



Concordia
UNIVERSITY

CONCORDIA UNIVERSITY &



ÉCOLE DE TECHNOLOGIE SUPÉRIEURE – MONTRÉAL - CANADA



A Case Study of Metrics-based & Scenario-driven Black-Box Testing for SAP Projects

M. Daneva, A. Abran, O. Ormandjieva, M. Abu Talib



Universiteit Twente
de ondernemende universiteit

Overview

1. Introduction

2. Background

2.1. SAP Testing: Process & Issues

2.2. The COSMIC FFP Testing Method

3. Research Approach

4. The Case Study

4.1 Context

4.2 COSMIC FFP Method Adaptation & Application

4.3 Evaluation of Validation Concerns

5. Findings and Future Activities

Background (I): the SAP Testing Process

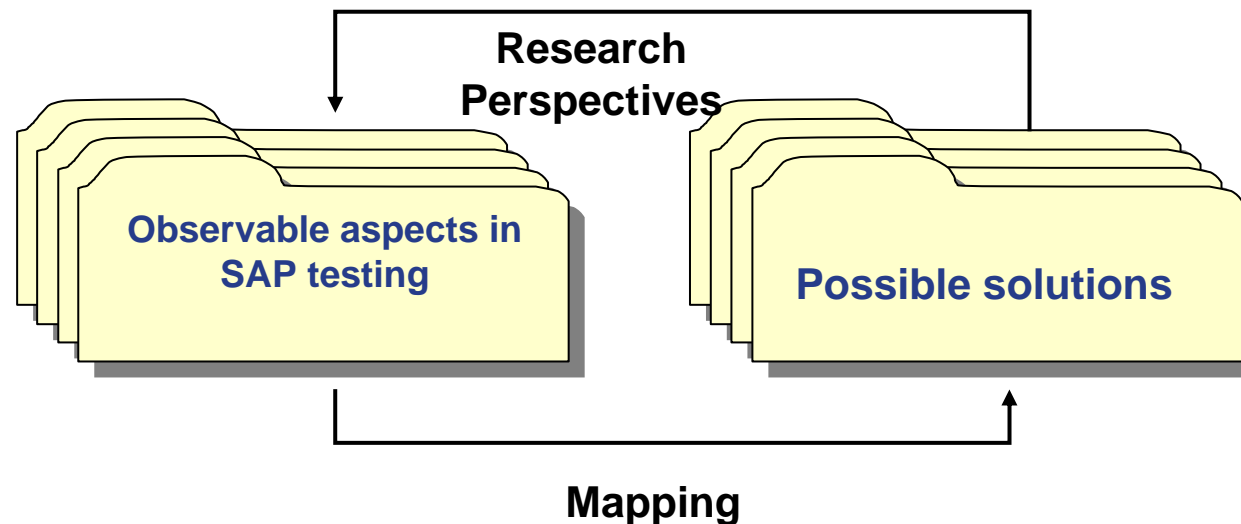
GOAL: To increase the user confidence that the SAP-based solution meets its requirements

Principles:

- 1 Model-driven, architecture-centric process**
- 2 Layered approach: SAP adopters assumes the SAP vendor did package testing (ISO 9000, SAP Product Standard Framework)**
- 3 Tool support: SAP Test Workbench, Test Data Migration, eCATT)**

Background (II): the SAP Testing Challenges

1. How to test fragments cost-effectively?
2. How to prioritize?



The Research Questions:

1. *How can the COSMIC FFP testing method be applied to SAP project contexts?*
2. *Where in the SAP testing process do benefits lie?*

Background (III): the COSMIC FFP Testing Approach

The Source: *M. Abu Talib, O. Ormandjieva, A. Abran, L. Buglione, Software Quality Professional, June 2006.*

The Steps:

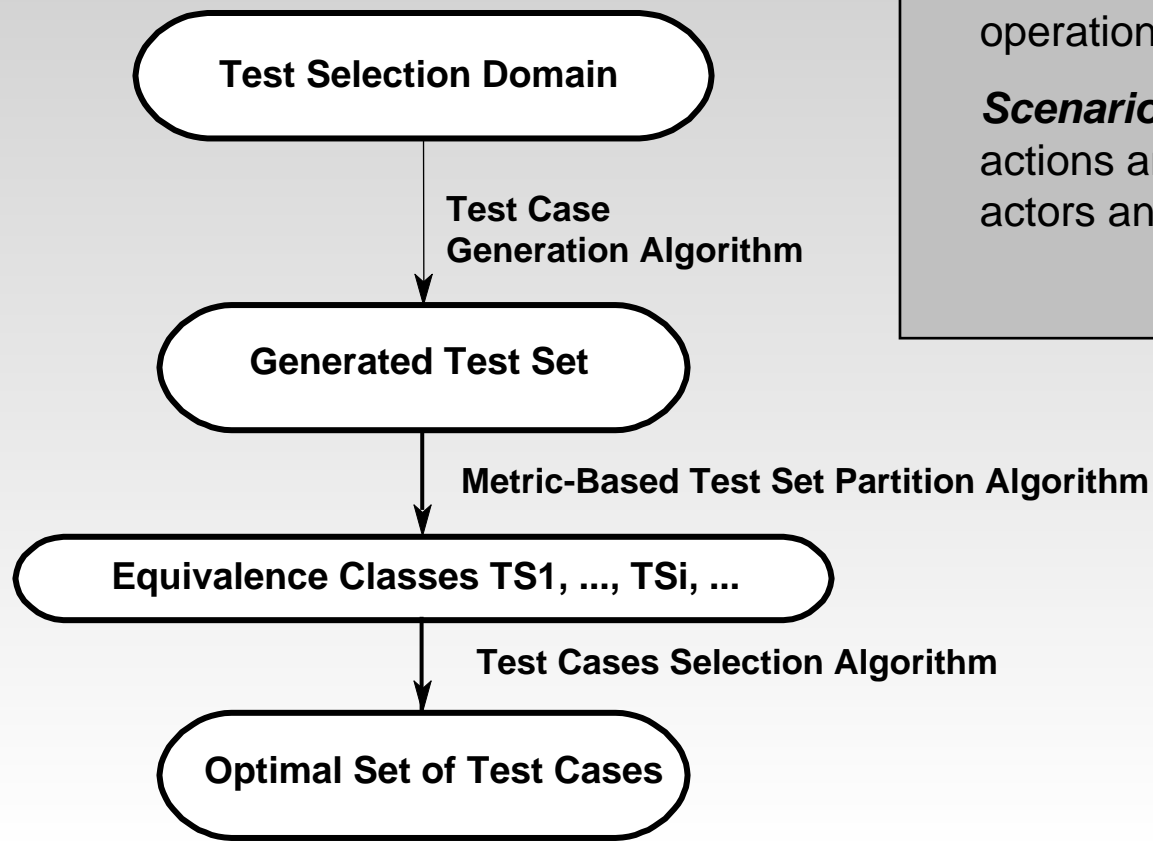
- 1. Generate test cases by mapping scenarios to sequences of events**
- 2. Partition test cases into equivalent classes based on similarity and dissimilarity measures**
- 3. Prioritize test cases in each class based on FC measures**
- 4. Select optimal subset within budgetary constraints while maximizing test coverage**

Background (IV) : the COSMIC FFP Testing Approach

Definitions:

Use Case: a collection of related scenarios that describes actors and operations in a system

Scenario: a specific sequence of actions and interactions between actors and the system



Case Study Research Method & Context

Groundwork:

- 1. The pre-step: to establish mappings between the logical components of UML and SAP requirements (which means use cases and event-driven process chains)**
- 2. Unit of analysis: the testing strategy deployed.**
- 3. Five SAP scenarios from the Material Mngt Module of SAP 4.0H.**
- 4. Decomposition of SAP scenarios to elementary processes.**



The Test Cases (I): the Descriptions

Test case #	Test-case description	Event-driven process model from which a test case is obtained	Length of test case
t1	e1.e2.e3.e4.e5.e6.e7	External service procurement	7
t2	e8.e9.e10.e11.e12.e13	Materials master maintenance	6
t3	e14.e15.e16.e17.e18.e19.e20.e21	Procurement of stock materials	8
t4	e16.e18.e19.e20.e21	Procurement of consumable materials	5
t5	e22.e23.e24.e25	Service master maintenance	4

Events:

e1: Create purchase requisition for service

e2: Determine possible service providers

e3: Create purchase order for service

e4: Monitor purchase order for service

The Test Cases (II): the Cost Data

Test case #	Total person/hours in testing*	EPC model from which a test case is obtained	Total cost
1	40	External Service Procurement	\$1730
2	25	Materials Master Maintenance	\$ 504
3	37	Procurement of Stock Materials	\$1483
4	26	Procurement of Consumable Materials	\$ 992
5	14	Service Master Maintenance	\$ 555

* Includes time spent in (a) writing & correcting test cases, (b) running & reviewing results, (c) writing test acceptance reports

The Steps & the Results

1. Generate test cases by mapping scenarios to sequences of events → { t1, t2, t3, t4, t5 }
 2. Partition test cases into equivalent classes based on similarity and dissimilarity measures → { t3, t4 }, { t1 }, { t2 }, { t5 }
 3. Prioritize test cases in each class based on FC measures → { t3 }, { t1 }, { t2 }, { t5 }
 4. Select optimal subset within budgetary constraints while maximizing test coverage → { t3, t1, t2 }
- assume budget = \$ 3000 and average cost per case = \$ 1000*

Assessment of the Research Questions

1. The COSMIC FFP testing strategy fits well with the SAP project context
2. No substantial cost incurred due to this testing strategy
3. Straightforward application when:
 - One SAP instance at a time.
 - Business process documentation up to date and valid
 - SAP transactions are automatically mapped to business process scenarios by means of a tool (LiveModel, Intellicorp)
4. Assessment in terms of effectiveness & efficiency of the testing process
 - Effectiveness of the optimal set of test cases within the budget: 70%, which represents 60% of the SAP exhaustive testing
 - Efficiency more than 16%

Related Work

SAP Testing is an under-researched topic:

- ❑ “SAP testing” does not yield any result in IEEE Xplore, ACM Digital Library, and Wiley InterScience**
- ❑ IBM: metrics to evaluate vendor-developed software based on test case execution results, 2002**

How do we stand with respect to earlier experiences?

- ❑ Testing is optimized early in the SAP process implementation**
- ❑ The objective is to achieve better testing results within a budget**

Validation Concerns

External validity:

- All five settings have up-to-date documentation by scenarios, and are telecommunication-specific (ASUG)**

Internal validity:

- Use of the public SAP Help library,**
- Use of standard mapping from the SAP modelling notation to UML.**
- Shared tool support**

Future Activities

- 1. Apply the COSMIC FFP counting method**
- 2. Replicate follow-up case studies**
- 3. Conduct a deeper research into validity threats**