

Influencing Factors in Model-Based Testing with UML State Machines: Report on an Industrial Cooperation

Models 2009

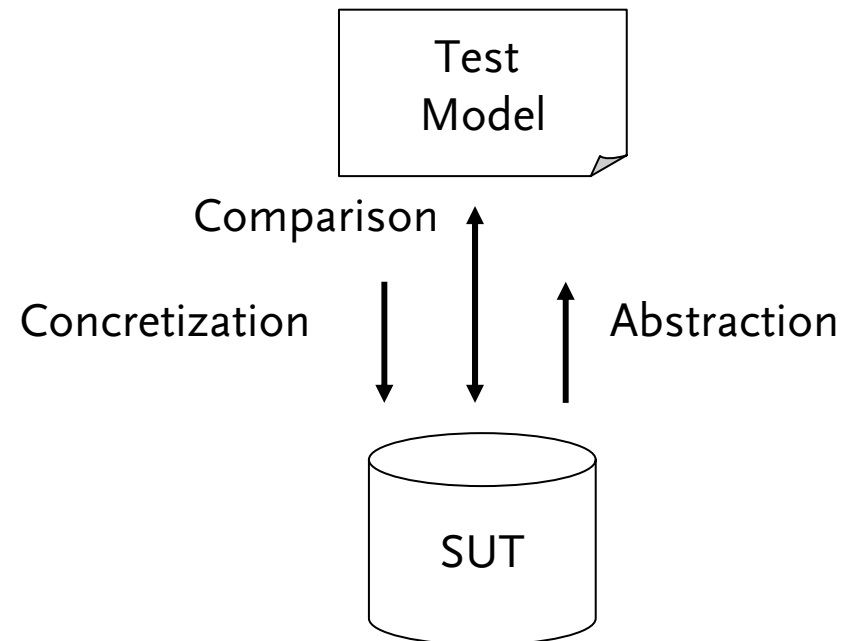
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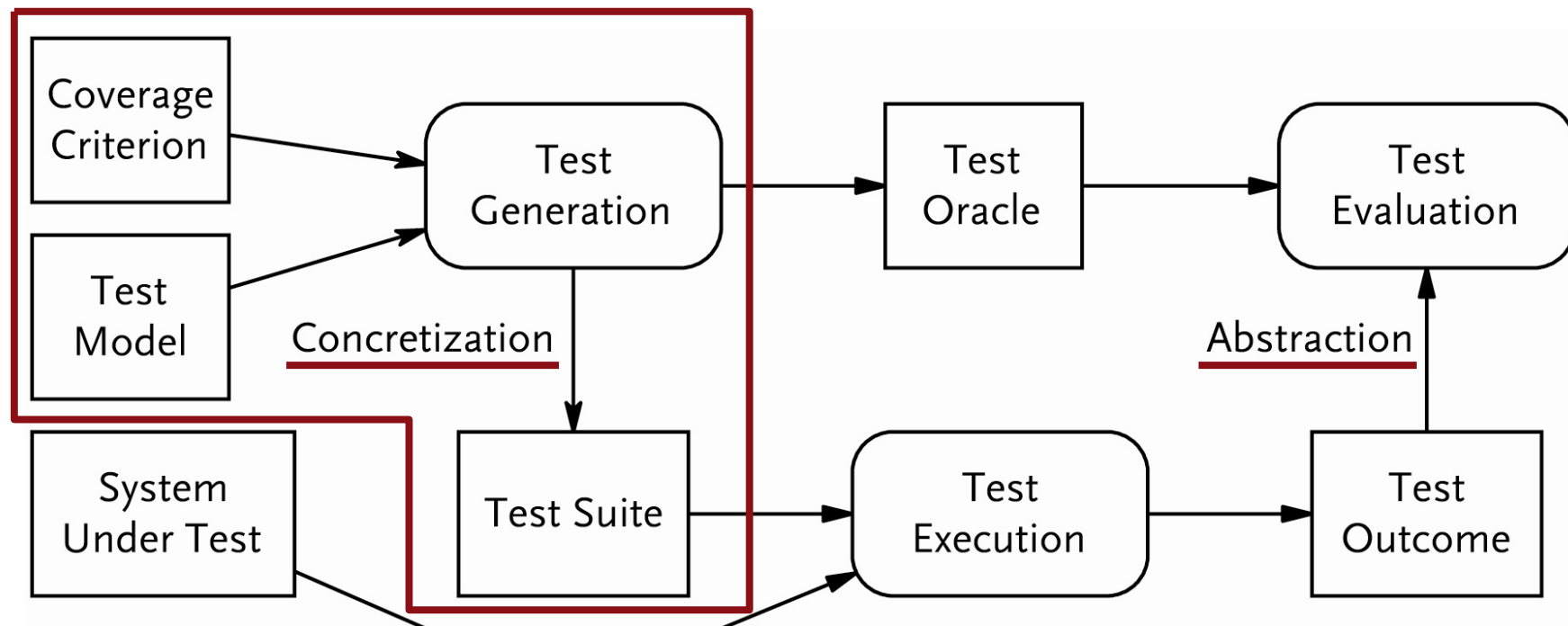
- Model-Based Testing
 - Short introduction
 - General influencing factors
- The test generator ParTeG
- Industrial Cooperation
 - Setting
 - Report

Model-Based Testing

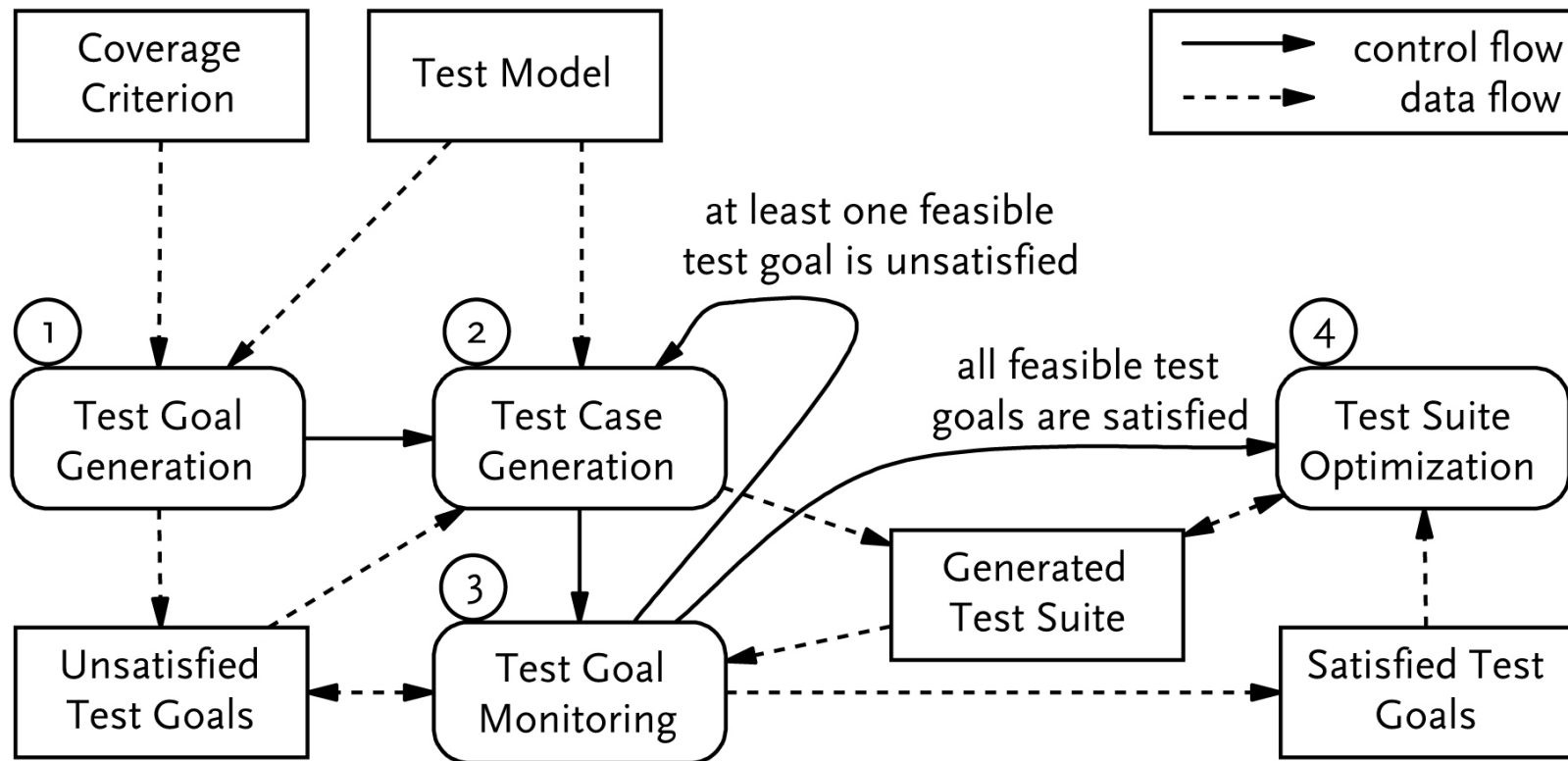
Model-Based Testing



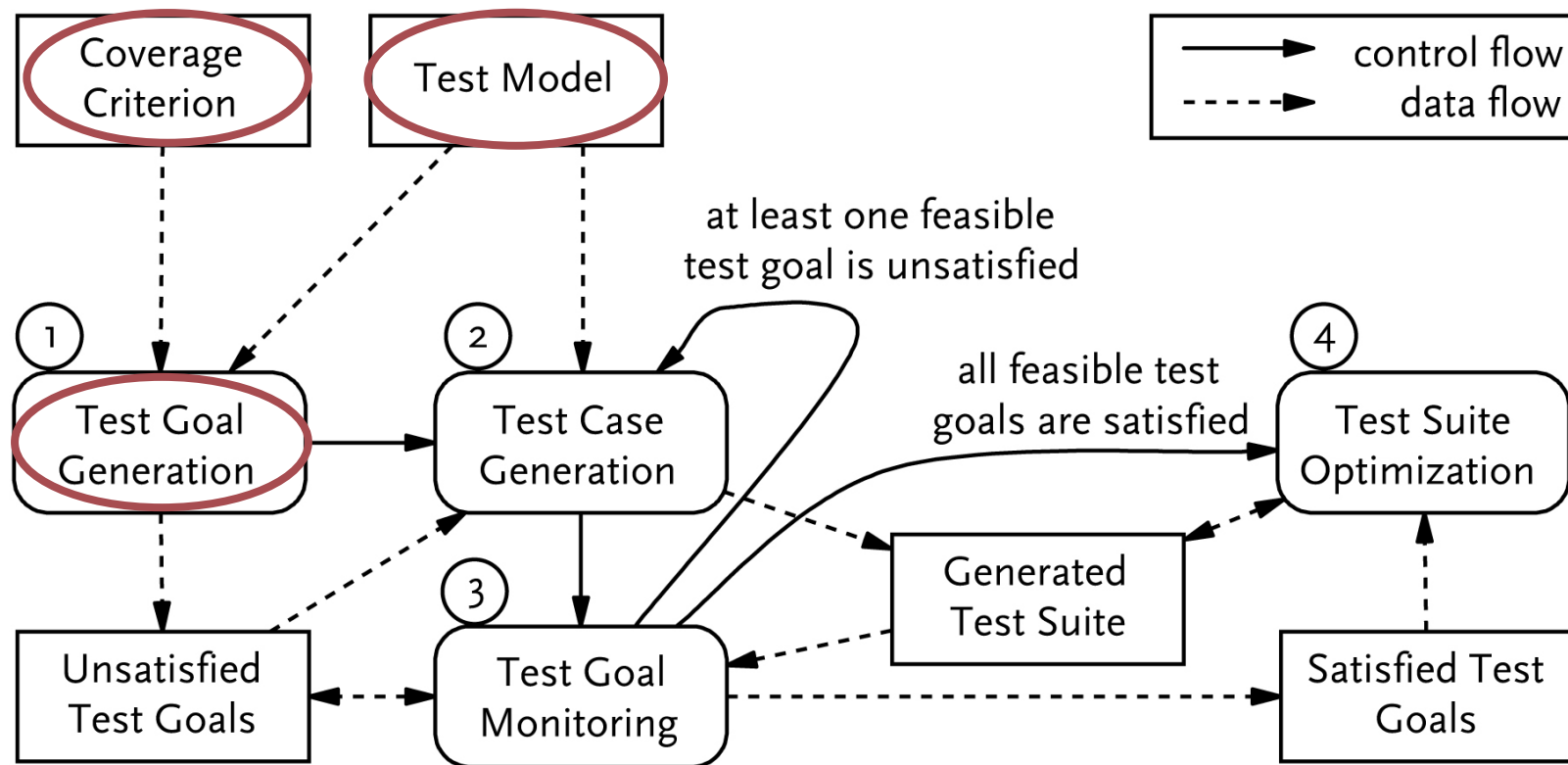
Model-Based Testing



Automatic Model-Based Test Generation

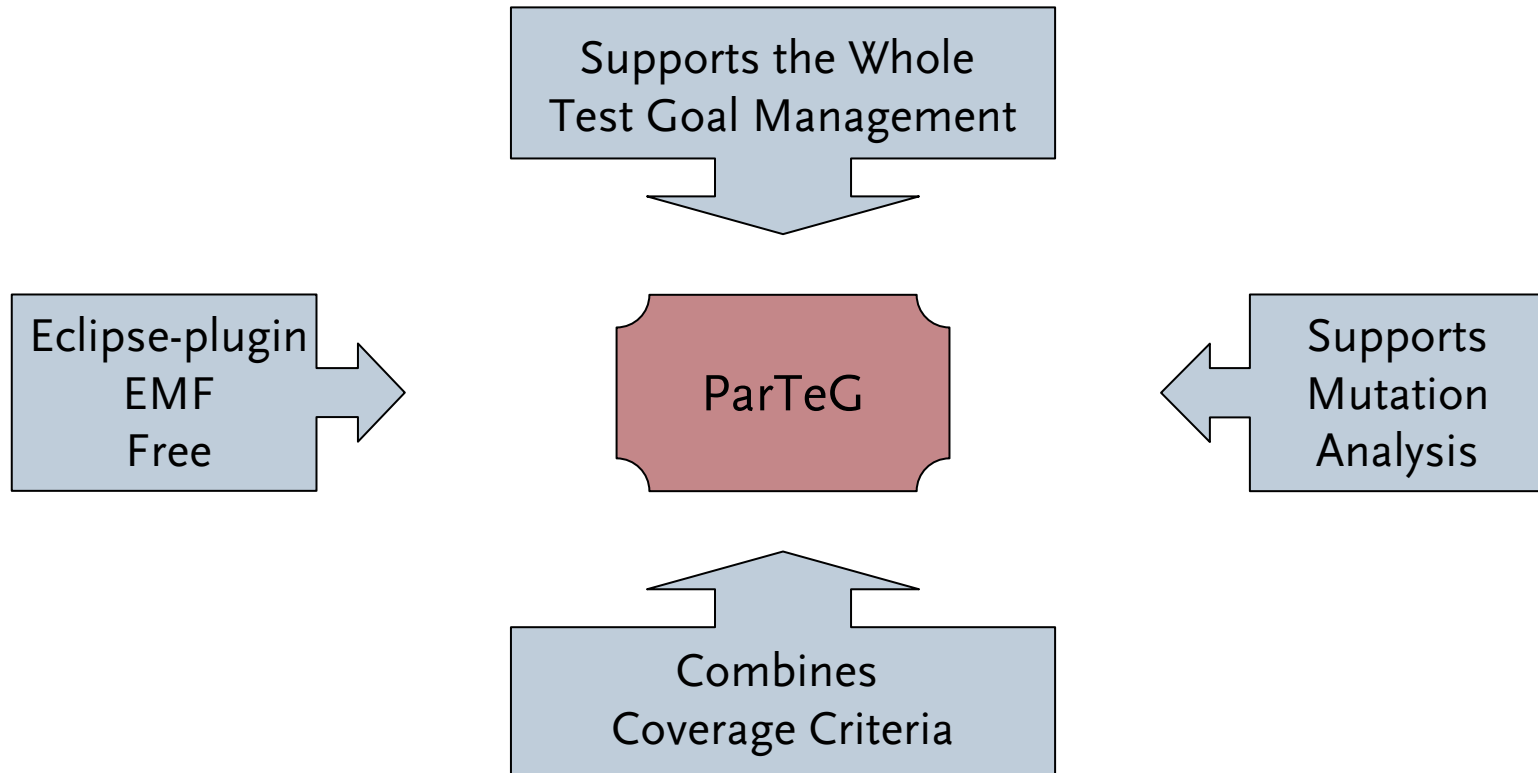


Influencing Factors



ParTeG (Partition Test Generator)

Partition Test Generator



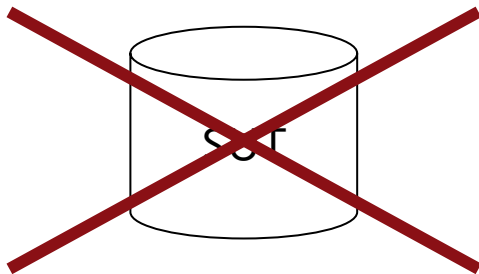


Report on Industrial Cooperation

Setting

Input

Test Model
State Machine



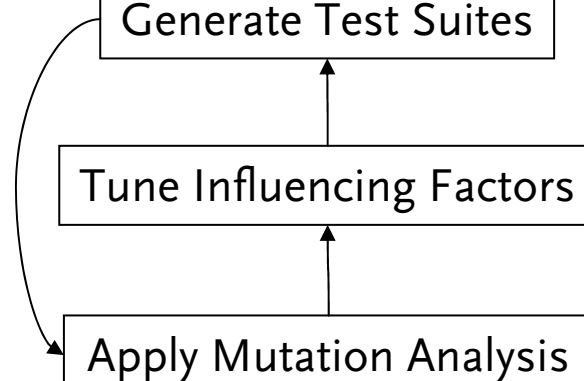
Actions

Manually Create
Several Artificial SUTs

Generate Test Suites

Tune Influencing Factors

Apply Mutation Analysis



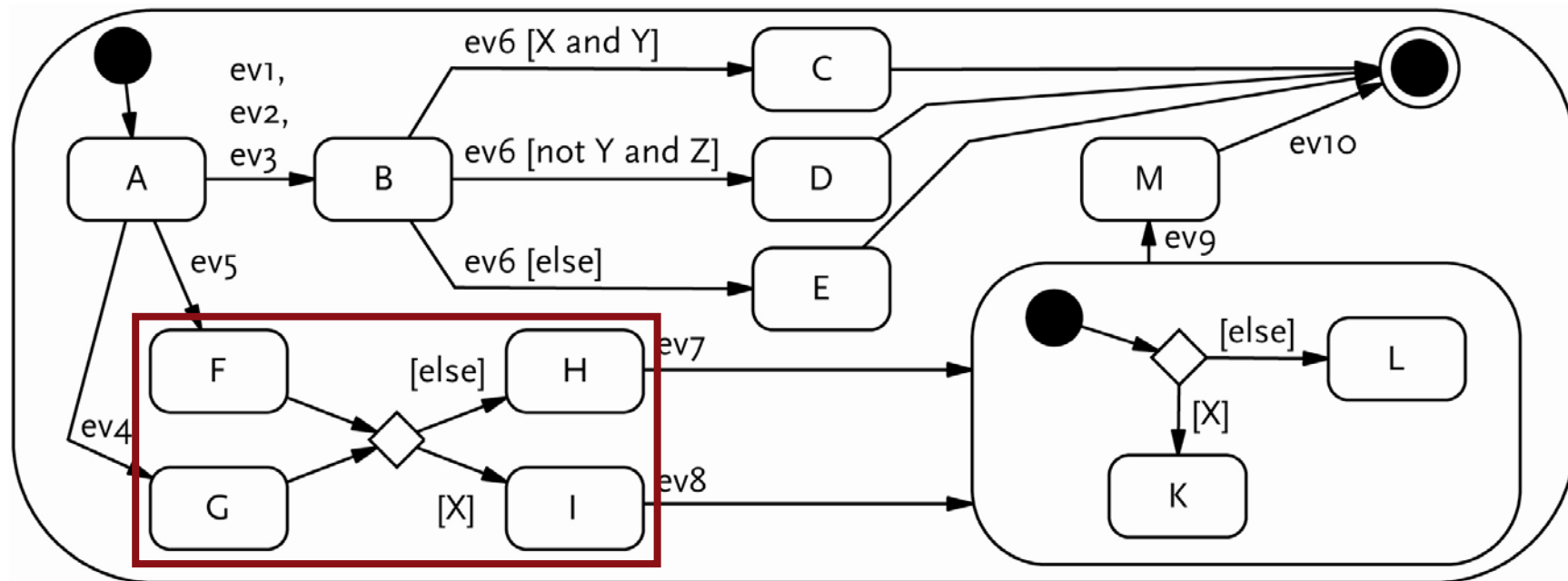
Output

```

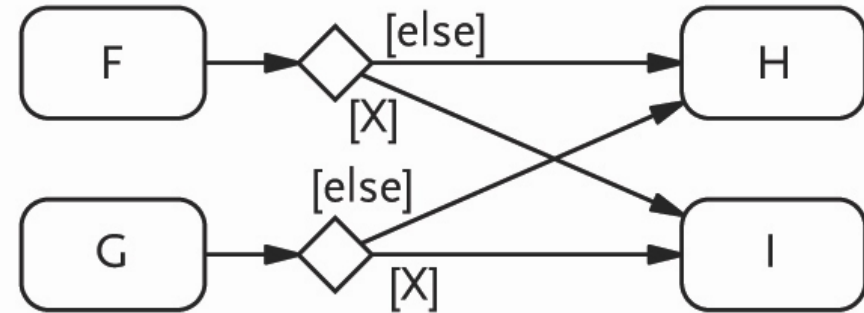
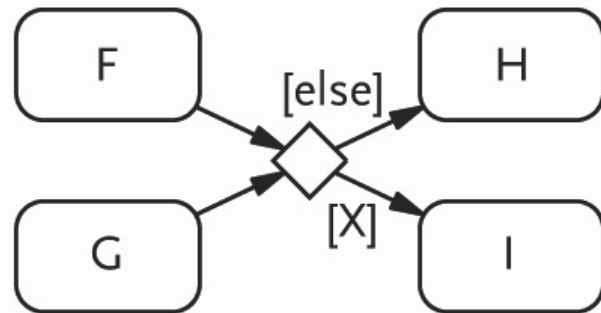
Class Test : public
CppUnit::TestCase {
public:
void runTest() {
  CPPUNIT_ASSERT(...);
}
}
  
```

Test Suite
CppUnit

Part of the Test Model

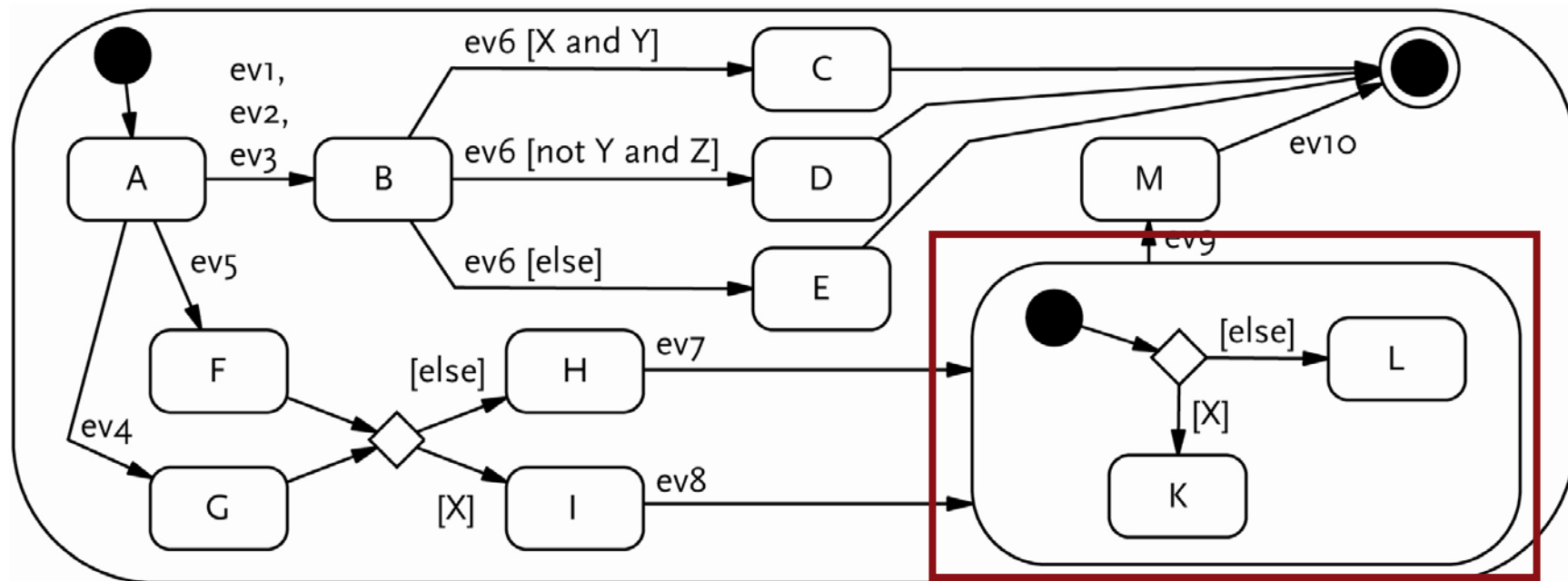


Choice Pseudostate Splitting

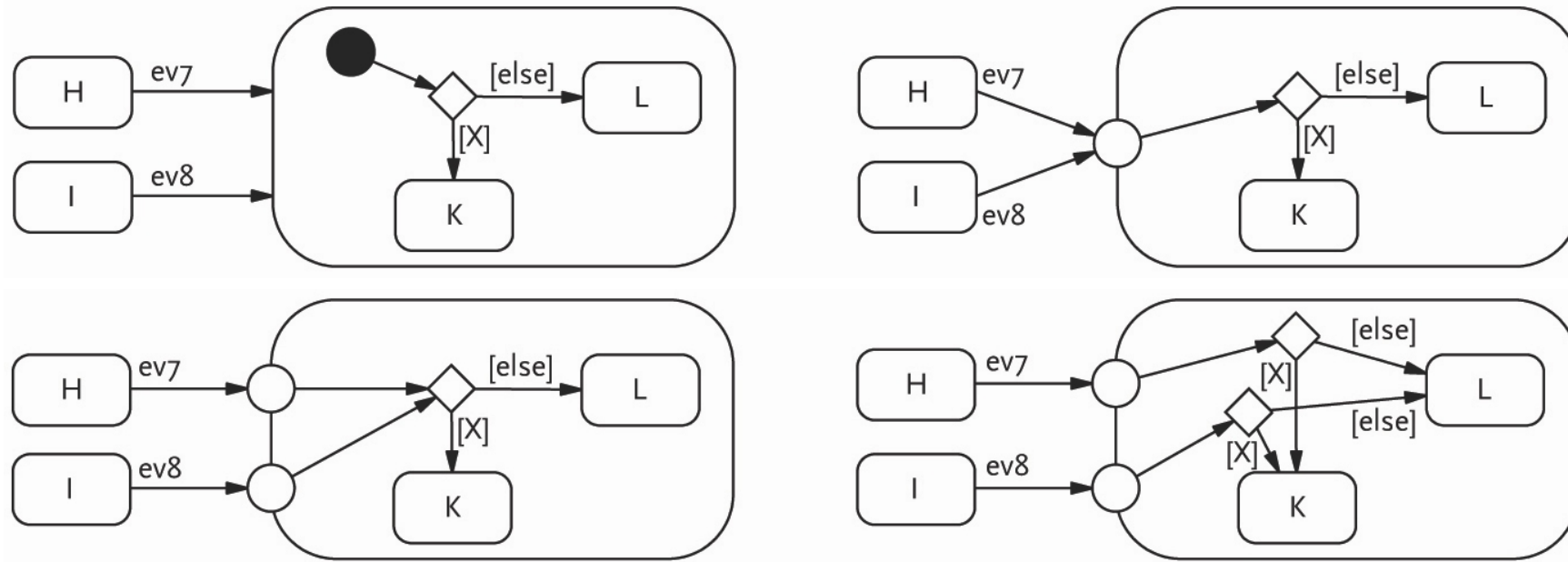


Mutation score

Part of the Test Model

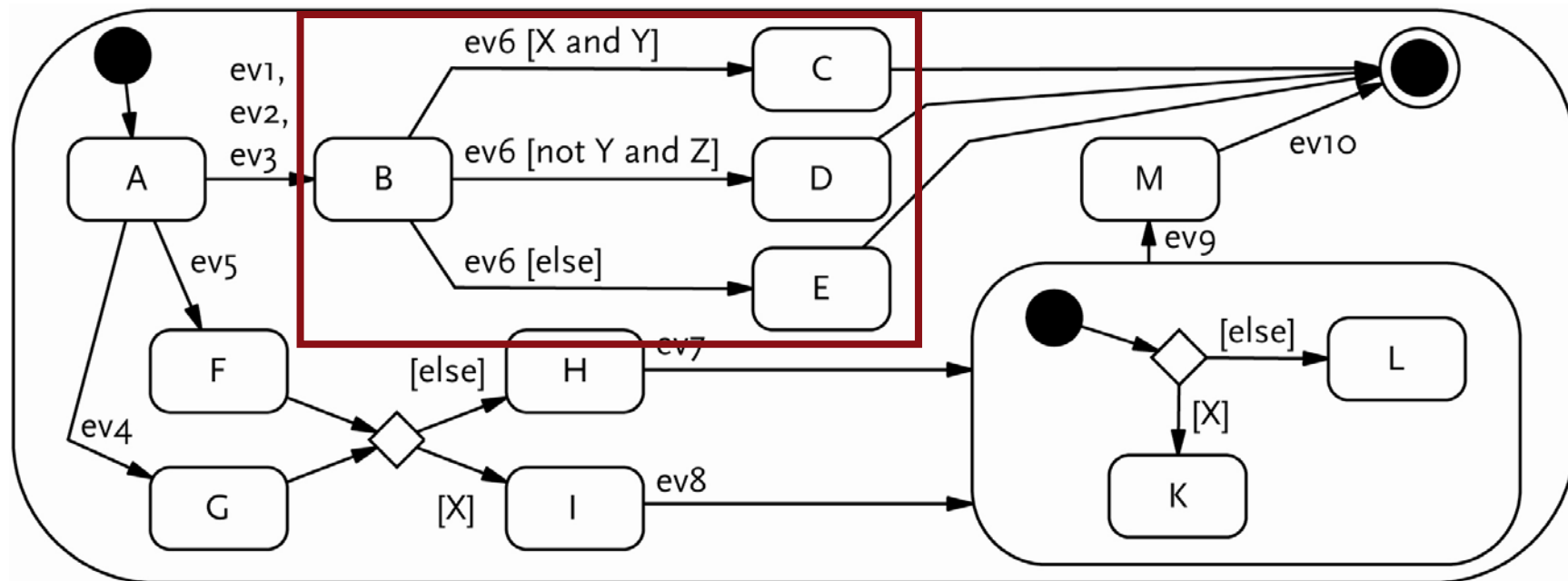


Composite State Transformation

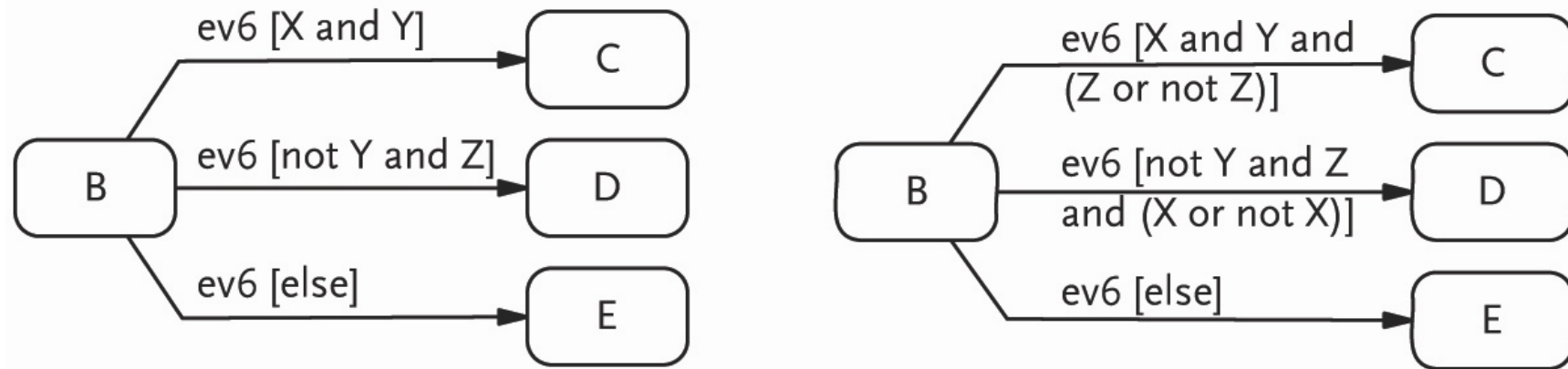


Mutation score

Part of the Test Model

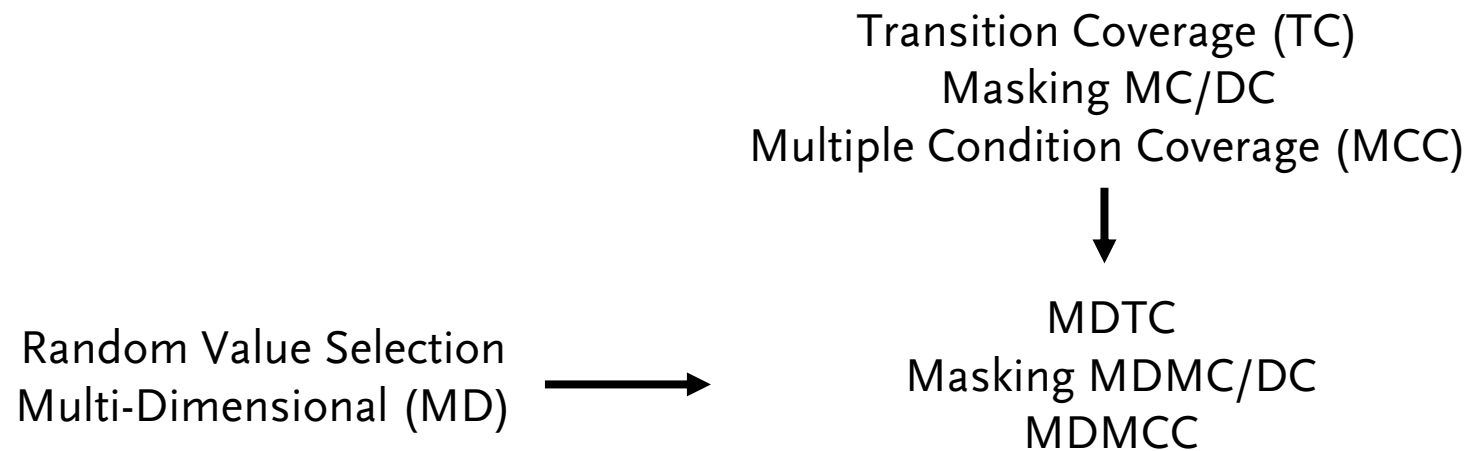


Dynamic Test Goal Adaptation



Mutation score

Coverage Criteria Combination



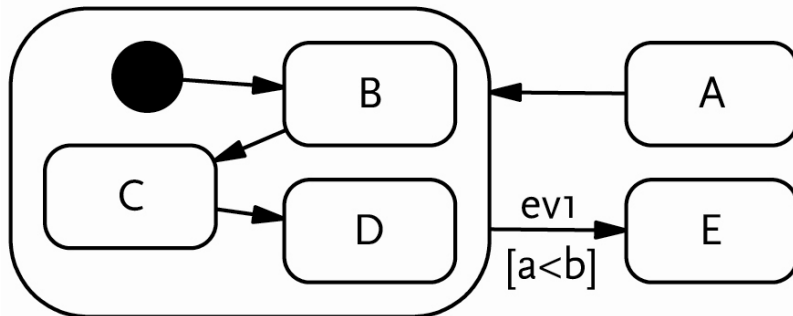
Mutation score

Efficient and Redundant SUT / Test Model

```

if(eventIs('ev1')) {
  if(inState('B') ||
    inState('C') ||
    inState('D')) {
    if(a < b) {
      setState('E');
    }
  }
}
  
```

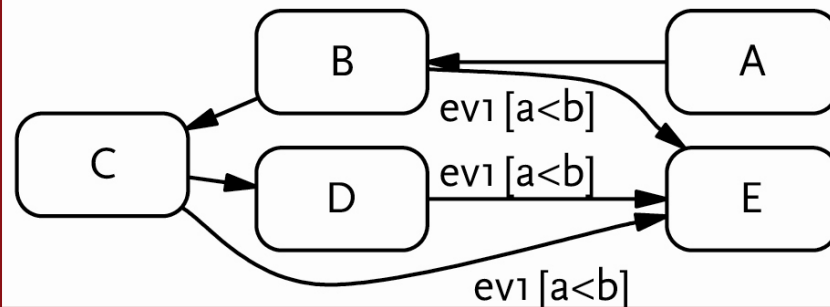
Efficient



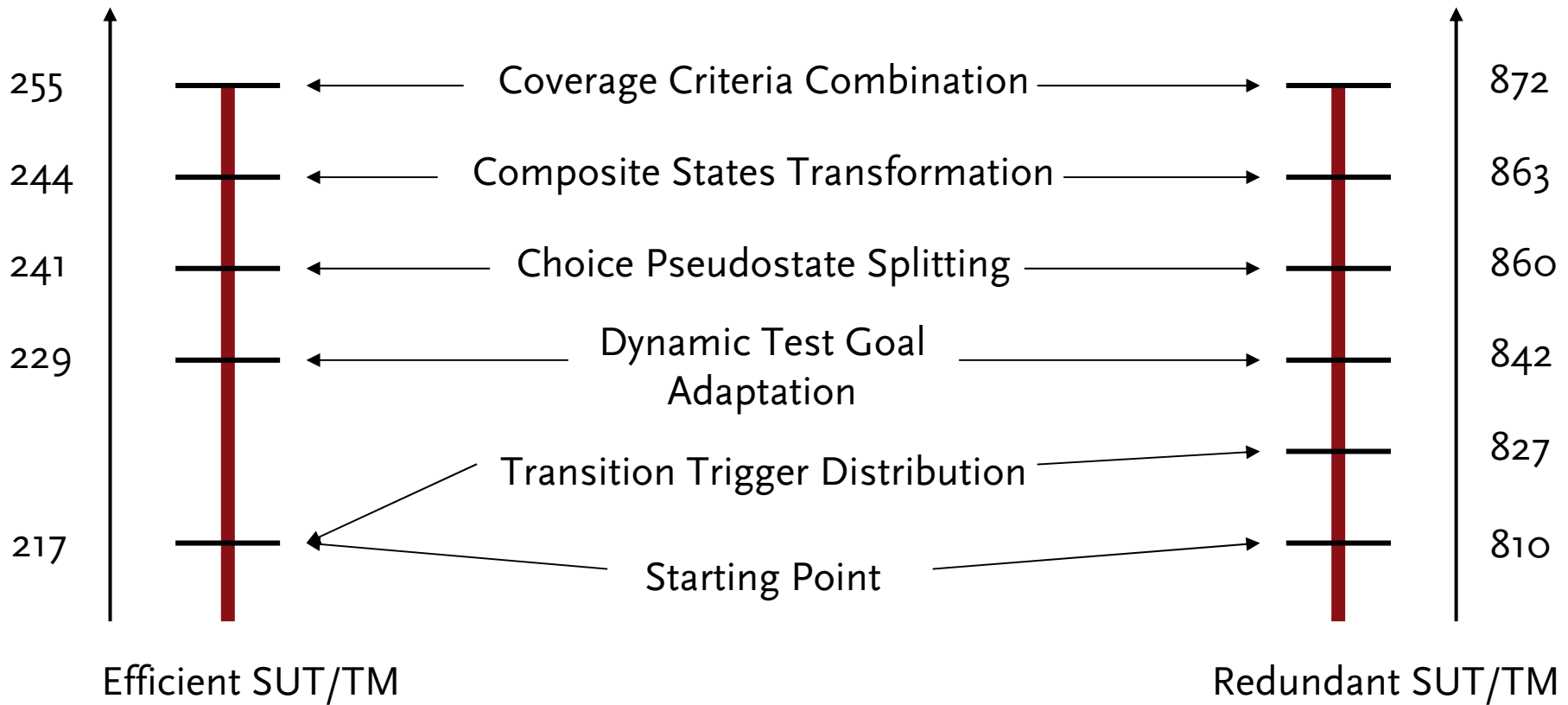
```

if(eventIs('ev1')) {
  if(inState('B') && a < b) {
    setState('E');
  }
  if(inState('C') && a < b) {
    setState('E');
  }
  if(inState('D') && a < b) {
    setState('E');
  }
}
  
```

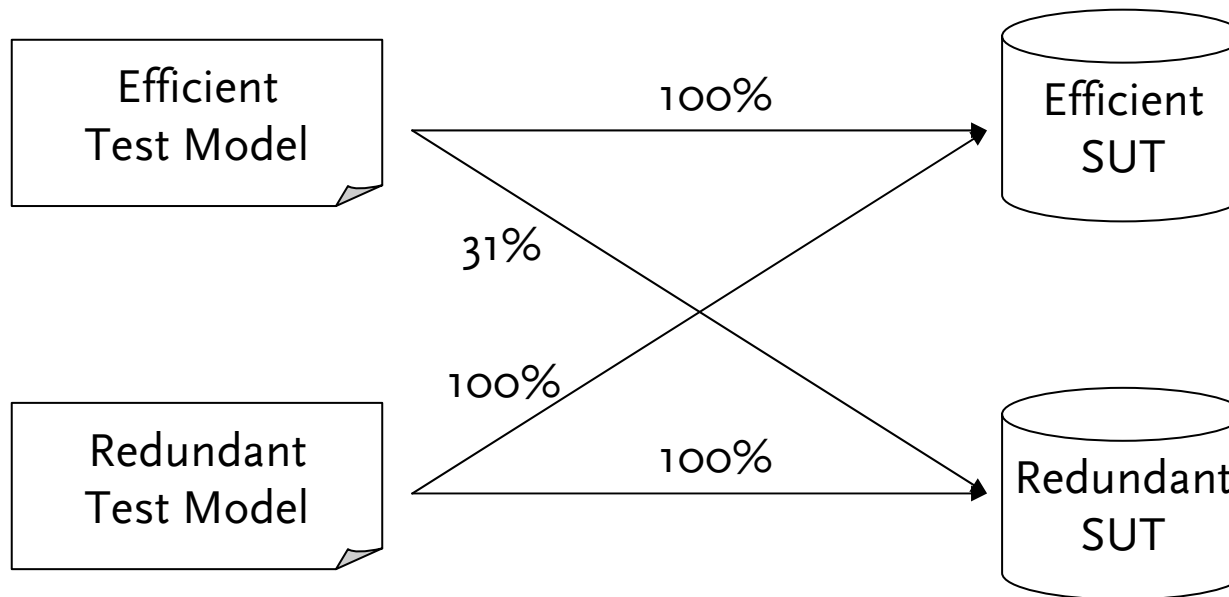
Redundant



Mutation Scores for Multiple Condition Coverage



Comparison of Efficient and Redundant TM/SUT



Application on the real SUT substantiated these results

Conclusion

- Report on an industrial cooperation
- Occurred technical challenges & their solution
- Mutation analysis on the real SUT
 - Quality of redundant test suite was higher than the quality of the efficient one
 - Quality of generated tests was comparable to the quality of manually created tests
- Contribution:
 - Presented procedure for MBT with a hidden SUT
 - Application of artificial SUTs
 - Similar results on the real SUT
 - Purposeful transformation of the test model
 - Adaptation of test goals
 - Combination of coverage criteria