

TESTADVANCE TEST-PROCESS IMPROVEMENT SERVICES (TCPI)

This document describes testadvance's Test-Process services

Rev D.01 Last modified: 02/02/10 Author: Ralph Becker

Assessment

Process Analysis

- Further productivity, yield & throughput
- Reduce costs & improve utilisation
- Reduce test-times
- Reduce Work In Progress, re-work and NTF/'false-fails'
- Increase utilisation of implement continual test-reduction
- Improve control and feedback between test-engineering, product-development and manufacture

Improvement Design & Delivery

- Accelerate ramp-up test-cycles
- Improve ROI/ROA

Testadvance Test-Process services help engineers and managers further operational performance through pragmatic and structured optimization of testing in operations.

1 Deliverables

Test-Process Document (TPD)

1. Scope of Engagement (SoE/SOW Section 1)
 - o Framework
 - o Target process and entity
 - o Metrics, Benchmarks
2. Scope of Optimisation (SoO/SOW Section 2)
 - o Structural Analysis
 - o Work-flow Analysis
 - o Performance Analysis
 - o Areas of Improvement/Opportunity
3. Optimisation Design Specification (ODS)
 - o Immediate measures
 - o Physical, functional and operational measures
 - o Opportunistic and ongoing measures
4. Delivery Plan
5. Benchmark and Performance Review

2 Test-Process Improvement Process (TCPIP)

Test-Process services use a structured, systems-thinking approach allowing us to quickly and correctly focus on specific areas while maintaining a correct understanding of the overall entity. Simply put, we can focus on what is needed without losing the 'big picture'. The 'operational layer' addresses the interaction with the parent operation. The 'functional layer' addresses the functions, work-structures and work-flows within the test-process. The 'physical layer' addresses individual procedures and routines, instruments, systems and tasks, etc. The structured approach ensures correct and consistent alignment with the client's needs, objectives and priorities across all 'layers'.

Operational Layer		Operation Test-Process Scope			Test-Environment
		Test-Layout			
Functional Layer	<i>Test Stage 1</i>	<i>Test Stage 2</i>	<i>Test Stage 3</i>		
	<i>e.g. ICT</i>	<i>e.g. Functional Test</i> <i>e.g. Parametric Test</i> <i>e.g. Calibration</i> <i>e.g. FW loading</i>	<i>e.g. User/Functional Testing</i> <i>e.g. Feature Loading</i> <i>e.g. Characterisation</i>		
Physical Layer	Knowledge, Skills and Abilities				<i>Test-Infrastructure</i>
	Test-Plan	Test-Plan	Test-Plan		
	Test-List/Sequence	Test-List/Sequence	Test-List/Sequence		
	Test-Routines, Test-Cases et al	Test-Routines, Test-Cases et al	Test-Routines, Test-Cases et al		
	Test-System	Test-System	Test-System		
	Instruments, devices, sub-systems et al	Instruments, devices, sub-systems et al	Instruments, devices, sub-systems et al		

Figure 1 Systems-Approach to Test-Processes

The TCPIP comprises the four phases of Scope, Analysis, Design and Execution. Each phase is an encapsulated segment of the overall service with a defined in- and output. The individual phases can be delivered as individual services and as one package. While the complete process described here includes all possible work-elements, individual engagements only include those elements needed. Indeed, a full execution of all analyses represents the 'worst-case' scenario.

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| <ul style="list-style-type: none">i. Test-Process Assessment<ul style="list-style-type: none">i. Define Scope of Engagementii. Test-Process Analysis<ul style="list-style-type: none">i. Work-flowii. Performanceiii. Areas of Improvement (AoI)/Areas of Opportunity (AoO)iv. Test-Process Report (TPR) | <ul style="list-style-type: none">iii. Test-Process Optimisation - Design<ul style="list-style-type: none">i. Root-causesii. Measures & Cost/Benefitiii. Optimisation Design Specification (ODS)iv. Test-Process Optimisation - Delivery<ul style="list-style-type: none">i. Planning/schedulingii. Implementation and reviewiii. Performance Review/Acceptance |
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Table 1 TCPI Process Overview

2.1 Test-Process Assessment

The Assessment establishes the client's needs, objectives and constraints, priorities and target areas, context and stakeholders, influences and constraints. As needed, a benchmark or basic performance assessment is provided to specify key criteria and metrics. The outcome is the Scope of Engagement (SoE). The SoE provides a clear description of the areas to address, proposes solutions and sets the focus and objectives of the engagement. The Assessment provides clients the opportunity to discuss concerns, ideas and objectives with experienced and independent experts – prior to a commitment. Clients receive a clear and quantified understanding of how the service applies to their specific operations, processes and organisation. The SoE is documented as section 1 of the Test Process Document. It also forms the basis of the Statement of Work (SOW) and is provided prior to a financial commitment from the client.

2.2 Test-Process Analysis

The Test-Process Analysis comprises three separate analyses: Work-flow, Performance and Gap-analysis. Each analysis builds on the previous, successively narrowing the focus. Each analysis is executed to the detail and extent defined in the SoE. The analyses identify and assess the structure (layout) of the test-process, the integration with operations and the functions provided; work, work-flow, -stages and -processes and procedures; test-output and -performance and how these compare to the required fulfilment and delivery towards operations. The results are compiled in the structured Test Process Report (TPR). The TPR defines Areas of Improvement (AoI) and Areas of Opportunity (AoO), metrics and expected outcomes. The TPR forms section 2 of the overall Test-Process Document.

2.2.1 Work-flow Analysis

The Work-flow Analysis determines the structure and functions of the test-process as depicted in Figure 1 Systems-Approach to Test-Processes. It defines operational, functional and physical layers and the layout, integration and interfaces with the parent operation. Within these, the work-stages, flow between work-stages, the sub-systems and elements and their interdependencies are defined.

2.2.2 Performance Analysis

The Performance Analysis quantifies performance, requirements and metrics, building on the previous work-flow analysis. Performance is typically analysed in a 'top-down' manner, beginning with the performance at the operational level and subsequently detailing individual sections or stages and down to individual tests and set-ups. This ensures that a consistent focus is maintained on the areas providing the most relevant improvement in view of objectives and constraints, schedule and stakeholders.

2.2.3 Gap-Analysis

The Gap-Analysis follows an approach similar to the performance analysis, starting with key operational metrics and detailing down to individual elements and their performance. This again ensures consistency with objectives and further avoids expending effort on areas that can not provide adequate improvement. The gap-analysis identifies differences between expected and actual performance. It utilises a broad range of applicable data that can adequately determine the capacity (potential) of the test-process, such as benchmark results, comparisons, experiential/empirical data, etc. This is compared to actual performance. Gaps are e.g. inconsistencies in test-results, tests that consistently fail to meet expected performance, yield vs. pristine-yield, targeted volume vs. achieved etc. Constraints are identified, e.g. limitations in instruments or operator skill-sets. All metrics and measures are reviewed and compared for consistency. The results are organised in areas requiring improvement, Areas of Improvement (AoI), and areas where performance is within expectation, yet where improvements can be made, as Areas of Opportunity (AoO).

2.3 Test-Process Optimisation - Design

The Optimisation Design provides the design of measures and actions to address the areas determined in the Test-Process Analysis and achieve the required/desired outcomes. It comprises the root-cause analysis and the design of measures for the operational, functional and physical layers of the test-process. The design is executed as best possible concurrently and prioritised according to necessities, opportunities and interdependencies. The measures, designs and their metrics are compiled in the structured Optimisation Design Specification (ODS), section 3 of the Test Process Document.

2.3.1 Root-cause analysis

The initial phase is the root-cause analysis. Root-causes are determined by applying understanding of the structure of the Test-Process, the results from the performance and gap-analyses and the in-depth understanding of testing and test-systems in general. The root-cause analysis provides the basis for the design of the measures to be applied at the different levels of the test-process, operational, functional and physical as well. It further identifies the immediacy of the implementation of these measures.

2.3.2 Design of optimisation measures

The design is executed using the structure established in the work-flow analysis and according to the priorities established from SoE through to Root-cause analysis. Typical optimisation measures for the physical level are the optimisation of test-sequences and routines, test-systems and instrumentation. Measures for the functional layer can include balancing testing across the test-process, optimising re-work and reducing testing. Measures for the operational layer can include improving feedback to R&D, coordinating volume/batch control with test-capacity, utilising 'test-headroom' in coordination with product development, test-engineering and short-run cycles, etc. All optimisation measures are balanced against, needs, objectives and constraints, schedules and budgets and projected costs and returns.

2.4 Test-Process Optimisation - Delivery

Optimisation Delivery first provides the planning and scheduling, execution and support for the optimisation in the Delivery Plan, section 4 of the TPD. Delivery and implementation are coordinated with the client and operations. Available resources and work are incorporated as feasible and agreed. Delivery and implementation of measures is in order of priority and typically commences with targeted measures for the 'physical layer'. Functional measures such as test-layouts are implemented subsequently or as feasible, concurrently. Operational and opportunistic measures such follow thereafter. Training and similar programs are executed as possible concurrently to all others. Each phase is reviewed individually. Once all measures have been implemented and effects are stabilised, an encompassing performance review is executed. The Performance Report constitutes the Final Acceptance and is documented in section 5 of the TPD.

3 Appendix – TCPIP Flowcharts



