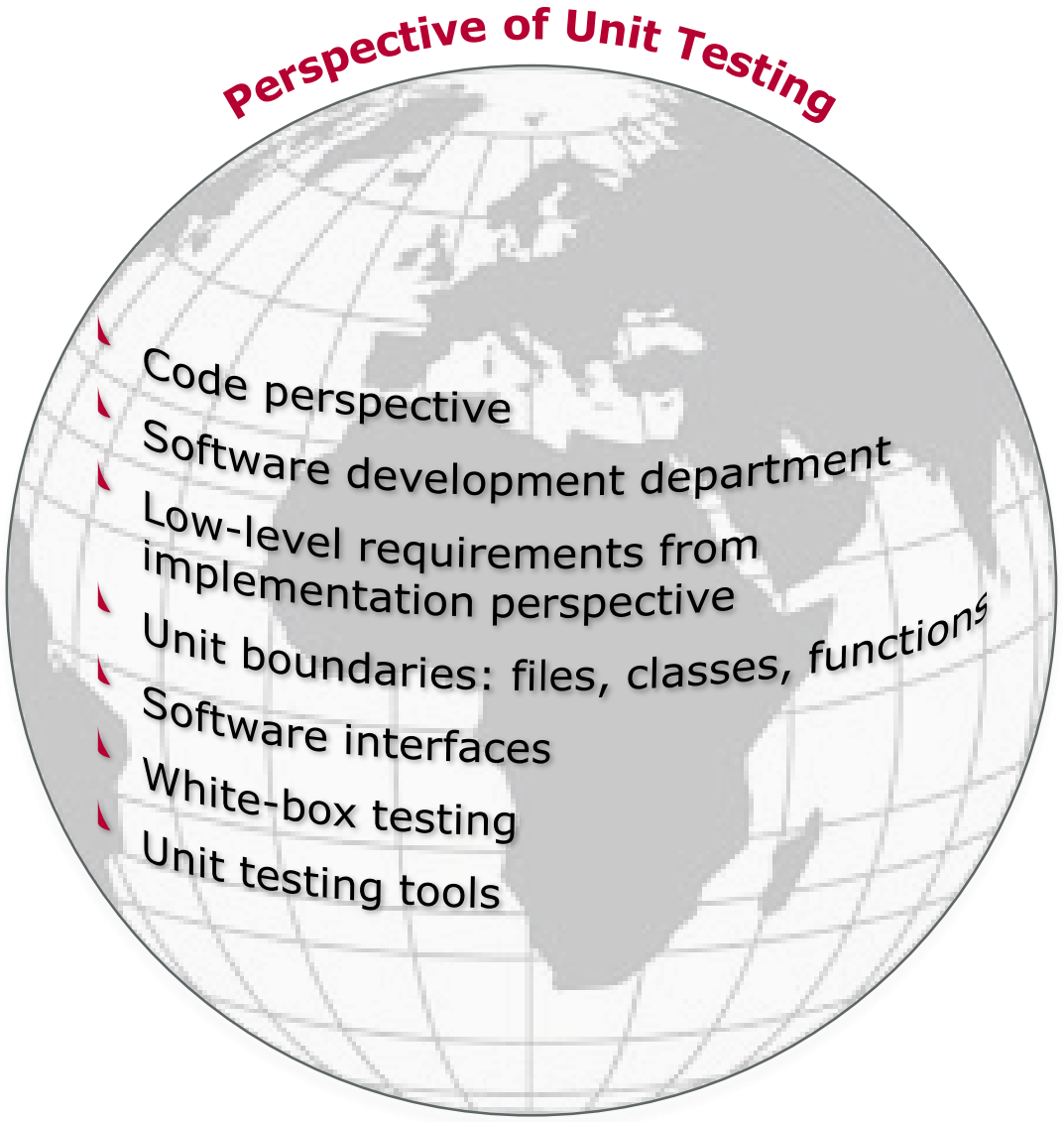
VECTOR

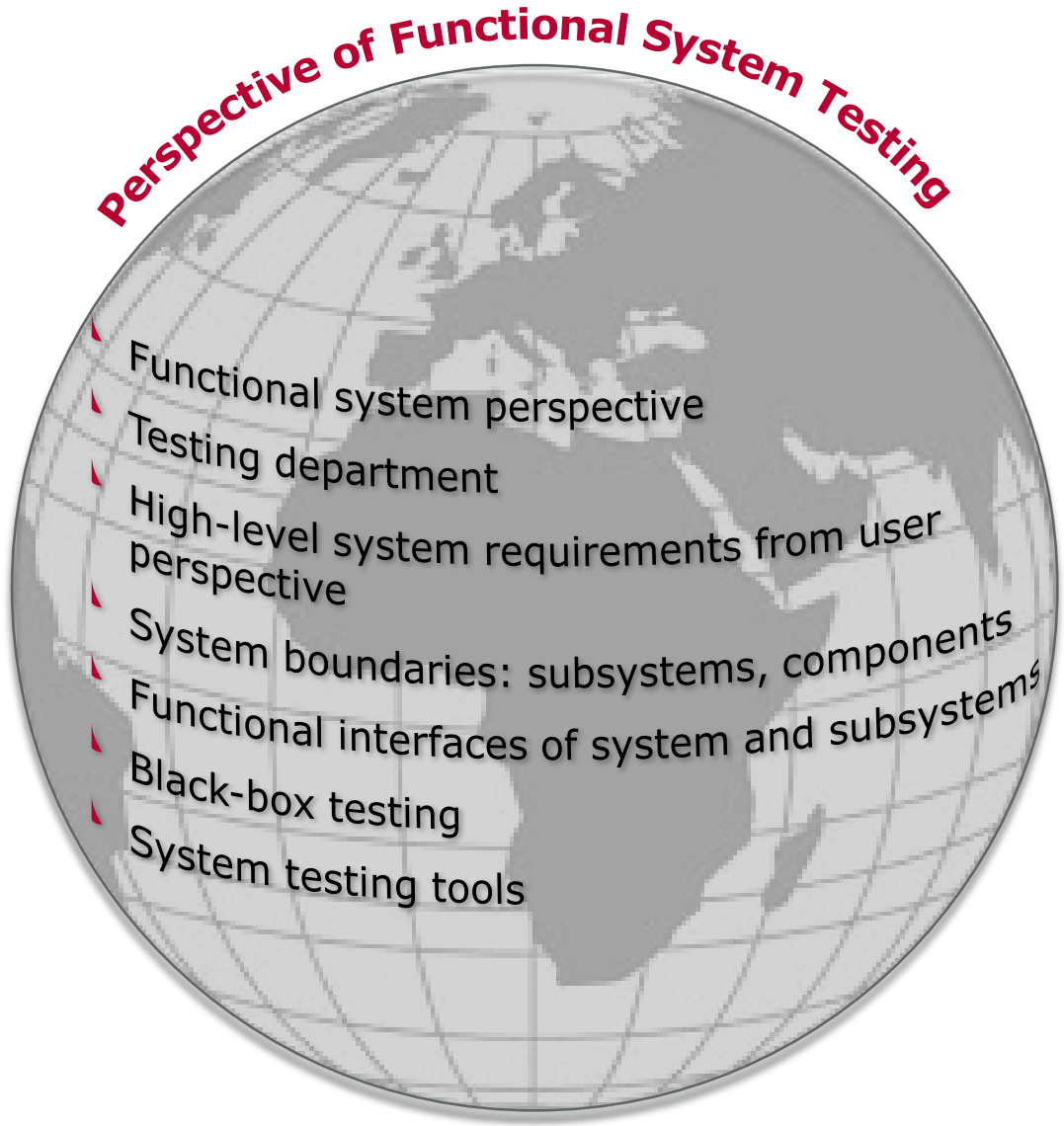
It's All About Software Testing

Concepts for Unit and Functional System Tests

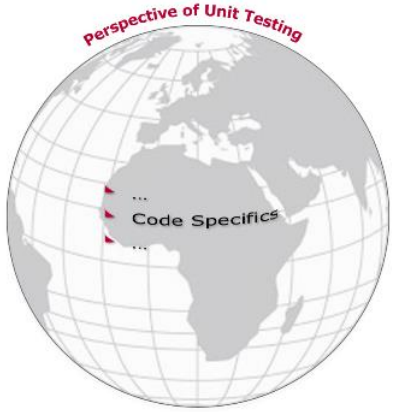
V1.0 | 2018-11-06

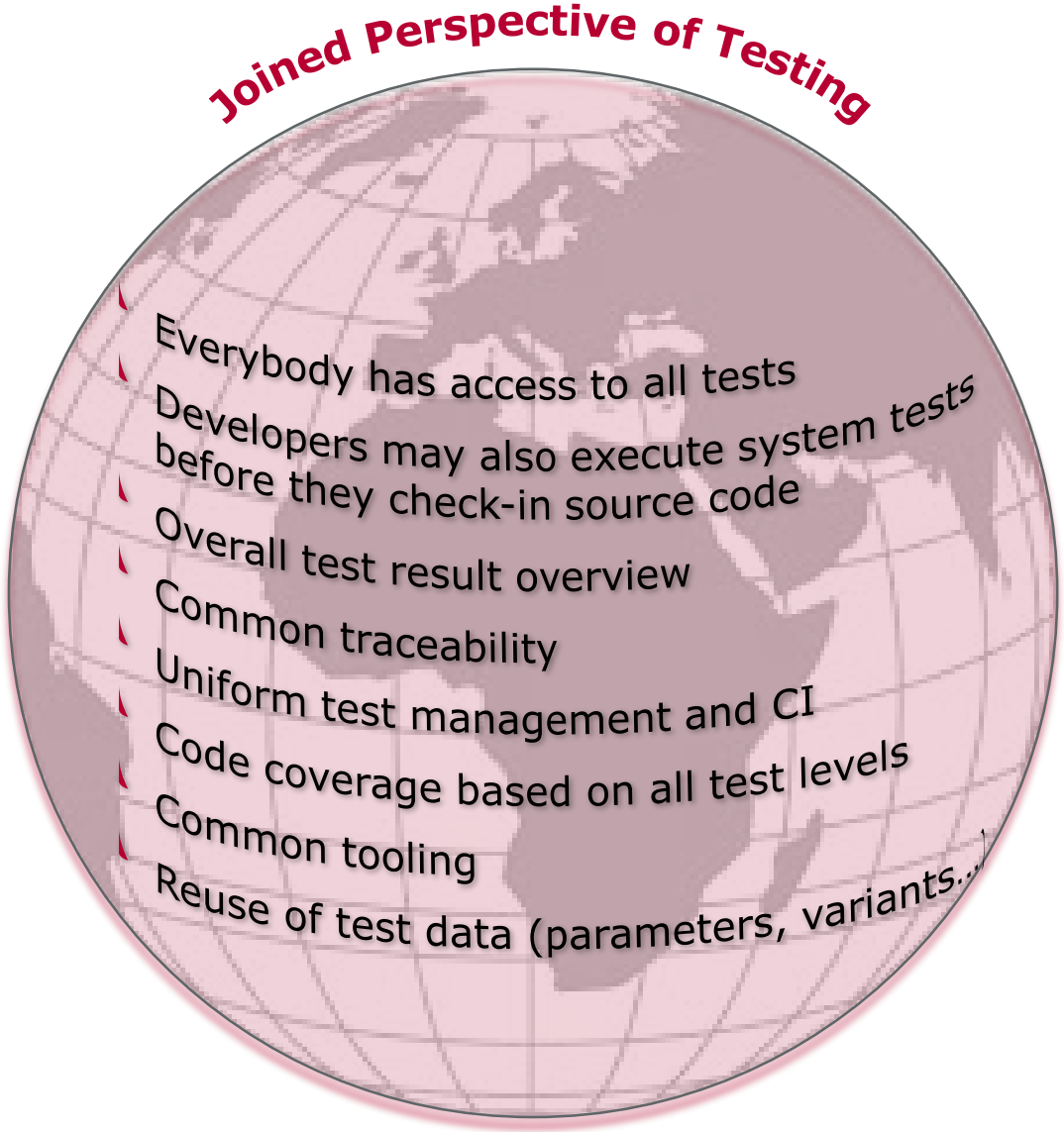
Situation: Perspective of Unit Testing and Functional System Testing





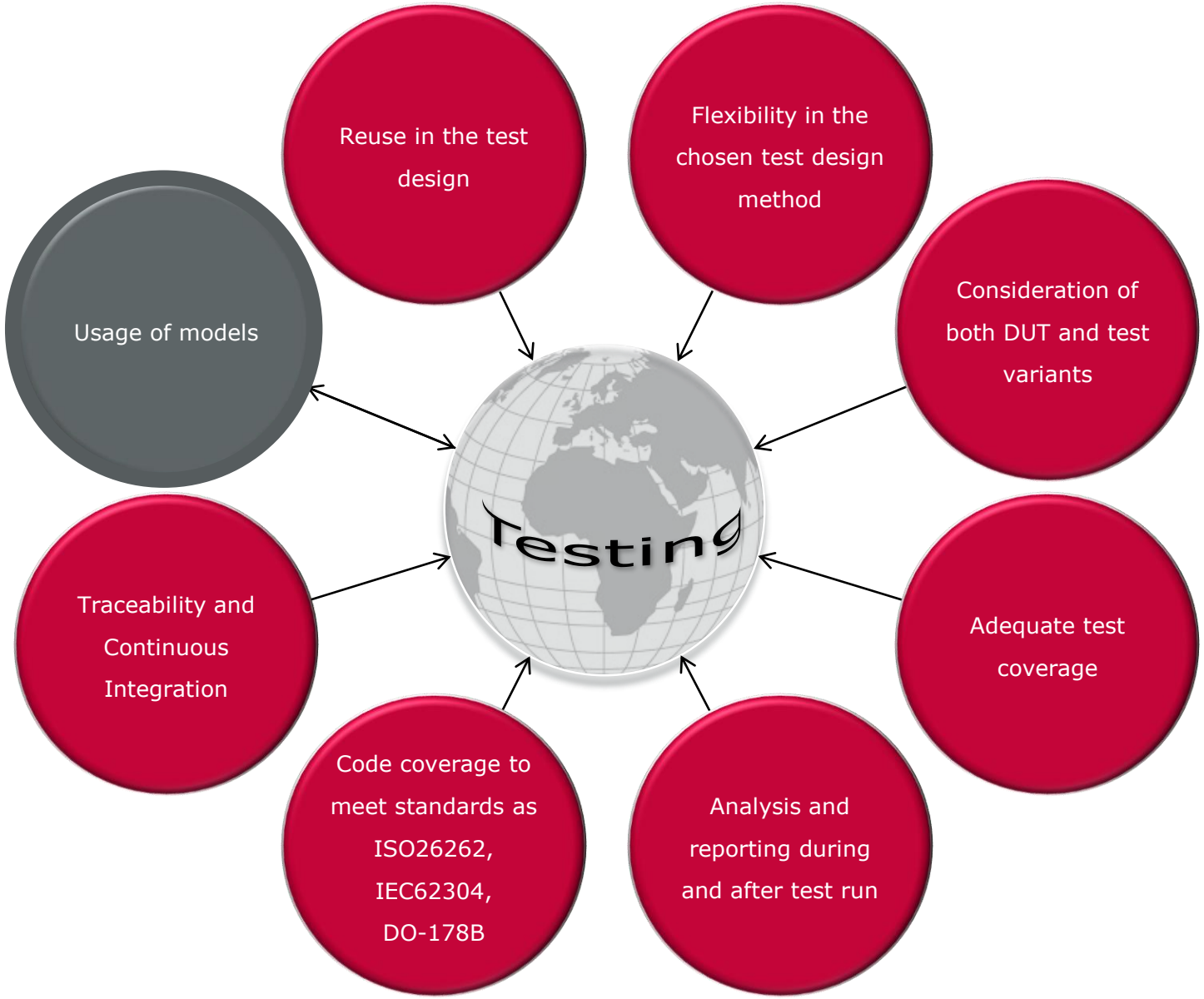
Goal: Joined Perspective of Testing





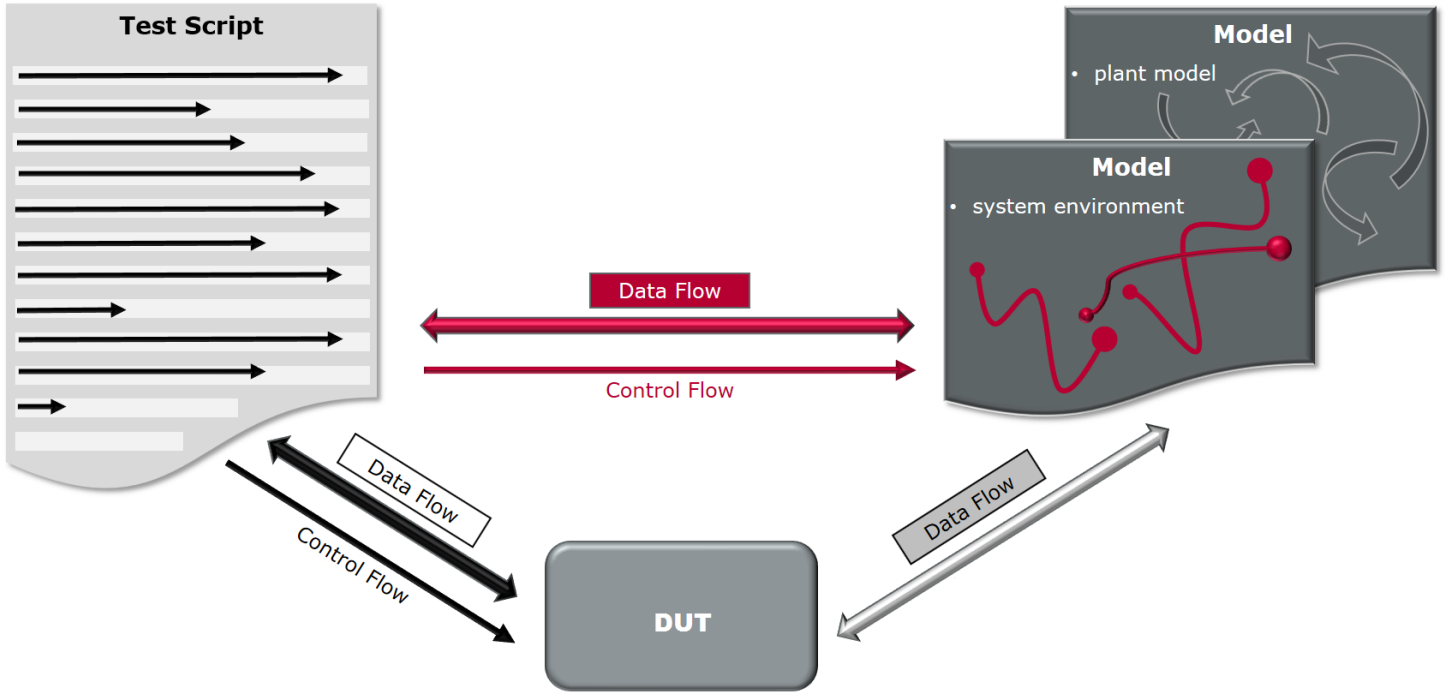
Test Concepts

Test Concepts

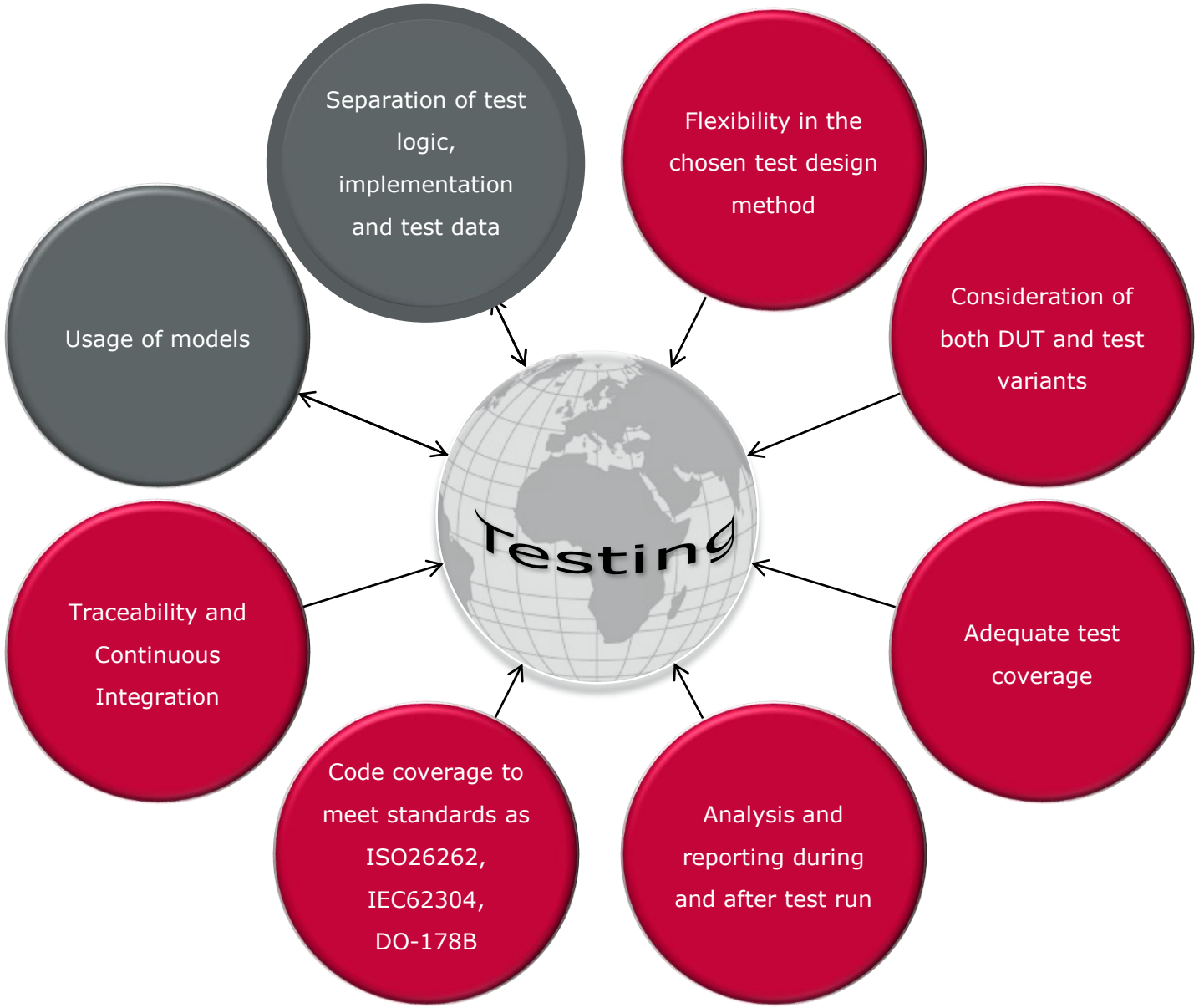


Test Concepts

Usage of models

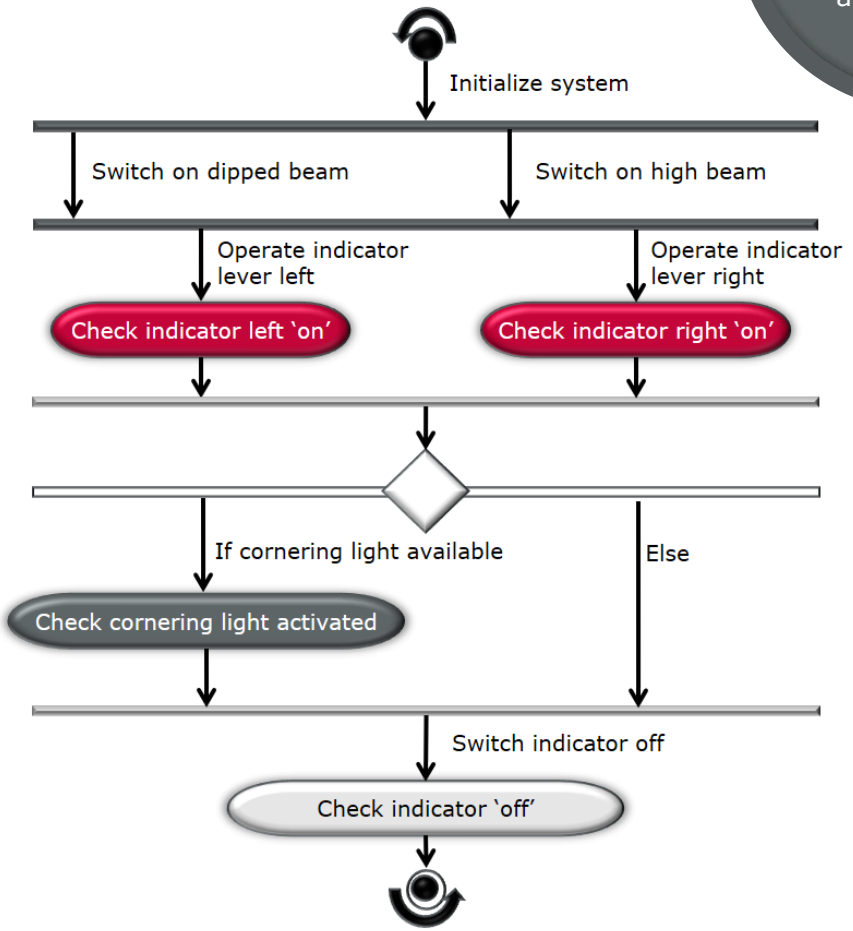


Test Concepts



Test Concepts

Separation of test logic, implementation and test data



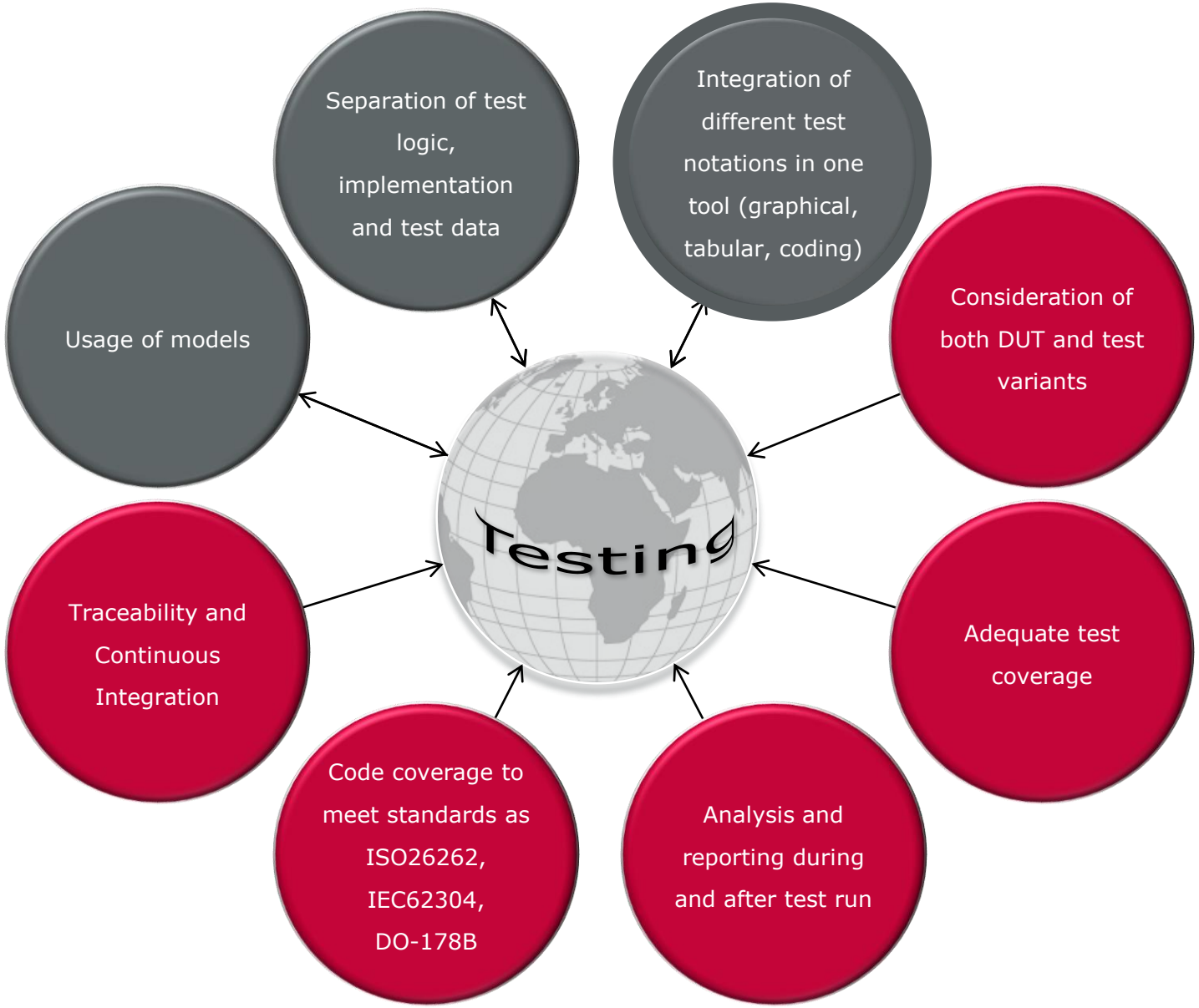
Test Data

ambientLightInt	80	20	...
automaticOnOff	1	1	...
expLightState	Off	On	...

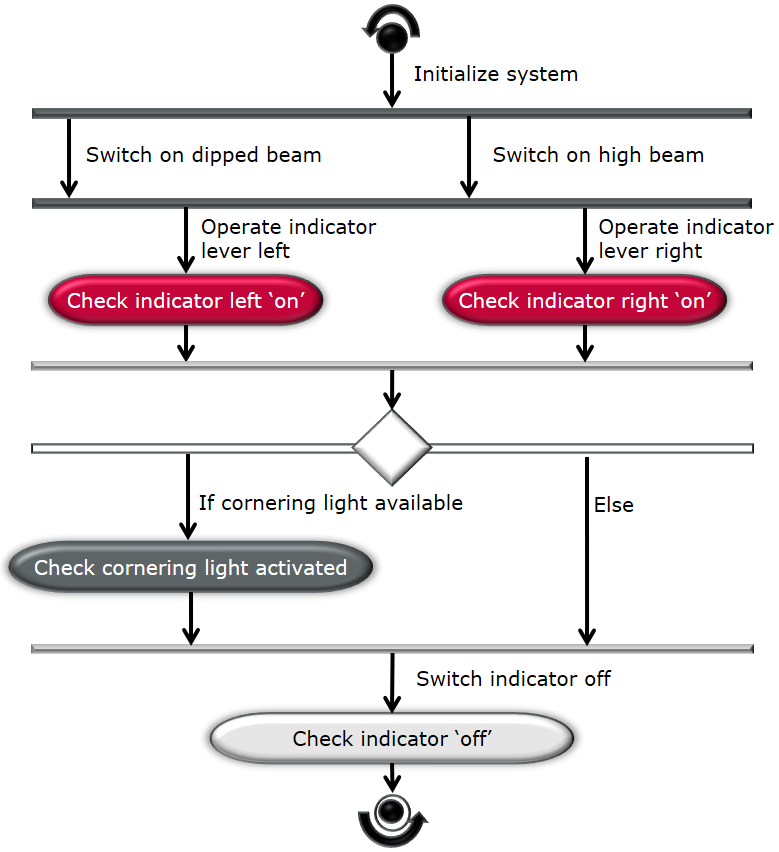
Executable Test Sequence

```
Set LightIntensity =   80   20   ...
Set AutomaticLight =   1    1    ...
Wait 500ms
Check LightState ==    Off  On   ...
```

Test Concepts



Test Concepts



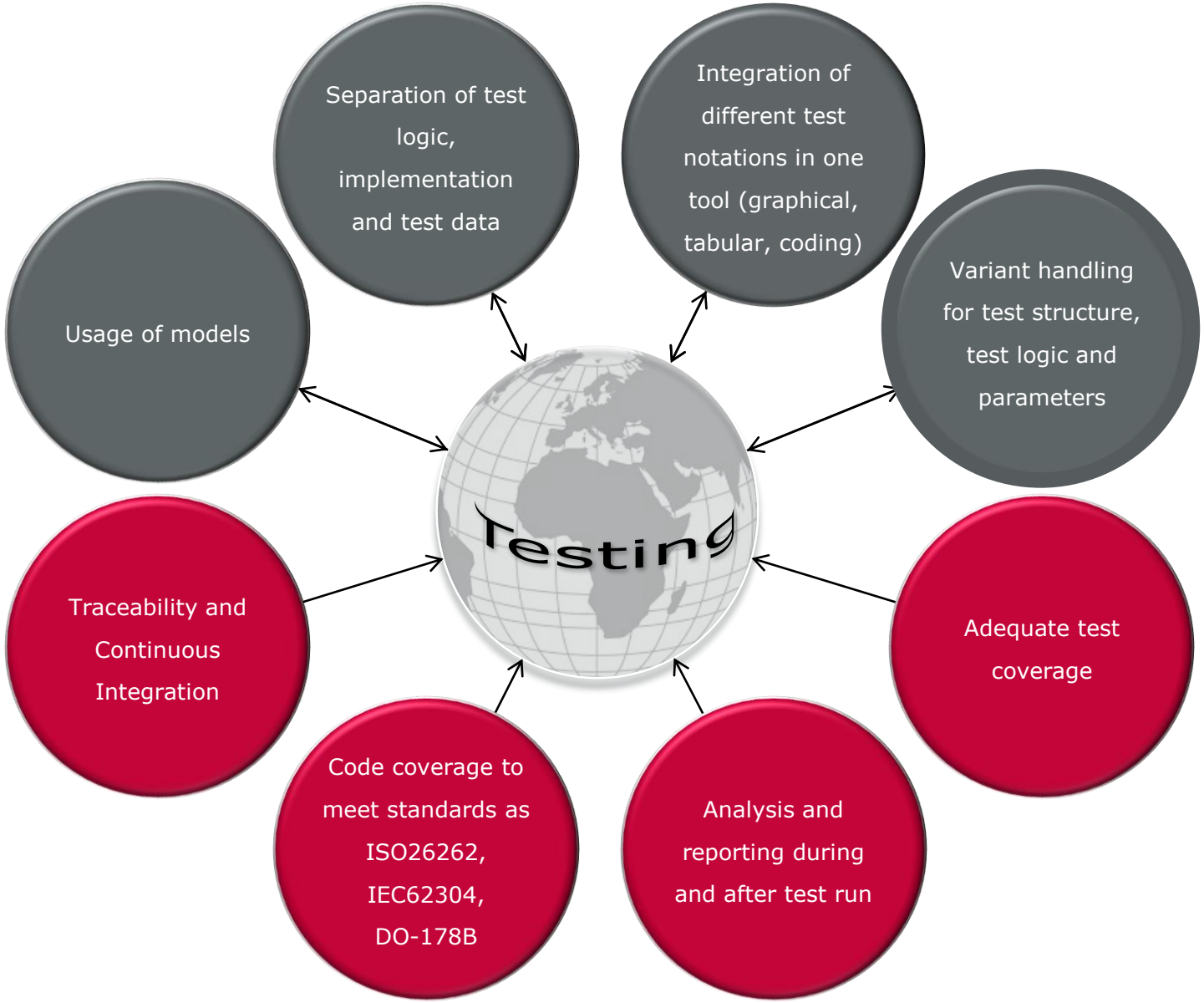
Integration of different test notations in one tool (graphical, tabular, coding)

```
Set LightIntensity =   80

Set AutomaticLight =   1

Wait 500ms

Check LightState  ==  Off
```

TC	Check light on by switch			
	Set	LightSwitch	=	On
	Wait	500		
	Check	LightState	==	On

TC	Check automatic light			
	Set	LightSwitch	=	Auto
	Set	LightIntensity	=	80
	Await Value Match	LightState	==	On

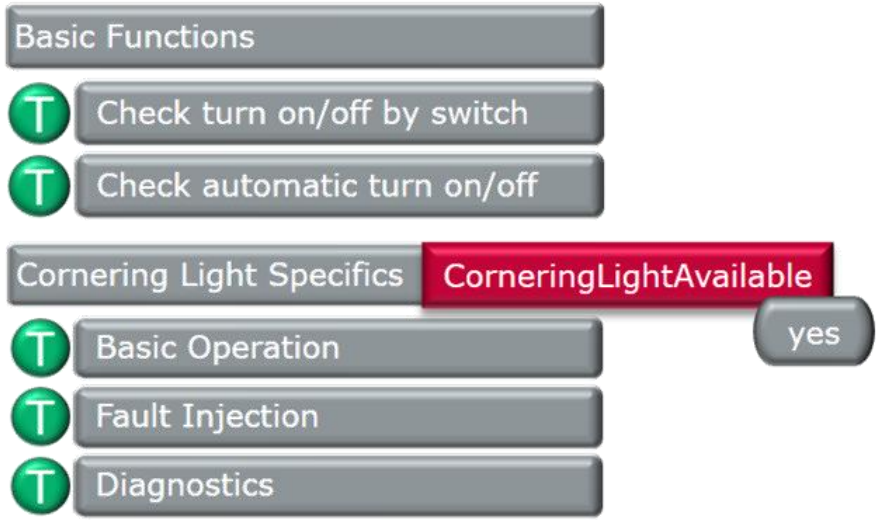
Test Concepts



Test Concepts

Variation Point	Values
Region	US, Europe, Asia
CorneringLightAvailable	yes, no
TestCoverage	regression, full

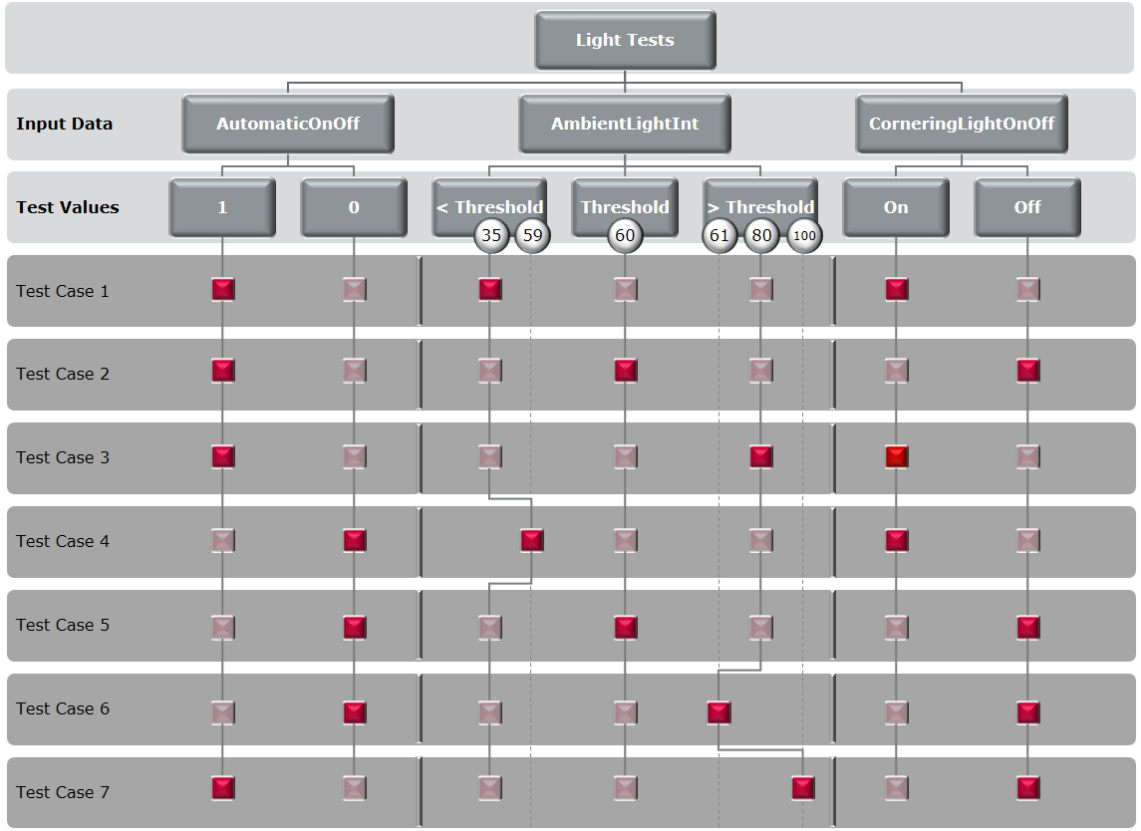
Variant handling for test structure, test logic and parameters



	Region		
Test Data	US	Europe	Asia
lightThreshold	70	60	60
reactionTime	1000	1500	1000
...	...	...	...

Test Concepts

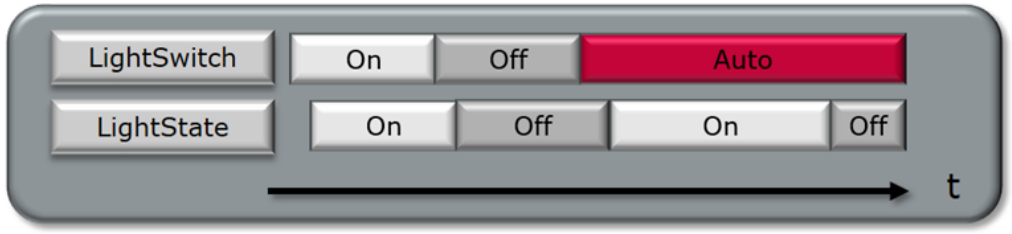
Test Concepts



Design features for definition of relevant test case data and generation of test cases

Test Concepts

Test Concepts



0.99000	LightSwitch	On
0.99000	LightIntensity	100
0.99000	LightState	On
1.03025	LightSwitch	Auto
1.99000	LightIntensity	100
1.99000	LightState	Off
2.03025	LightSwitch	Off
2.99000	LightIntensity	100
2.99000	LightSwitch	Auto
2.99025	LightIntensity	20
2.99025	LightState	On
3.14025	LightIntensity	70

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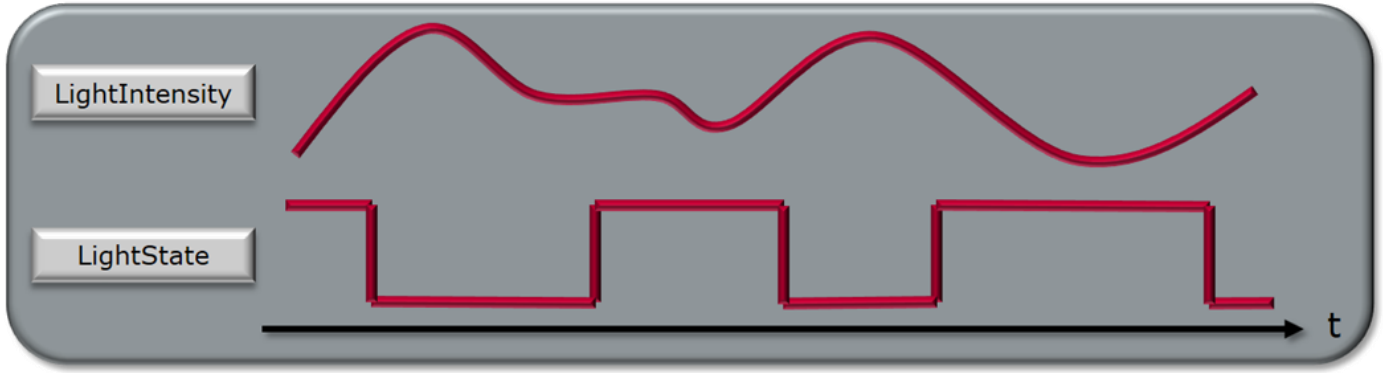
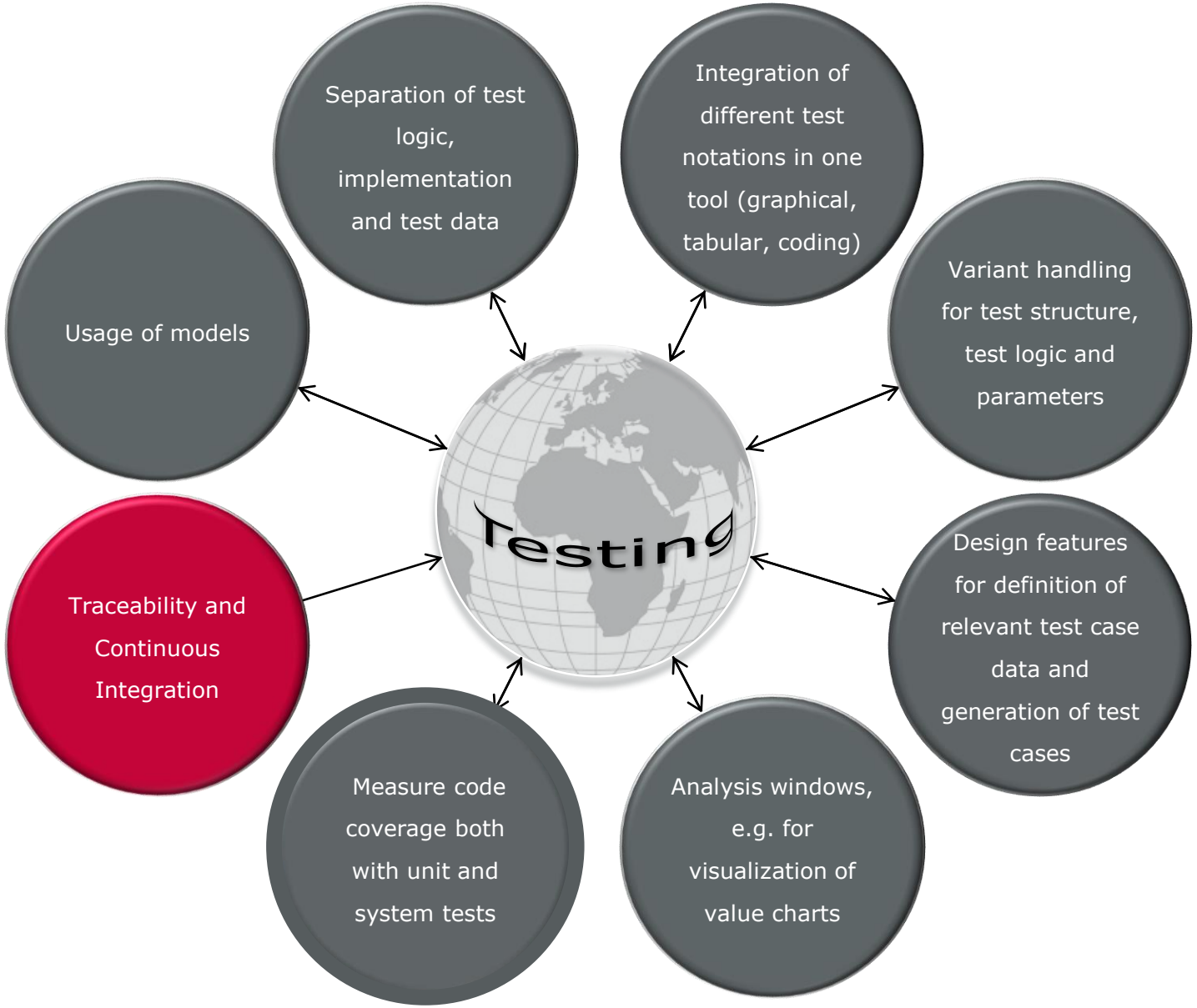


Analysis windows, e.g. for visualization of value charts

Test Concepts



Test Concepts

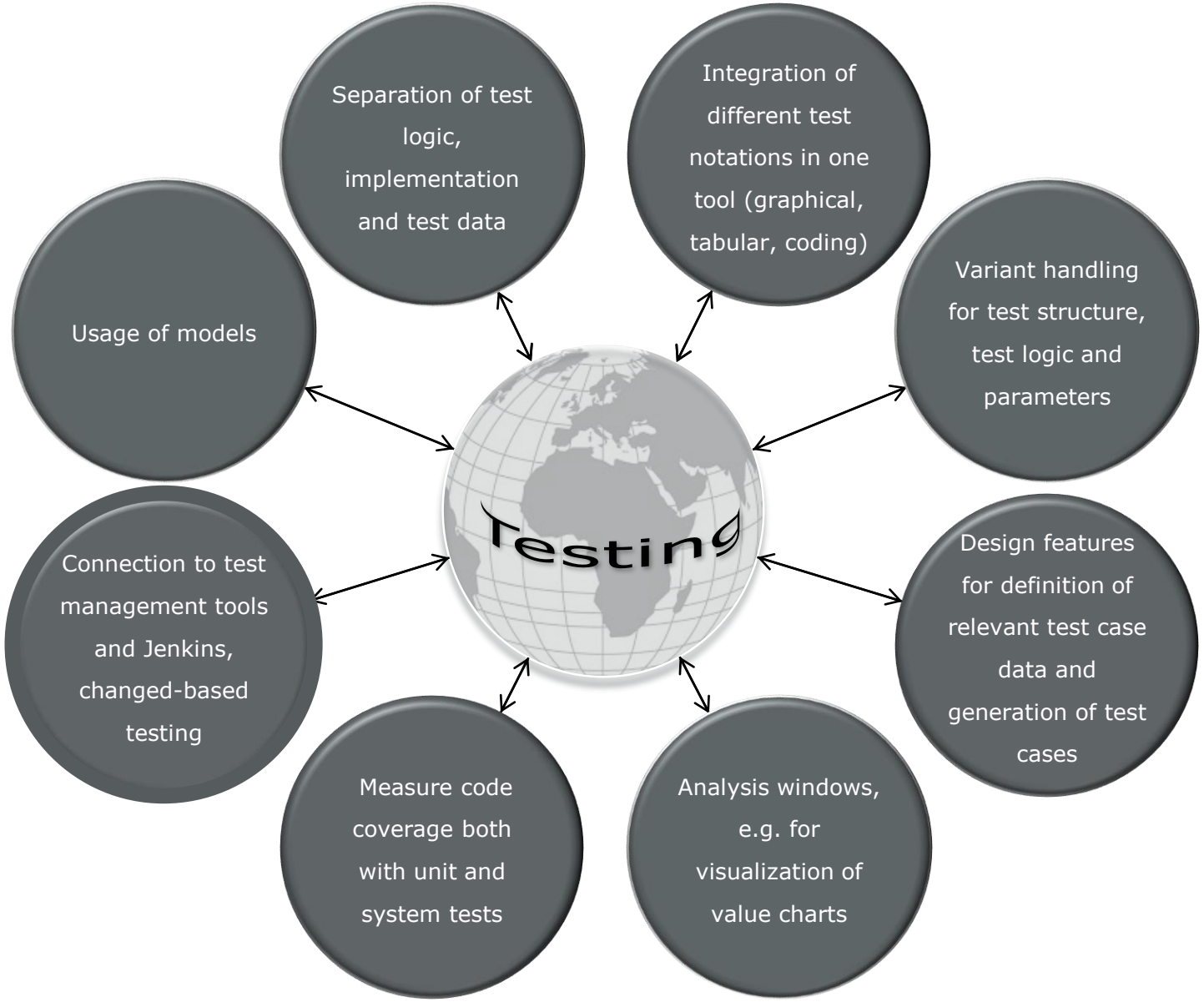
- Basic Functions
  - [X] Check turn on/off by switch
  - [ ] Check automatic turn on/off
- Cornering Light Specifics
  - [ ] Basic Operation
  - [X] Fault Injection
  - [X] Diagnostics

SUT

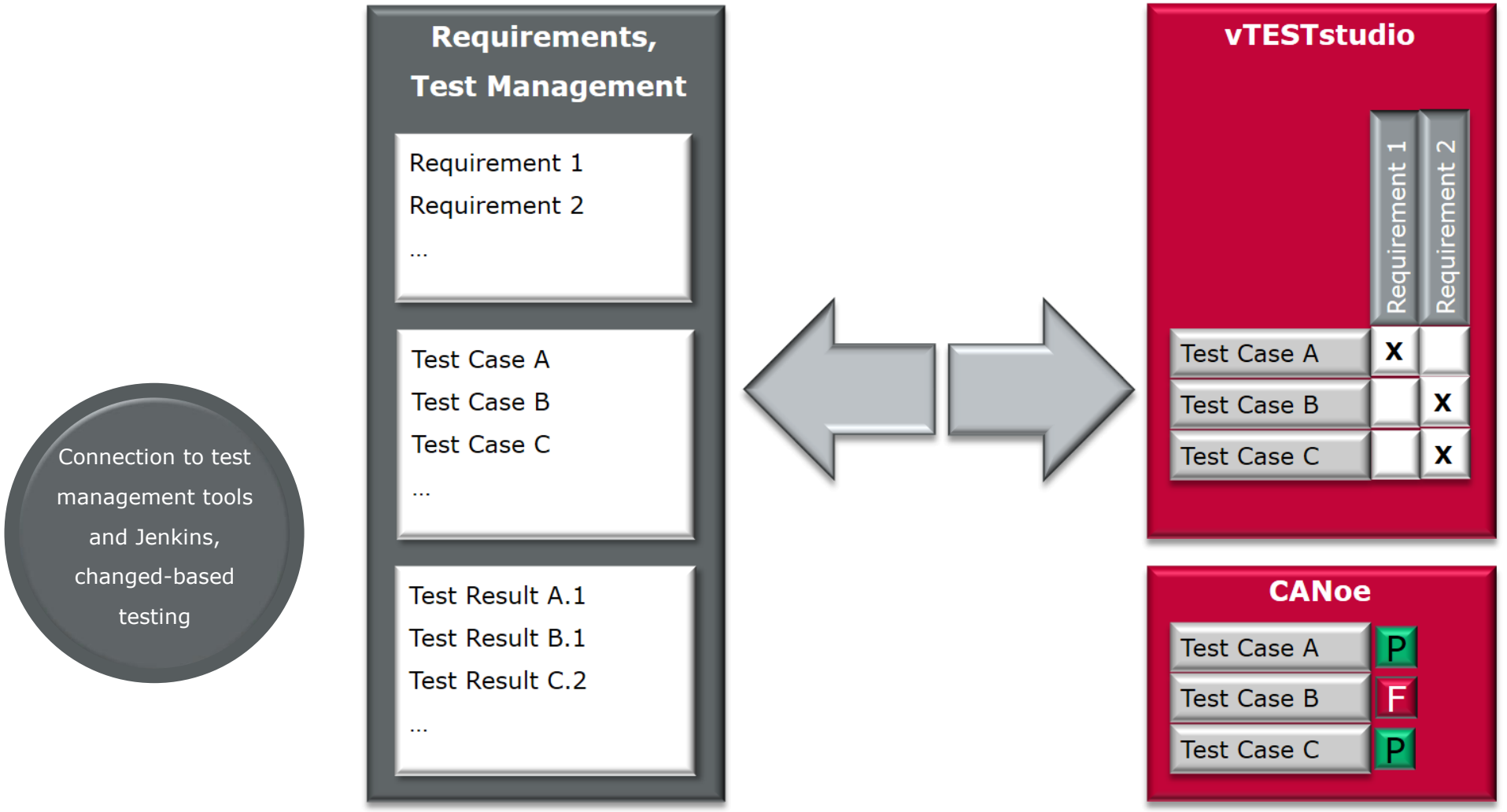
```
void Transition_S2_37(void)
{
    LightCtrl_SWC_DW.is_c1_LightCtrl_SWC = C_LightCtrl_SWC_IN_OffMode;
}
void Transition_S2_39(void)
{
    LightCtrl_SWC_DW.is_AutoMode = C_LightCtrl_SW_IN_NO_ACTIVE_CHILD;
    LightCtrl_SWC_DW.is_c1_LightCtrl_SWC = C_LightCtrl_SWC_IN_OnMode;
}
void Transition_S2_41(void)
{
  LightCtrl_SWC_DW.is_AutoMode = C_LightCtrl_SW_IN_NO_ACTIVE_CHILD;
  LightCtrl_SWC_DW.is_c1_LightCtrl_SWC = C_LightCtrl_SWC_IN_OffMode;
}
void Transition_S2_32(void)
{
    LightCtrl_SWC_DW.is_AutoMode
```

Measure code coverage both with unit and system tests

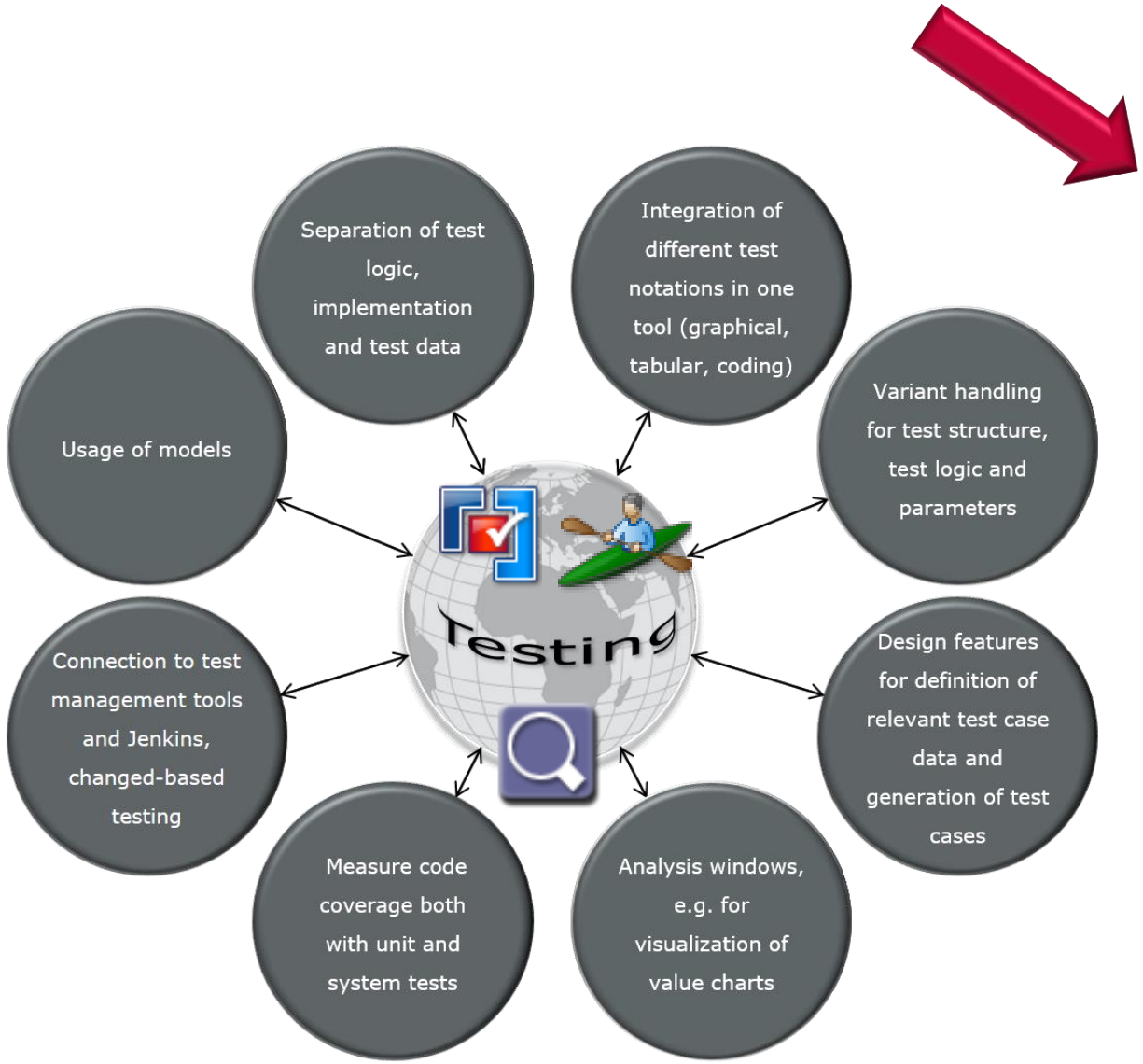
Test Concepts



Test Concepts



Conclusion



- The requirements and challenges on test environments of HIL system tests, SW system tests, integration tests and unit tests are widely the same
- Corresponding test concepts are applicable to all kind of tests
- Vector strategy: provide a comprehensive test solution for all kind of tests based on well established tools
- Combine the strength of vTESTstudio and CANoe for system tests with the strength of VectorCAST for code based tests

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