

A low-angle shot of a building with a large, red, 3D Telekom logo on its facade. The sky is blue, and there are some blurred red and white elements in the foreground.

# Model-based Testing @ Telekom. Lessons learned from a R&D transfer project.

MBTUC Keynote, Berlin, October 2011.

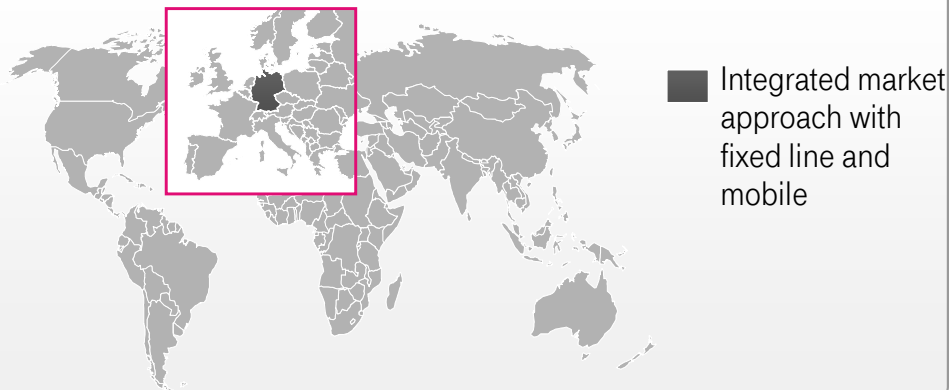
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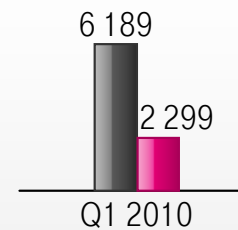
# Introduction – IT Deutschland & T-Labs.

# Operating Segment Germany.

## Operating Segment Germany



## Facts



Employees Q1 2010: 80 729

■ Revenue in million €  
■ Adjusted EBITDA in million €

## Customers / Partners

- Over 26M fixed line connections
- Over 11M broadband connections
- Market leader in mobile: Over 39M cell phone customers
- Market share in the DSL new customer business in Germany: 45%
- Over 1 million Entertain Packages marketed
- Revenue from mobile data: Near €1B

## Highlights

- IPTV offering with over 120 channels, 10.000 items in TV archive and online video store – a thousand of them in HD quality
- LIGA total! – all games of German Bundesliga in HD
- Mobile TV
- Exclusive partner of Apple iPhone
- Market launch of 1st Android-Phone T-Mobile G1
- Deutschland LAN: comprehensive communication solution for connect worked in the office and on the road

Stand: 31.12.2009



# IT Deutschland in Numbers.

**2851**

Employees

**533**

IT Applications

**500+**

Projects

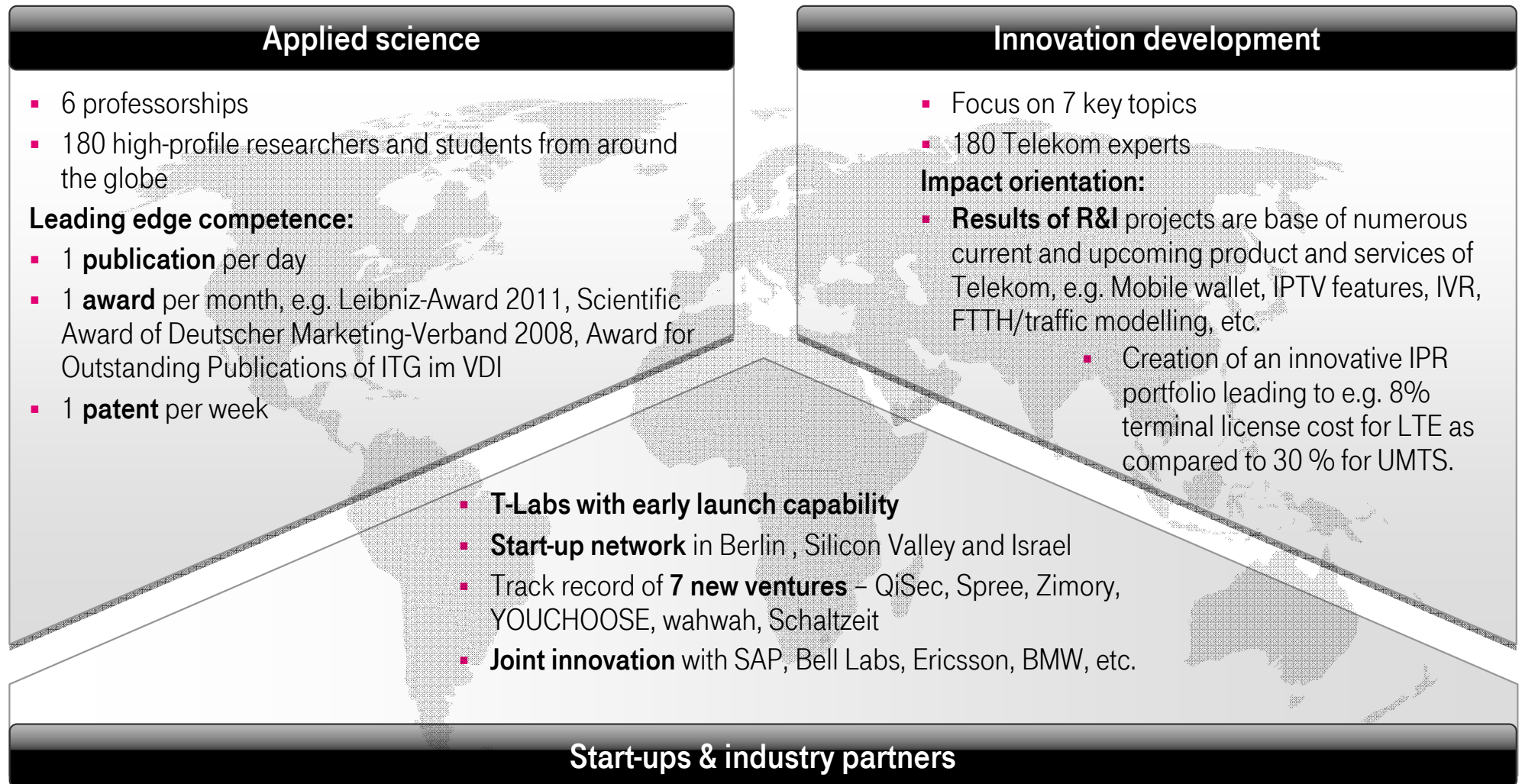
Effective August, 28th 2010



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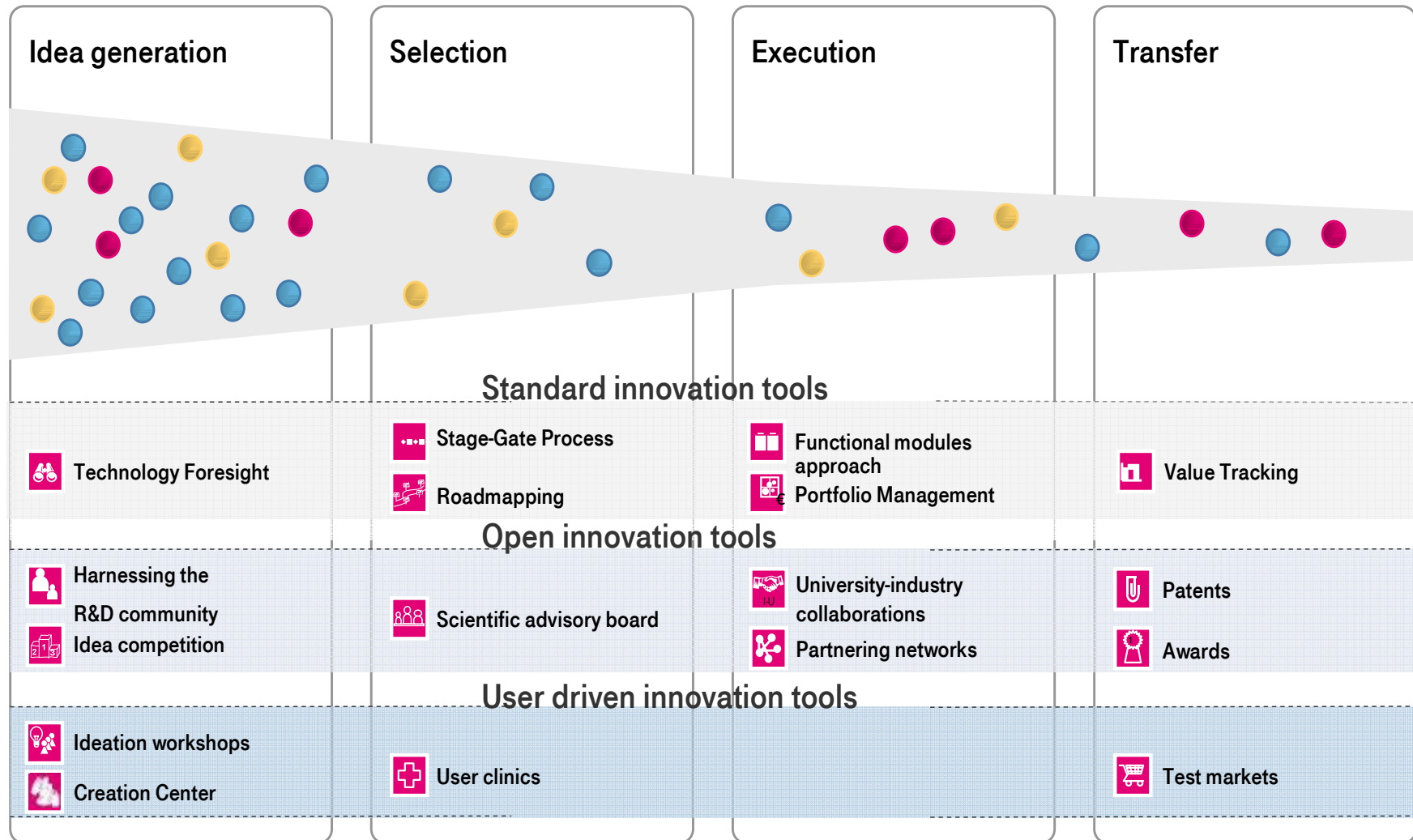
# T-Labs – The best of three worlds as a long-term success factor for Deutsche Telekom.

Network of international partnerships with prestigious research institutes, universities, industrial partners and start-ups.



# Core T-Labs process and tools.

Diverse methods support value generation from R&I.



# Agenda.

What will we talk about.

**IT Process and  
UML-based  
modelling  
at T-Deutschland**

**Interest in MBT  
and R&D project  
with T-Labs**



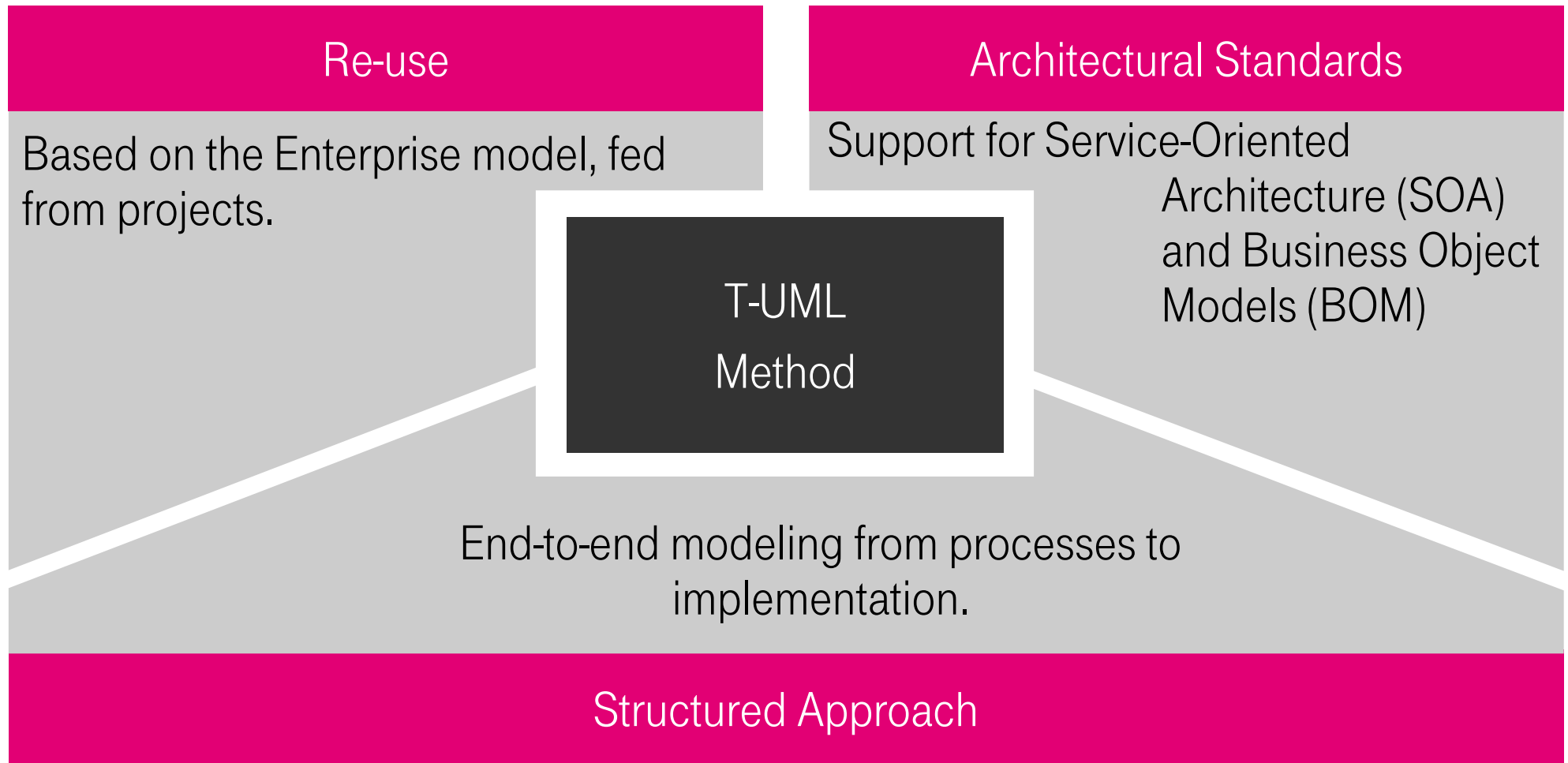
**Results, Insights and  
Future Plans  
regarding MBT  
at T-Deutschland**





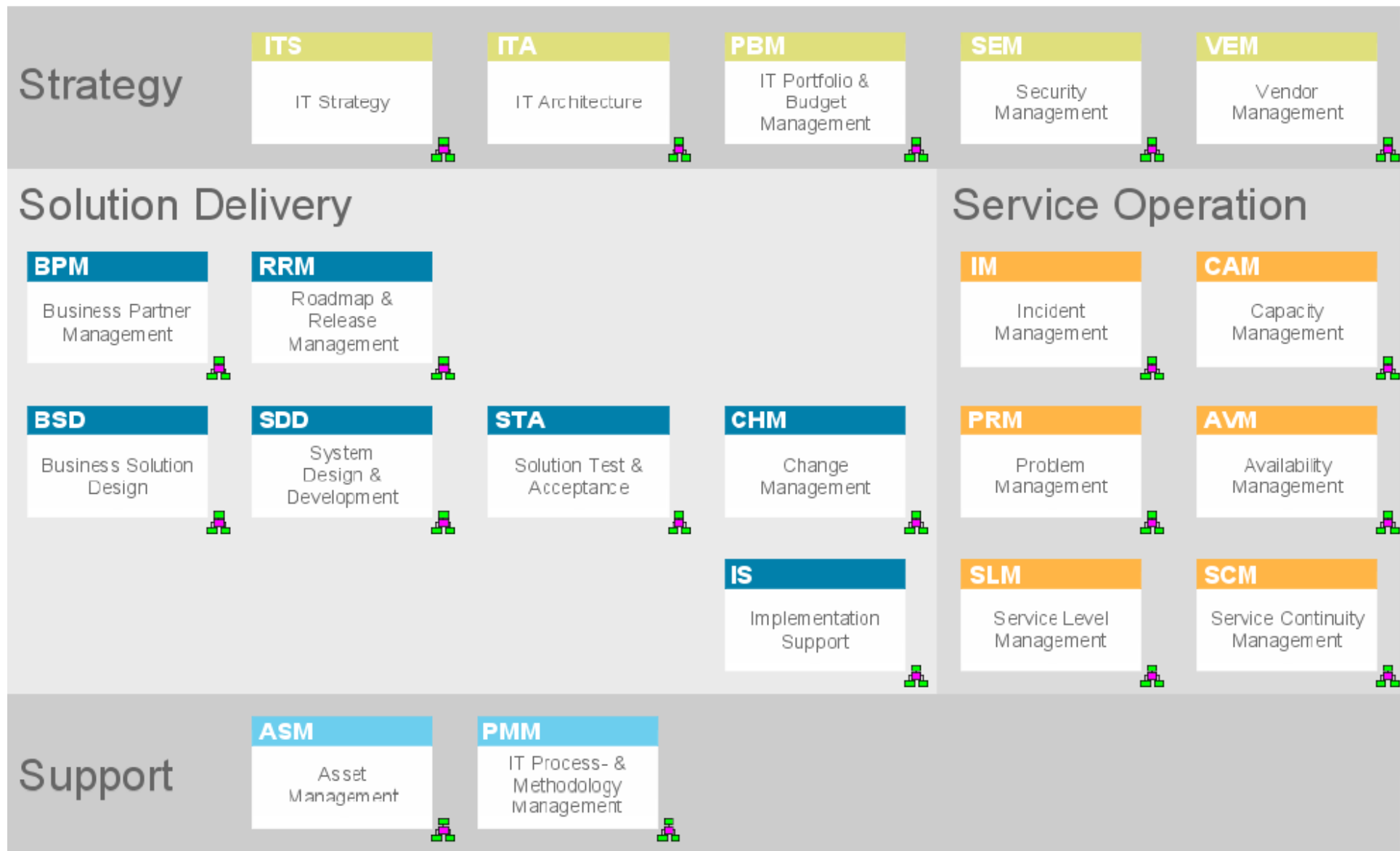
IT Process and UML-based modeling at T-Deutschland.

# Overview of T-UML Method.

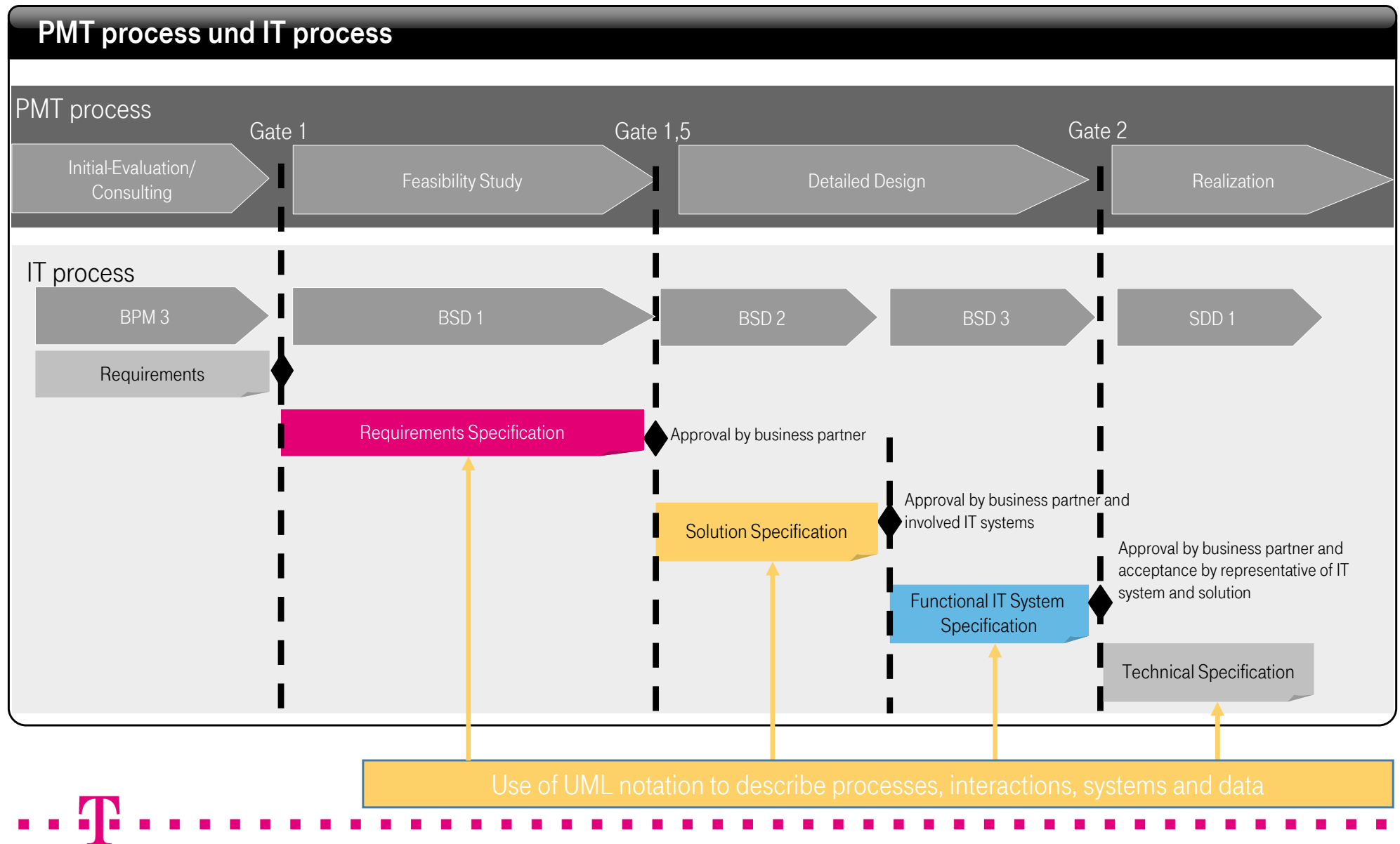


# Overview IT Process Disciplines.

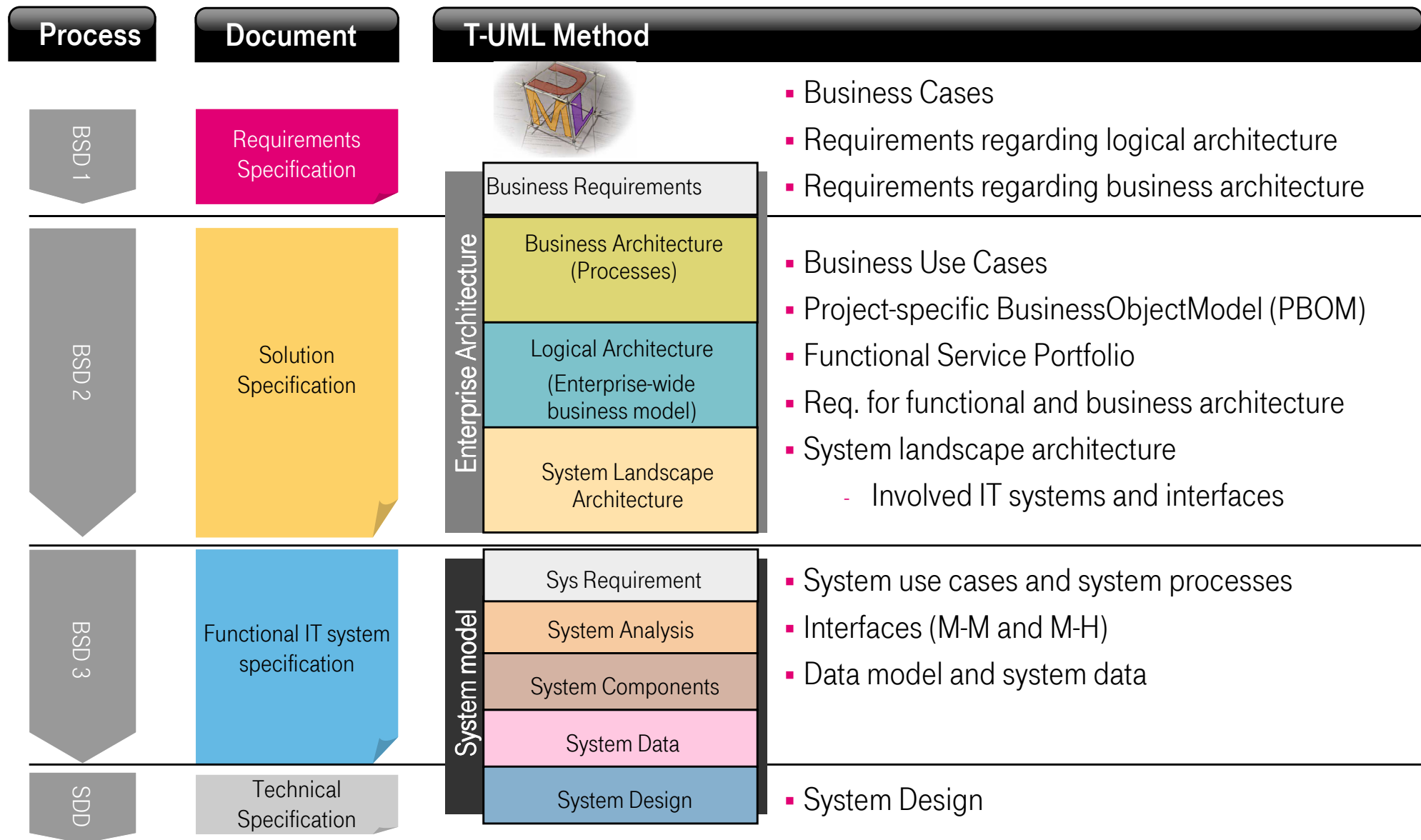
## Process map.



# The T-UML method in the context of the IT process.



# Modeling scope in solution design.



Interest in MBT and R&D project with T-Labs.

# Examining Model-based Testing at Telekom Deutschland. Reasons and Goals.

## Opportunity

Rollout of new IT Process and UML guidelines provided an anchor for Model-based approaches.

**How can MBT be integrated into existing IT practice?**

## Interest of Projects

Individual projects were interested in earlier and more formalized involvement of testing.

Earlier involvement of testing discipline

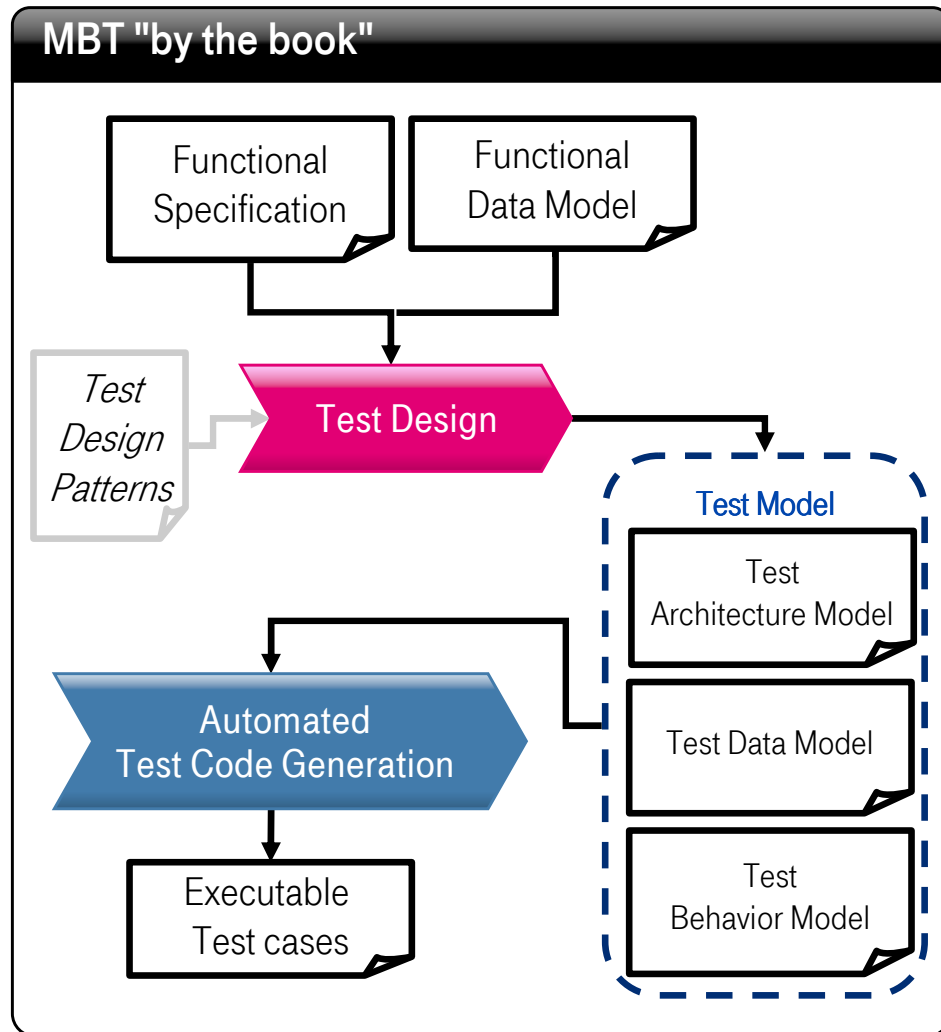
Feedback for system specification

Consistent derivation of test cases



# Project Challenge.

Transferring academic MBT knowledge into industry setting.



## Integration into real-life setting

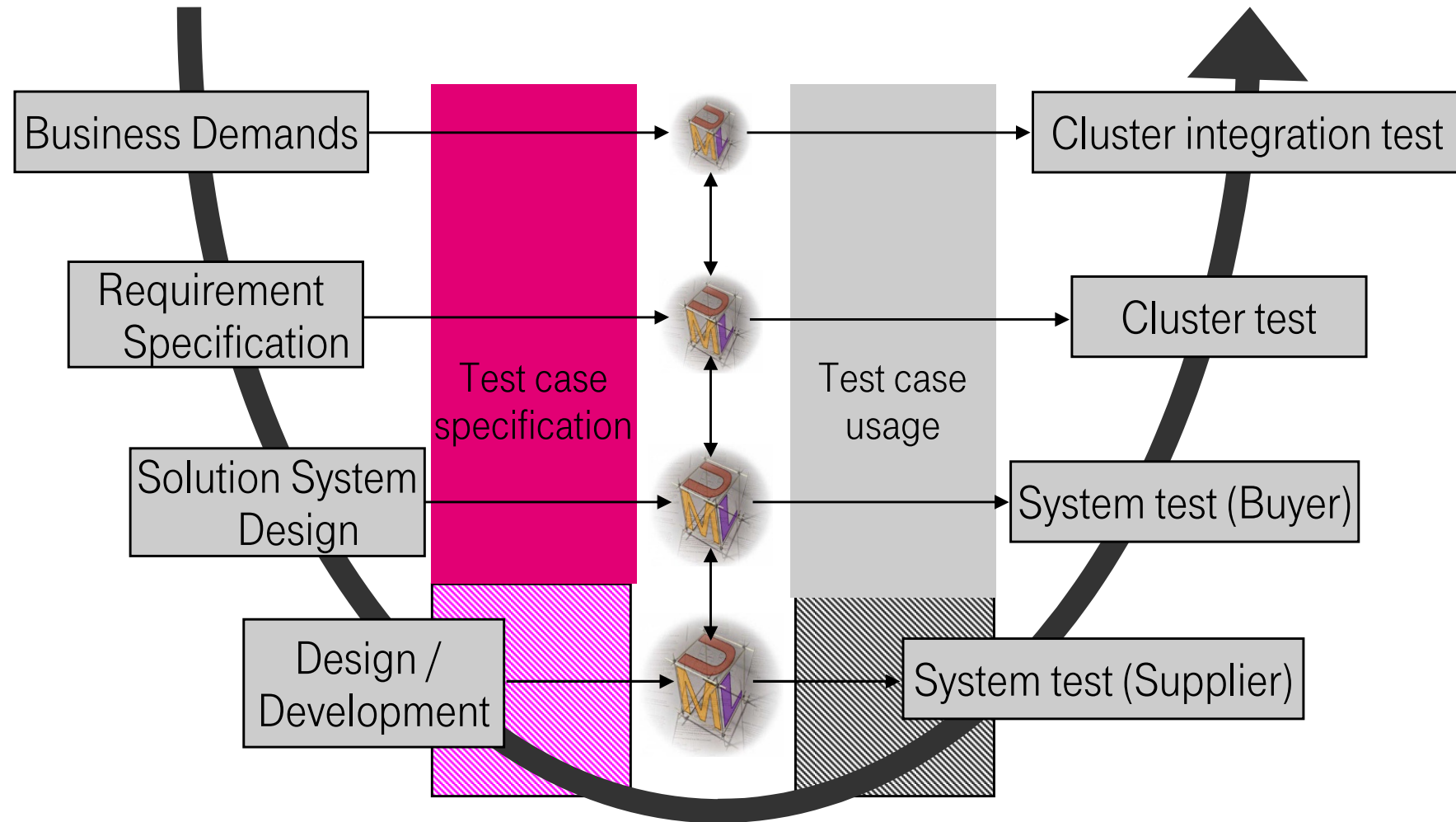
- Support by Fraunhofer FOKUS' Motion team
- They have extensive knowledge about Model-based testing
- But: the approach is generic and needs to be adapted to specific setting
- Existing models, tools and practices need to be understood and considered

**Organizing transfer between academia and industry (i.e. operational units of DTAG) is one aspect of T-Labs' mission.**

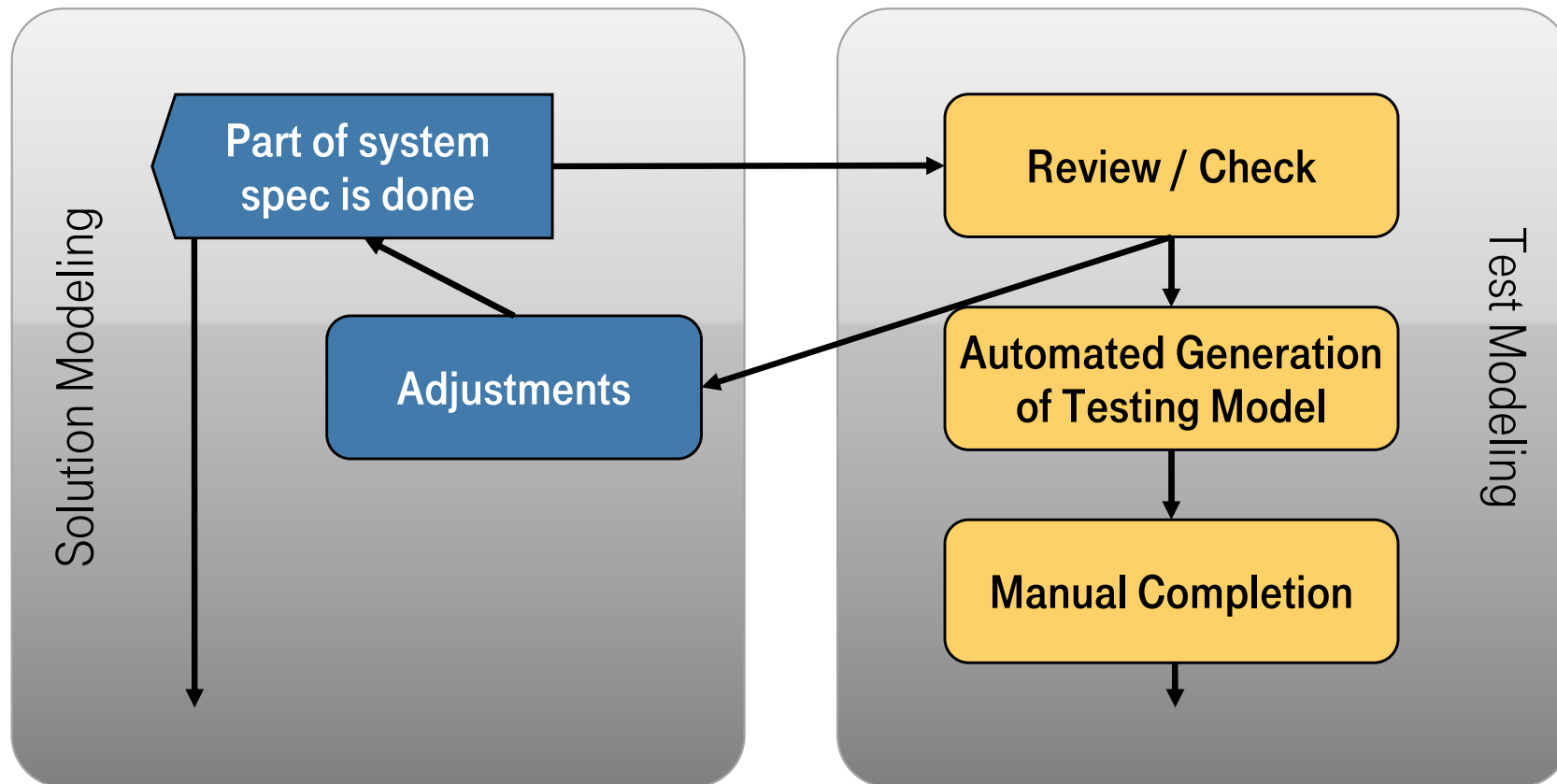




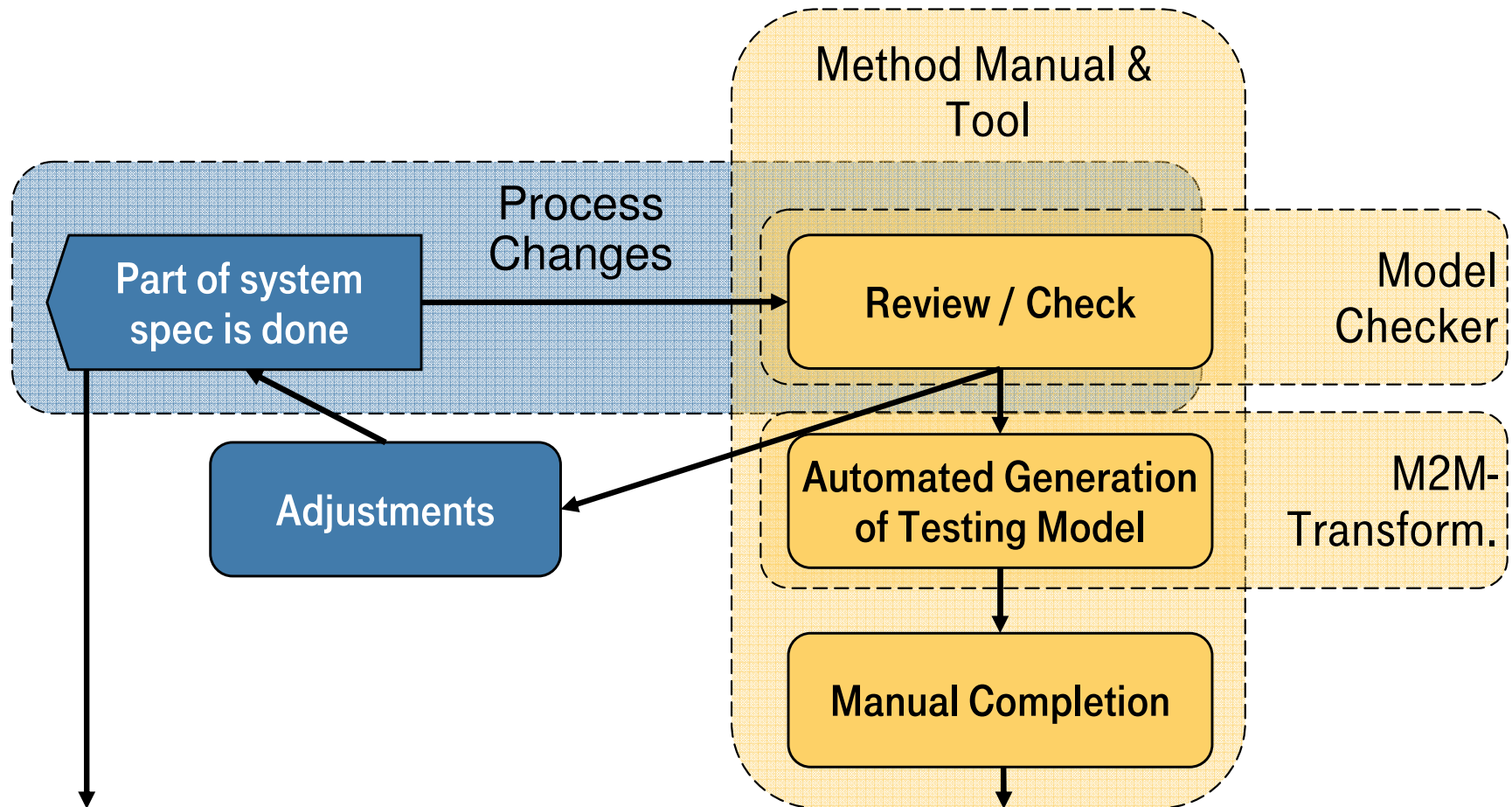
Scope: Test Case Specification.  
Other projects work on test case usage and execution.



Interaction between system and test specification.  
Triggered for each milestone of the system specification.



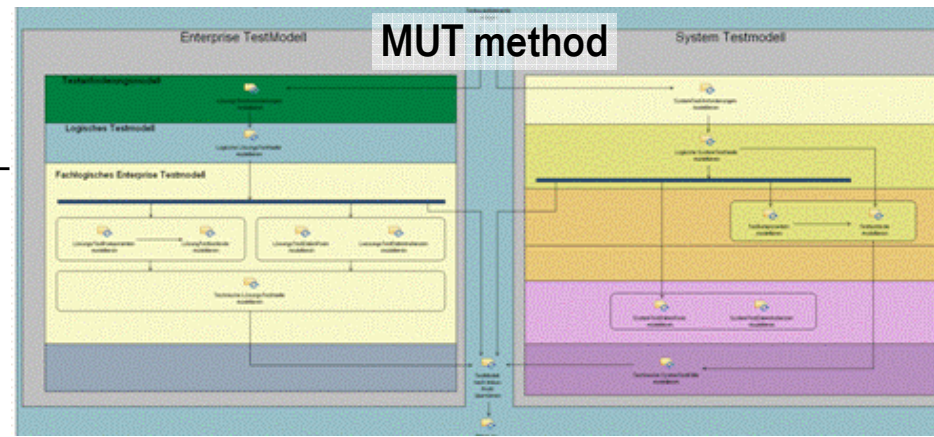
# Deliverables of the R&D project. Method and tool-support for MBT.



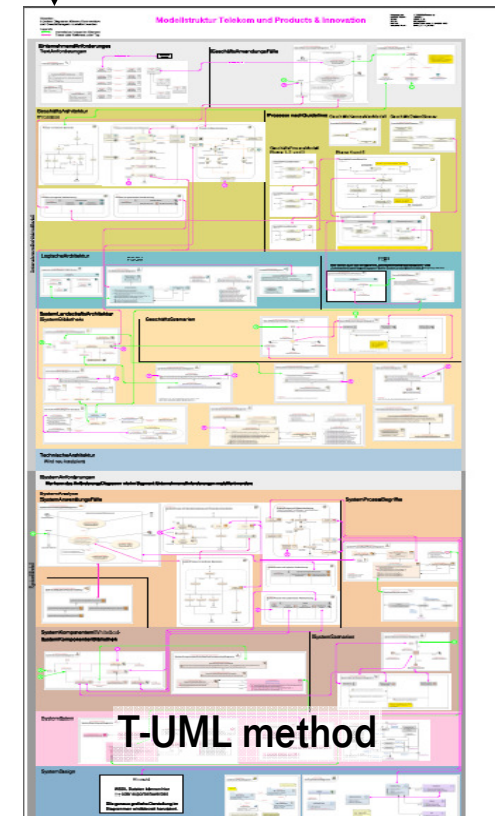
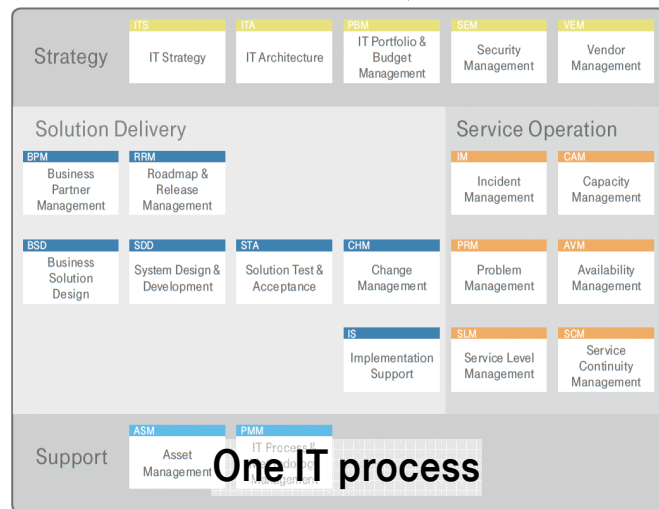
# Process Analysis and Adaption.

MBT method needs to be integrated into IT process and UML modelling guideline.

Where are test-relevant activities and roles?  
Do they need to be adapted?

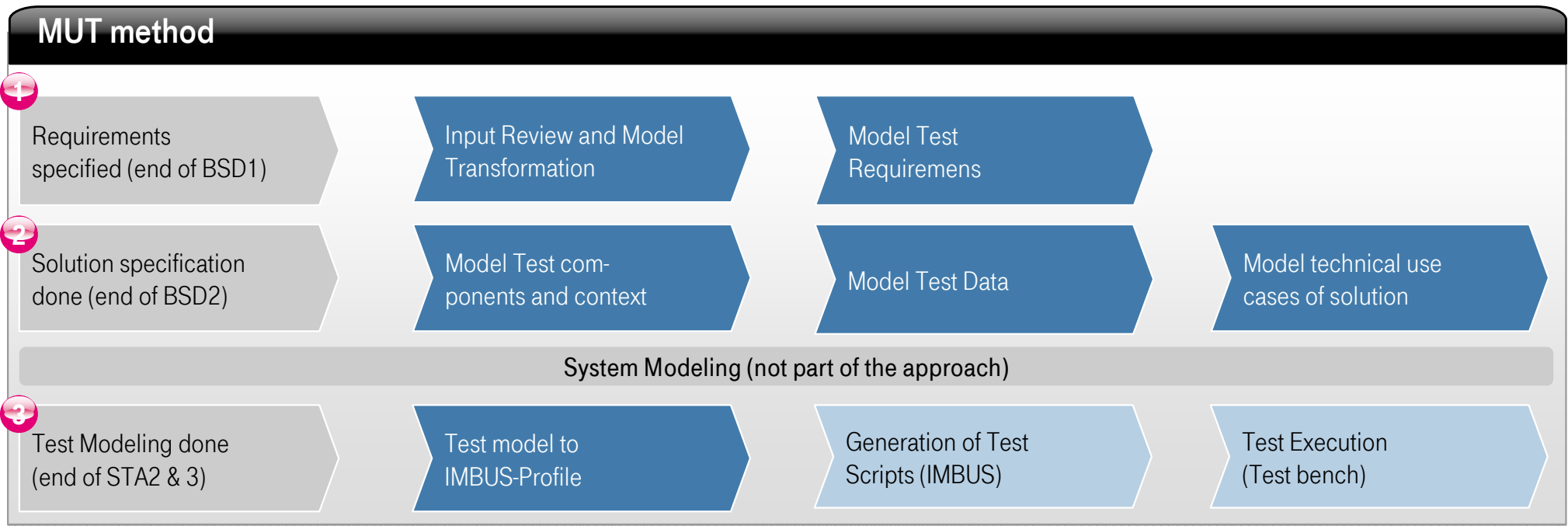
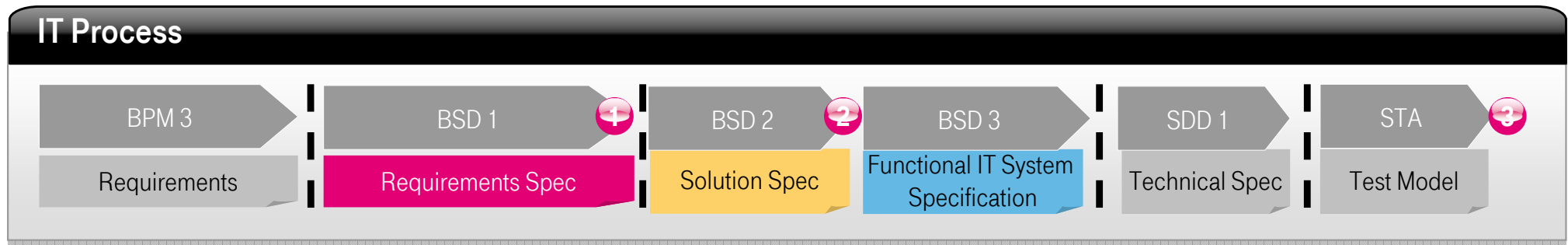


Which model elements of the solution modelling are relevant for testing?



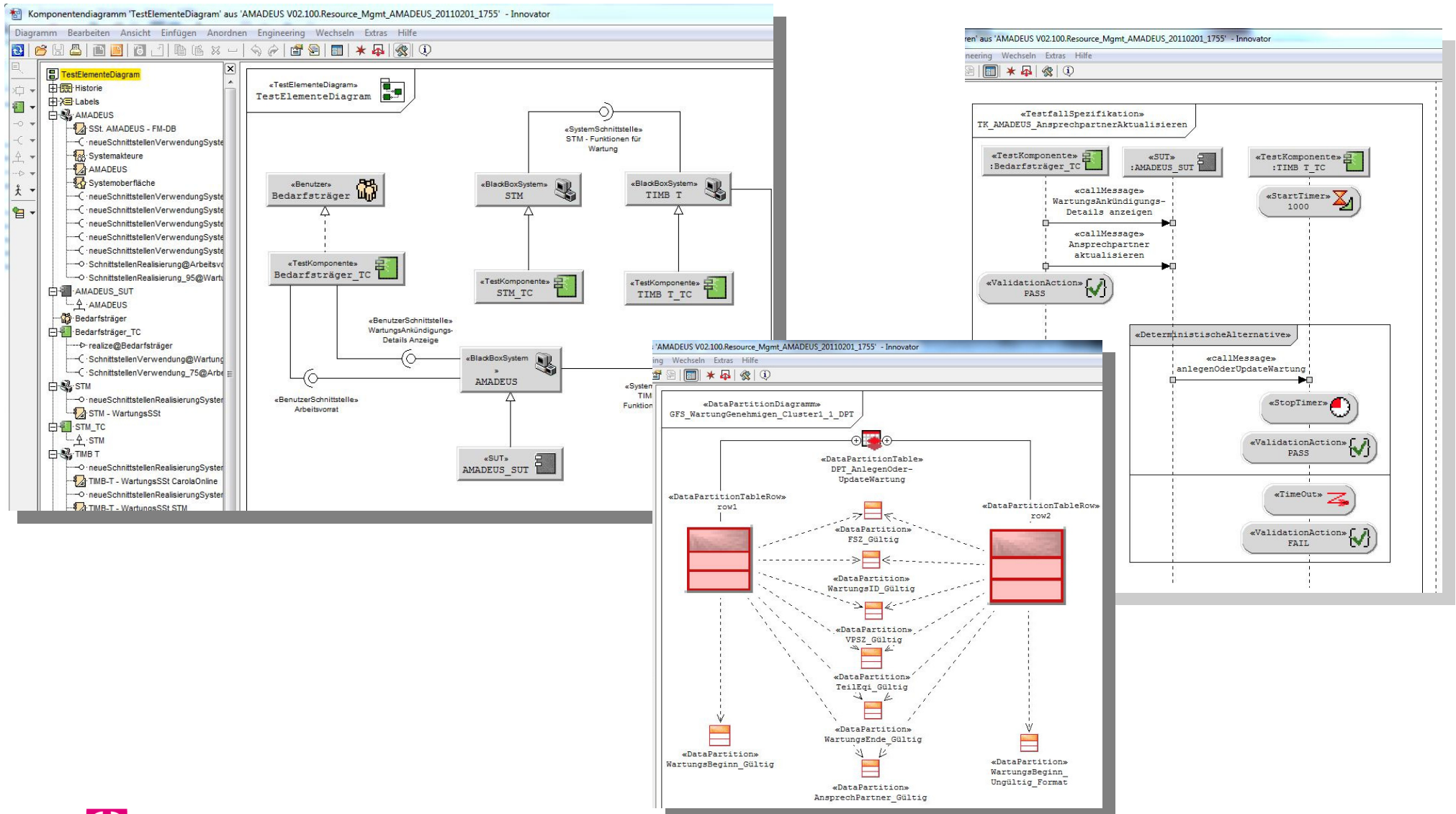
# Modeling Method.

Milestones in system modeling trigger test modeling activities.



# Screenshots.

Test modeling in MID Innovator, using DT-specific testing profile.

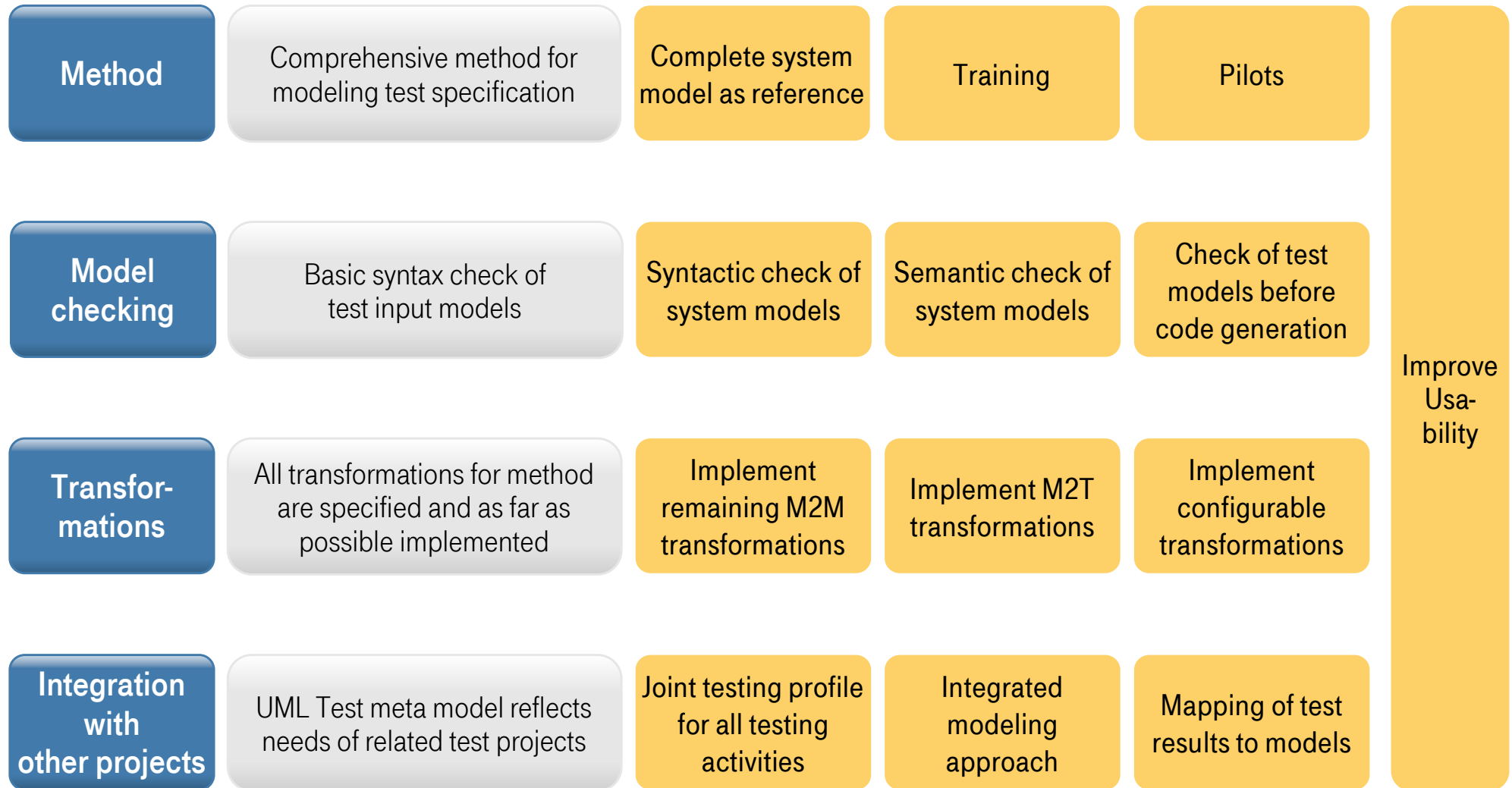


Results & Insights.



# Get R&D results to product grade.

## What is there and what needs to be done for productive use of method and tools?





# Outlook.

## Implementation is not guaranteed.

### Model-based Testing needs to show Return on Investment.

Finalizing development of a MBT approach for Telekom-Deutschland has to compete with all the other activities undertaken to improve testing.

#### "Best" Case: Company wide roll-out.

- Integration of solution specification
- But also: Possibility to work independently from solution specifications.
- Automation in all steps of the process.
- (Automated) quality gates for test model inputs and outputs.

#### "Worst" Case: No MBT in the near future.

- Involvement of Test-Manager in approval of early specification models can lead to value feedback regardless of MBT.
- Model-checking routines can be easily implemented to check general quality attributes of solution and test-models.





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