Yes
       Justification: The test team performs a risk assessment workshop with all stakeholders. This is used to identify the critical areas for testing.
SP2.2 A test strategy is defined that identifies and defines the test levels
       Ok: Yes
       Justification: There is a test strategy document which fully describes all the test levels.
SP2.3 The test strategy is presented and discussed with the stakeholders inside and outside of testing
       OK: Yes
       Justification: Explained to the test team first and then presented to the stakeholders.

SG 3 Establish Test Performance Indicators   Score: 0% (Not Achieved)
SP3.1 The test performance indicators are defined based on the test policy and goals including a procedure for data collection, storage and analysis
       Ok: No
       Justification: Test performance indicators are not defined.

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Expert Level Improving the Test Process

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SP3.2 Deploy the test performance indicators and provide measurement results addressing the identified test performance indicators to stakeholders

> Ok: No
>
> Justification: Test performance indicators are not defined.

Legend:
Not Achieved: the percentage of achievement scores in the range from 0 up to 15%
Partly Achieved: the percentage of achievement scores in the range from 15 up to 50%
Largely Achieved: the percentage of achievement scores in the range from 50 up to 85%
Partly Achieved: the percentage of achievement scores in the range from 85 up to 100%

- **A.** Correct – See above.
- **B.** Incorrect.
- **C.** Incorrect.
- **D.** Incorrect.

Point Value: 2

Question 13

EITP-3.3.9   (K3) Carry out an informal assessment using the TPI Next test process improvement model

Justification:
- **A.** Incorrect – see justification answer B.
- **B.** Correct – With TMMi the lowest score rating determines the overall rating. Since Test Environment is Not Applicable (most likely out of scope), the lowest is for Test Policy and Strategy being rate as Party Achieved.
- **C.** Incorrect – see justification answer B.
- **D.** Incorrect – see justification answer B.

Point Value: 2

Question 14

EITP-3.4.2   (K2) Summarize the activities, work products and roles of the STEP model

Justification:
- **A.** Incorrect – This role is not identified within the STEP improvement model.
- **B.** Correct – According to the STEP model, the test analyst performs detailed planning, lists test objectives, does the analysis and performs test design and specification.
- **C.** Incorrect – According to the STEP model, the test manager performs planning, coordination and communication to stakeholders.
- **D.** Incorrect – According to the STEP model, the tester performs the implementation of test cases, executes test cases, checks results, log tests and reports problems.

Point Value: 1

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Question 15

EITP-4.2.2   (K2) Understand causal analysis during an inspection process

Justification:
   A. Incorrect – Based on syllabus. Defect Analysis: not about analyzing the defect itself. Generic Analysis: this is more about improvement in skills and processes.
   B. Incorrect – Based on syllabus. Defect Analysis can be ok. Generic Analysis: This is not about analysing trends in defects.
   C. Correct – In syllabus.
   D. Incorrect – Based on syllabus. Defect Analysis: ok. Generic Analysis is not about test trends

Point Value: 1

Question 16

EITP-4.2.5   (K2) Apply a causal analysis method on a given problem description

Justification:
   A. Incorrect - Investigating the accuracy of the test data used should not be the next activity. Input test data have already been updated for the specific flight characteristics of the aircraft. It is possible but unlikely that this data is inaccurate.
   B. Correct - Investigating whether tests are being passed which should have failed is promising as the next activity. The pass / fail criteria used in the test cases are based on previous flight trials for *similar* aircraft, but not for *this* aircraft. We know the test data were updated for the specific aircraft (option A), but there is no mention that the pass/fail criteria were also updated. We also know that all tests passed, which would be a likely outcome if the pass/fail criteria were to be incorrect and allowing failures to go undetected.
   C. Incorrect - Investigating the procedures used for the audits should not be the next activity. Test case coverage of requirements is quite likely to be satisfactory as a result of the audit. There is a possibility that faulty procedures were used in the audit which lead to incomplete coverage of requirements by test cases. However, the likelihood of this is small, especially when compared to option B.
   D. Incorrect - Investigating configuration management procedures used for the test environment should not be the next activity because a production copy of the hardware and software is used for the test environment.

Point Value: 1

Question 17

EITP-4.2.7   (K4) Select defects for causal analysis using a structured approach

Justification:
   A. Incorrect – although they may be frequent, most likely the (direct) impact is limited although over time users may move to another website for ordering books.
   B. Incorrect – although it is always good to look back at the testing process, e.g., test environment problems, it does not directly relate to a production defect. However, as part the analysis done at a later the test environment instability could be one of the cause for the current production problem since some features have possibly not been tested correctly.

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International
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    C. Correct - this seems to be frequent (most evenings) and also has a high impact both in terms of revenue and customers satisfaction.
    D. Incorrect – there is only one complaint (low frequency) and the impact of this problem may be loss of revenue but is currently unclear. It could even be that the customer is looking for a book that is not part of the offering of the on-line book store.

Point Value: 3

Question 18

EITP-4.4.1   (K2) Provide examples of the various categories of metrics and how they can be used in a test improvement context

Justification:
    A. Correct - Both metrics will give insight in the efficiency of the test process.
    B. Incorrect – Post-release Defect Rate is an effectiveness metric.
    C. Incorrect –Defect Detection Percentage is an effectiveness metric.
    D. Incorrect – Both metrics are effectiveness metrics.

Point Value: 1

Question 19

EITP-4.3.4   (K2) Understand the steps and challenges of the data collection phase

Justification:
    A. Incorrect – This is part of the trial period that is performed before the kick-off session.
    B. Incorrect – This is performed to explain the background to the measurements that will be collected and to therefore to motivate those involved.
    C. Incorrect – This is done during the feedback session, part of the interpretation phase.
    D. Incorrect – This is done during the feedback session, part of the interpretation phase..

Point Value: 1

Question 20

EITP-4.3.2   (K3) Apply the Goal-Question-Metric (GQM) approach to derive appropriate metrics from a testing improvement goal

Justification:
    A. Incorrect – Q.3 is not "Understanding" but the higher level "Improving", M.06 is on level "Controlling", M.12 on level "Improving" – see (B) for correct answer.
    B. Correct – Q.1, Q.2, Q.4 and Q.6 directly refer to the given goal, M.01-M.05, M.07-M.08 M.10 answer these questions.
    C. Incorrect – Q.3 is not "Understanding" but the higher level "Improving". Moreover typically several questions are needed to fulfill one goal (remember the GQM graphic), M.06 is on level (statistical) "Controlling", M.12 on level "Improving" – see (B) for correct answer. M.09 is not dealing with only reusability; it could very well be the case that changed requirements

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during a projects' lifetime caused new revisions (therefore this is not a good metric to use).
M.11 is a metric to answer Q.5 which is not directly related to reusability.
  D. Incorrect – Answers to Q.5 and Q.7 do not help in fulfilling the given goal.

Point Value: 2

Question 21

EITP-4.3.3   (K3) Define metrics for a testing improvement goal

Justification:
  A. Incorrect – This is part of the analysis plan, not of the measurement plan.
  B. Incorrect – An important aspect within GQM when defining goals, but not so much when defining the detail metric.
  C. Incorrect – The environment may well be an attribute to be considered, this depends on the actual real-life situation. However, answer D is generally considered more important for the measurement process.
  D. Correct – It is important to at the start also consider which factors could influence the metrics and their type of impact on the hypothesis. When collecting the data also these factors should be documented to allow analysis at a later stage.

Point Value: 2

Question 22

EITP-5.5.1   (K2) Summarize reasons for best applying a test process improvement approach

Justification:
  A. Incorrect – based on syllabus.
  B. Incorrect – based on syllabus.
  C. Incorrect – based on syllabus.
  D. Correct – Specifically stated in syllabus.

Point Value: 1

Question 23

EITP-6.2.1   (K2) Summarize the activities of the Initiating phase of the IDEAL improvement framework

Justification:
  A. Correct –, set context and establish sponsorship (1), Identify stimulus for improvement (3) and Establish an improvement infrastructure (i.e., organization) (4) are high-level activities of the IDEAL model.
  B. Incorrect – see (A) for correct answer.
  C. Incorrect – see (A) for correct answer.
  D. Incorrect – see (A) for correct answer.

Point Value: 1

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Expert Level Improving the Test Process

International
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Question 24

EITP-6.2.2   (K4) Analyze business goals (e.g. using corporate dashboards or balanced scorecards) in order to derive appropriate testing goals

Justification:
  A. Incorrect – You shouldn't change goals on your own – the development manager has provided you with the task to look at productivity goals, probably with the idea that he will put someone else working on the other goals.
  B. Correct – As the syllabus says you should derive testing goals from corporate level goals e.g., use balanced scorecard to focus your work properly.
  C. Incorrect – Same as B. You shouldn't focus on your own goals – you are asked for the productivity goals for a reason. It isn't your responsibility to look at the whole business, but just to look at the productivity issue of testing with the context of the software development business unit.
  D. Incorrect – You are to produce realistic goals. It is good aim high, but you need to be realistic as well. Again, stick to the testing part and your responsibility.

Point Value: 3

Question 25

EITP-6.3.4   (K2) Summarize the approach to solution analysis

Justification:
  A. Incorrect – Solution analysis focuses on the specific problems found during assessment
  B. Correct – This is the overall definition of solution analysis
  C. Incorrect – This might happen as a small part of solution analysis but does not summarize the approach
  D. Incorrect – this would be called assessment, and the following analysis of results

Point Value: 1

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Essay 1

EITP-3.3.10   (K5) Assess a test organization using either the TPI Next or TMMi model
EITP-6.3.2   (K6) Plan and perform assessment interviews using a particular process or content model in which an awareness of interview style and inter-personal skills are demonstrated

Grading Criteria:

Question 1

The candidate should describe enough TMMi structure to show an understanding of the improvement model and how to use it.

1. Mention staged model and its purpose – need to start from lower levels, and all the process areas at those levels.

2. Mention need to cover all level 2 Process Areas – to complete a level, several process areas are needed, even though one process area would be in the focus. TMMi model provides evolutionary improvements based on meeting all obligatory process area goals on a level. The process areas at a certain level are a coherent set. The candidate should preferably mention the five level 2 process areas. Also it does not seem to make much sense to go beyond TMMi level 2, since the company is not fully CMMI level 2.

3. Describe Test Design and Execution Process Area– this should be a special focus as this area includes test coverage measurement as part of test design..

4. Describe Test Planning process area, this should in addition to Test Design and Execution be in special focus since with Test Planning there are specific goals on doing product risk assessment and defining the test approach.

5. Good arguments on which Process Areas to use – good analysis skills should be shown regardless which Process Area the candidate mentions.

Max 5 points for each area listed above, 25 points total.

Question 2

1. Roles to be interviewed – minimum 5 mentioned out of the list of Tester, Test manager, Developer, Project manager, Business owners, Business analysts (domain experts), Specialists such as environment manager, defect manager, release manager, automation specialists

2. Reasoning about interviewee choices
   a. reasoning about who would know about test coverage and should thus be interviewed
   b. reasoning why it is important to look outside testing team, especially if some people suspect the improvements and the root cause would be in some other teams for the particular problem at hand.

Max 1 points for each identified role and an additional point for a good reasoning, 10 points total.

Question 3

What subjects to discuss with different roles – outline for discussion with each role (see also item 2 listed above). The subjects could be derived from the specific goals and specific practices of the identified process area.

Max 7 points (1 point for a reasonable set of subjects listed per role, 2 additional points if the lists are linked to the TMMi model)

Question 4

The candidate should demonstrate knowledge of interviewing, especially in a difficult situation, where inter-personal skills become particularly important. Sensitivity should be shown about the potentially conflicting interests of different teams

Motivating interviewees – minimum 3 out of list of
1. Confidentiality is ensured
2. Recognition for improvement ideas is given
3. No fear of punishment or failure exists
4. They know and understand how the information they provide will be used

Max 8 points, 1 pt. of each motivating criteria listed (max. 3 points) and an additional 5 points for the reasoning and explanation.

Certified Tester
Expert Level Improving the Test Process

ISTQB

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Essay 2

EITP-4.2.6   (K5) Recommend and select test process improvement actions based on the results of a causal analysis

EITP-6.3.3   (K6) Create and present a summary of the conclusions (based on an analysis of the findings) and findings from an assessment

EITP-6.3.5   (K5) Recommend test process improvement actions on the basis of assessment results and the analysis performed

Grading Criteria:

Task 1 "Recommendations based on TPI Next assessment" (Maximum 20 points)

Make 5 recommendations based on the results of the TPI Next assessment. Enter your answers in Table 3.

Each recommendation must clearly state what should be done and what the positive impact will be on the business objectives of CGF regarding testing.

Scoring:
- 2 points for each justified and plausible recommendation
- 2 points for linking the recommendation correctly to one or more business objectives

Use the tables provided below to support the scoring. Allow for other well-reasoned recommendations.

Key area	CLUSTER A: Checkpoint Number / Checkpoint	Scoring Notes
Stakeholder commitment	1. The principal stakeholder is defined (not necessarily documented) and known to the testers.	OK
Degree of involvement	1. The test assignment, scope and approach are negotiated early with the principal stakeholder as one of the first test activities.	OK
Test strategy	1.The principal stakeholder agrees with the documented test strategy.	Transparency: they are not involved
	2. The test strategy is based on a product risk analysis.	Test management practices; no risks considered
Test organization	1. People involved know where to find the persons (or department) responsible for test services.	OK
Reporting	1. The reporting contains aspects of time and/or costs, results and risks.	Transparency no reporting
Test process management	1. At the start of the test project a test plan is created. The test plan includes at least the test assignment, the test scope, the test planning, the roles and responsibilities.	OK
	2. The test plan is agreed with the principal stakeholder.	Transparency they are not involved
Defect management	1. The defect lifecycle is defined (including a retest) and applied.	OK
	2. The following items are recorded for each defect: unique ID, related test case ID (if applicable), person reporting the defect, date, severity category, description (the actions to reproduce the defect, expected and observed result) and defect status.	OK
Test case design	1. The test cases are recorded on a logical level.	Effectiveness of test cases reduced

	2. The test cases consist of a description of: a) initial situation, b) change process = test actions to be performed, c) predicted result.	Effectiveness: Test cases are incomplete.

Table 1: Checkpoints for TPI Next cluster A – Scoring Notes

Key area	CLUSTER B: Checkpoint Number / Checkpoint	Your notes
Stakeholder commitment	2. Budget for test resources is granted by and negotiable with the principal stakeholder.	OK
	3. Stakeholders actually deliver the committed resources.	OK
Degree of involvement	2. Test activities are started early, timely before test execution, with the goal of keeping the test activities of the project's critical path.	OK
Test strategy	3. There is a differentiation in test levels, test types, test coverage and test depth, depending on the analyzed risks.	Test management practices; no risks considered
Communication	1. Every team member is aware of decisions being made and of internal progress.	Transparency within the test team is poor
Test process management	3. Each test activity is monitored and when necessary adjustments are initiated.	Test management practices; no monitoring and control
	4. The test plan is agreed with the relevant stakeholders.	Transparency: they are not involved
Estimating and planning	1. For test effort estimation, simple techniques are used such as ratios.	Test management practices: no estimates
	2. For each test activity there is an indication of the period in which it runs, the resources required and the products to be delivered. Activities to be identified are: test planning and management, defining test cases and executing test cases.	OK
Defect management	3. For further handling of defects the responsibilities are defined.	OK
Testware management	1. The test basis, the test object and all testware are identified by name and version.	OK
	2. Each test case is related to a test basis document in a transparent way.	OK

Table 2: Checkpoints for TPI Next cluster B Scoring notes

The following table shows possible recommendations based on the TPI Next Matrix. The answers provided by candidates should be identifiable (but not literally) from those shown in the table below. Allow for other recommendations if they are well justified.

Problem area	Recommendation	Positive impact on business objective
Test case design: no test cases	Ensure that test cases are created at the logical level and that the contents of those test cases include at least the three steps: set initial state – perform actions – expected result.	**Test effectiveness** will be improved by specifying test cases with the minimum contents. There is a greater chance that software faults will not be found in testing (assuming that experience-based testing is not performed)
	Ensure that test cases are linked to the test object (user story, requirement etc) and that test	**Transparency** will be increased by having documented test cases and showing test coverage to stakeholders.

Problem area	Recommendation	Positive impact on business objective
	coverage can be shown to the stakeholders.	
No agreements made with the stakeholders	Establish a stronger working relationship with the principal stakeholder which allows important test documents such as test plans and test strategy to be agreed at an early stage in the software development life cycle.	**Transparency** will be improved by agreeing the test plan and test strategy with the principal stakeholder. **Test management practices** are improved by establishing good working relationship with the principal stakeholder.
No consideration of product risks	Create a risk management process which starts with a consideration of product risks.	**Test management practices** are improved by establishing a risk-based testing strategy. Priorities can be set in a transparent way and coverage of risk by tests can be provided.
	Consider product risks together with the stakeholders	**Transparency** will be improved by enabling the principal stakeholders to contribute to the identification of product risks.
Communication	The test manager shall conduct regular team meetings at which 1. decisions made regarding testing are discussed and 2. the team are provided with information about internal progress (e.g. as a burndown chart or status report)	**Transparency** within the test team will be improved by making decisions known and allowing for discussion. **Test management practices** are improved by keeping up motivation levels in the team and giving the test team information about status.
Test estimation	The test manager shall establish a methodology for estimating test effort for various testing activities. This may be a simple ratio (e.g. % of development budget assigned to testing) until useful metrics are available to make estimates more accurate.	**Test management practices** are improved by ensuring that estimates of testing effort are available and accurate. Communication of reliable estimates will have a positive impact on **transparency** within the test team and stakeholders.
No monitoring and control of test process	The test manager shall ensure that planned testing activities, test estimates, test strategy and risks are regularly monitored. Differences between planned and actual/predicted values shall be identified and appropriate actions taken to correct them (actions shall be discussed during the test team meeting mentioned above).	**Test management practices** are improved by ensuring that an appropriate response is made to changes in planned activities, estimates, risks and test strategy. **Transparency** will be improved by taking the most current information into account and communicating this to the test team and stakeholders (e.g. in reports).

Table 3: Recommendations based on the results of the TPI Next assessment

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Task 2: "Defect analysis" (maximum 10 points)

Propose two improvement recommendations. Each recommendation must clearly relate to an analysis of the root-cause information shown below. It must state what should be done and what the positive impact will be on the business objectives of CGF.

Scoring:
- 3 points for each recommendation based on a correct and plausible analysis of the root-cause analysis shown in Table 4.
- 2 points for each recommendation that is clearly and correctly linked to one or more business objectives

Use the table provided below to support the scoring. Allow for other well-reasoned recommendations.

Galaxy product	Galaxy-TX	Galaxy-Go	Galaxy-Self	Galaxy-App
Defects				
Number of defects	30	20	30	50
% high severity	67%	20%	0%	10%
% medium severity	17%	60%	50%	10%
% low severity	16%	20%	50%	80%
Top three root causes				
Testing not completed as planned	80%	60%	0%	10%
Poor Release-Management	10%	30%	10%	80%
Stakeholder expectations not fulfilled	10%	20%	90%	10%

Table 4: Results of Root-Cause Analysis for defects affecting the Galaxy product range

The following table shows possible recommendations based on the root-cause analysis. The answers provided by candidates may show some similarities with those proposed for task 1 (TPI Next matrix) .

Allow for other recommendations if they are justified on the basis of the root-cause data shown.

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Analysis, justification and recommendations	Positive impact on business objective(s)
Analysis and justification (shown in green) • The largest number of high-severity defects were reported in the Galaxy-TX product. (20 out of 30 defects) • These defects were primarily caused by incomplete testing. • The Galaxy-Go product also experienced some medium severity defects relating to this root-cause. • This is an indication of inadequate test process management for mainframe-based applications Recommendations • It is recommended to update plans and estimates on a regular basis and make any necessary adjustments. • It is recommended to prioritize according to product risk if it becomes clear that planned testing activities may not be achievable.	**Test management practices** are improved by monitoring planned testing activities and identifying risks that they may not be completed in time. **Test management practices** are improved by establishing a testing strategy which focuses on the main "pain point", which is the Galaxy-TX product. **Transparency** is increased when clear priorities are set which target the pain points.
Analysis and justification (shown in blue) • The Galaxy-Self product has many defects of medium or low severity which were caused by the expectations of stakeholders not being fulfilled. • This may be an indication that the expectations of end-users of this web-based application were not considered when gathering requirements and testing. Recommendations • Perform validation of requirements from the perspective of the end-user. • Implement a beta-test phase which enables end-users to providing feedback regarding their user experience.	**The effectiveness of testing** will be improved by involving end-users in beta testing. It is anticipated that many of the medium and low severity defects reported in web-based applications will be identified at this stage. **Transparency** of testing will be improved by involving end-users
Analysis and justification (shown in yellow) • A large number of low-severity defects have occurred in the Galaxy-App. The overall quantity of defects is likely to have a negative impact on the company for users of the mobile App. • These defects were primarily caused by poor release management. Recommendations • It is recommended to discuss the release management process regarding the development and testing of mobile Apps. This is a dependency on the test process and cannot be directly resolved by improving the test process by itself.	**Test management practices** will be indirectly improved if the software releases are better coordinated and communicated. This will provide a more reliable basis for test planning.

Table 5: Recommendations based on the results of the Root-Cause analysis

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Task 3: "Summary of conclusions" (maximum 20 points)

The following table shows some typical statements. These are provided for guidance. It is <u>not</u> expected that the candidate's answer includes these statements word for word.

Each statement must achieve the following criteria:
1. Is understandable for senior management (plain English, no complex statements, no technical terms)
2. Addresses company objectives
3. Relates to findings
4. Clearly states what actions management needs to take.

Scoring scheme:

Score 1 point for achieving each of the 4 criteria shown above.

Current test process maturity:	
- The testing at CGF is currently not able to contribute fully to achieving the business goals. - A relatively low level of test process maturity is achieved, based on a model of testing best practices. - There are some areas, however, where testing practices are showing encouraging signs of higher maturity, although their impact on business objectives is not high. - To achieve more test process maturity, it is recommended that management considers the areas for improvement highlighted below and set up a test improvement plan together with an external consultant.	
Area for improvement: Business objective "Improve the effectiveness of testing"	
- We need to improve our test cases so that they find more defects before products go out. - The assessment showed this is a particularly weak area in our testing. - By writing down our test cases in a standard and complete way, our testing effectiveness will be improved. We would expect to find more defects for the money spent. - We should make test cases a mandatory part of our testing. It will help if we improve our know how in this area by taking more training and getting some tool support.	
Area for improvement: Business objective "Improve transparency of testing to stakeholders"	
- The assessment showed that we need to get the relevant people more involved in testing issues and make testing generally more transparent. - Our stakeholders should be involved to our test planning and estimating meetings so we can agree on what our testing should achieve and how we should achieve it. - For our web-based systems, such as Galaxy-Self, we should get end-users more involved in testing before the applications go live. - We should improve the exchange of information about testing to our stakeholders and also within the testing team. This will mean writing concise status reports. - Management should decide on which stakeholders shall be invited to our test planning meetings and decide on which stakeholders will receive reports. - Management should contact an agency to help us identify representative end-users.	
Area for improvement: Business objective "Improve test management practices"	
- Several issues were found in the assessment and the analysis of defects which highlighted the need to improve our test management practices. - In the future, we need to consider the risks in our Galaxy range of products more thoroughly when planning our tests and also make our estimates more reliable. - Once we have agreed test plans and estimates we should update them regularly and make any changes needed. This will ensure we are up to date and avoid the testing shortfalls we experienced in Galaxy-TX and Galaxy-Go. - Management should identify and train staff to perform the test manager role.	

Priorities for improving test process maturity

• The model used for the assessment suggests that the top three priorities for improving test process maturity are in the following areas:
  o More stakeholder involvement for better transparency
  o Creating test cases for more effective testing
  o Using a risk-based approach to our testing as an essential test management practice
• The defect analysis shows that we should initially prioritize our efforts on mainframe projects, such as Galaxy-Go and Galaxy-TX.

Table 6: Summary of conclusions

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Essay 3

EITP-3.3.7   (K5) Recommend which is appropriate in a given scenario, either the TPI Next or the TMMi model

EITP-5.1.2   (K6) Recommend a test process improvement approach in a specific scenario and for a given improvement scope

Grading Criteria:

Question 1

1. You have been asked by management to recommend a test improvement model for the project.

    -   Identify the two major test improvement models (2 points)
        TPI Next and TMMi are the two leading test improvement models in the world. (1 point for each model correctly identified)

    -   Identify 4 criteria that can be used to compare the models (4 points)
        The syllabus lists a number of criteria that can be used to compare the models. Typical criteria to be identified are:
        -   Type of model (representation)
        -   Test method relationship
        -   Relationship to SPI model
        -   Main Focus
        -   Overall Improvement approach
        -   Terminology

    Although some criteria are often perceived more important than others, all can be identified by the candidate as being relevant. Type of model is a leading criterion and must be mentioned (1 point). Allow for three more points for each additional criterion that is mentioned from the list. Note they may be stated in other terms.

    c.   Evaluate both models against the defined criteria in the context of this project (16 points)

    The syllabus provides an overview comparison of the two models against the defined criteria. (see table 1).

    Allow one point for each correct description (per model) against criteria (max. 8 points).

    Allow 1 additional point when the description (per model) is correctly linked to the context of the ATM project. (Expectations for this are provided in table in italic text.)

Criteria	TPI Next	TMMi
Type	Continuous model - *this is more flexible in use and since there are no long term objectives this maybe perfect to be used on a project basis*	Staged model – *this is more milestone oriented with long term strategy. This does not seem to be the case for the bank.*
Test methods	Uses generic TMap (Next) practices as terms of reference. - *since a standard method does not yet exist, TMap could be an ideal add-on to be implemented. It may also be too much depending on the size of the project.*	Test method independent – *this fits with the current approach of the organization, which is to have a test process using a number of best practices. TMMi could provide a structure for this.*

Criteria	TPI Next	TMMi
Terminology	Based on TMap – *there is no need for a standard international terminology within the organization, thus using TMap terminology is as good as any.*	Based on standard testing terminology – *since development and testing is organized internally there is no real need to adopt an international testing terminology. Any terminology is ok it seems as long as it is standard across the organization.*
SPI	No formal relationship to a specific SPI model but mapping possible – *TPI Next seems to fit with the fact that the organization also does not have a model for process improvement of development and that there is thus no constraint here.*	Highly correlated to CMMI – *although TMMi can also be used independent of CMMI, there is a clear link between the two models. The organization has no history on process improvement whatsoever thus the correlation to CMMI does not have an added value. In fact, it could turn out to have a limited negative impact.*
Focus	An overview across the entire test process is achieved with 16 key areas with close-up view per key area. – *having the entire test process within scope provides flexibility to focus on those things that matter most for the banking organization.*	Detailed focus on limited number of process areas per maturity level. – *in general this is a good thing, however the testing issues for this project may well go across other maturity levels as well. There is a risk in applying TMMi that this is then out of scope.*
Approach	Thorough, business-driven and test engineering approach – *business driven matches with the fact that there is a clear problem (product quality) on the project. An engineering based approach to tackle the most important testing issues is needed.*	Strong focus on management commitment – *TMMi looks at management commitment and long terms strategies. There is already management commitment for test improvement on this project and no real need (for now) for a long term strategy. In this context the philosophy of TPI Next seems to have a better match.*

Table 1: Comparison TPI Next and TMMi

    d.   Make a substantiated management recommendation which one of test improvement models is probably best to be used in this context. (3 points)

Allow 1 point for choosing the TPI Next model as the best choice for this situation. Two additional points can be given if this is well reasoned (see above part c) for reasons). Note that no additional points should be given if the management recommendation is too technical for management. It needs to be high level and related to the test improvement objective.

Question 2

2.   You have now visited a leading test conference where you listened to a presentation discussing analytical-based improvement. This was totally new to you, but seems very interesting and you've been inspired.

    a.   Identify and explain 4 reasons why an analytical-based approach could be beneficial to the bank (and ATM project). (16 points)

-   *Specific problems need to be targeted*; A large percentage of the defects that are being found after release seem to be somehow related. Causal analysis is a perfect mechanism to target specific problems that keep reoccurring or a major failure that occurred in

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production. For these types of problems, using a model (either process or content based) is typically not the way to go. The specific problems are often context dependent and this is where analytical approaches are strong; they focus on the specifics of the project or organization.
- *Metrics (defect data) are available*; The defect data (well-documented) from previous projects is stored in a defect management system. With all this information lying around for free, starting to analyze the available data is an easy way forward. The data can be transformed into metrics and analyzed to enable recommendations for (test) process improvement to be established.
- *The root cause of the problem is not necessarily within the test process*; With the bank situation it's not really clear in which area the problem lies. Using a test (improvement) model doesn't help to solve problems that originate outside of testing. Doing causal analysis that shows that the root cause is somewhere other than the test process can help to raise awareness and make the problem area more visible.
- *A small-scale improvement project is budgeted* for; Within the bank there is not a huge budget allocated for the test process improvement activities, so it is needed to be very focused. If there are few resources available for improvements, then using full-blown reference models is often not really helpful. You can focus on only one or two critical issues. Using analytical approaches can reveal these one or two critical issues and test improvement recommendations can be identified based on the analysis.

(1 point for each correctly identified reason, 1 point for correctly linking the problem to the bank and 2 points for correctly explaining the reason, max. 4 points per reason and total maximum of 16 points)

b.   In case an analytical approach is going to be used, which analytical-approach would you use and why? Also briefly explain the analytical approach that you have chosen. (5 points)

Causal analysis is obviously the analytical approach to be used and much preferred over a GQM or metrics-based approach, which would require a higher investment and long term commitment. (1 point if causal analysis is selected)

Main reasons:
- A large percentage of the defects seem related, which would indicate there is a common root cause to be found. This would be uncovered by causal analysis.
- There is a defect database that can be used as a basis for a causal analysis
- Causal analysis is very focused on solving today's problems and does not necessary require a long term strategy, which seems to be the case for the bank as well.

(2 points max, 1 point per well identified and described reason)

Causal analysis consists of the following steps:
1. Selecting item for causal analysis, e.g. using Pareto principle and/or defect categorization
2. Gathering and organizing information, e.g. using Cause/Effect (Ishikawa) diagrams or mind-maps
3. Identify root causes
4. Drawing conclusions

(0,5 points for each step identified and briefly explained, max. 2 points)

c.   As part of the project, to justify the (small) investment and measure the effect of the activities a test process improvement indicator (metrics) needs to be identified. Which metrics would you choose and why? Also briefly explain the metric. (4 points)

The business objective for the test improvement project is a higher level of product quality. This implies that the test objective for the project would be to improve test effectiveness. (1 point if this reasoning is stated)

Most popular test effectiveness metrics are Defect Detection Percentage (DDP) and Post-Release Defect Rate. An alternative would be Mean Time Between Failure (MTBF). (2 points if one of these metrics has been selected and 1 additional point if well explained)

The candidate may also have selected a coverage metric, e.g. requirements coverage. (allow for 1 point if a coverage metric has been selected and 1 additional point if well explained). A coverage metric is only indirectly related to the objective and also most of the times less suitable for management communication.