



Supporting a Smart Grids Laboratory: Testing Management for Cyber-Physical Systems

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Thesis Goal

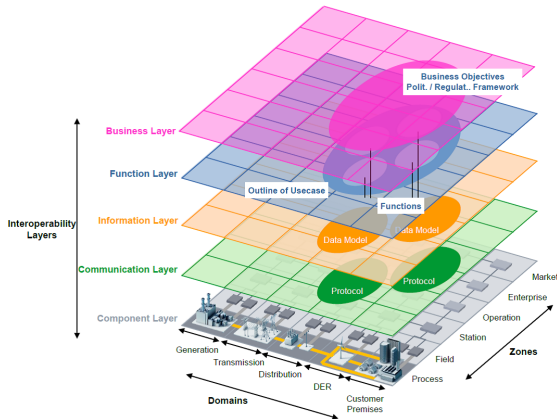
- suggest software testing process for a Smart Grid Laboratory and design data models and the software components, which supports this process

Thesis Contribution

- review of existing testing standards
- application of the ISO/IEC/IEEE 29119 standard for a Smart Grid Laboratory in terms of the process structure and documentation needed
- definition of a conceptual model to represent the testing process
- definition of design and components diagrams for implementation of the testing process

Smart Grids (SG)

- electric power and communication networks used in the electricity sector to help effectively manage consumption of electricity in real time
- two-way communication allows to supply power in more efficient ways
- extremely complex because of their multi-level structure



Question 1

What are possible testing standards and/or frameworks that can be used in a SG Lab?

Question 2

Which could be the domain model representation to support the testing system for a SG Lab?

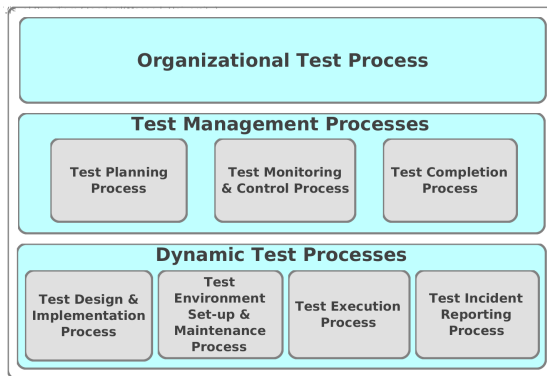
Question 3

How can the overall architecture of the testing system for a SG Lab be structured?

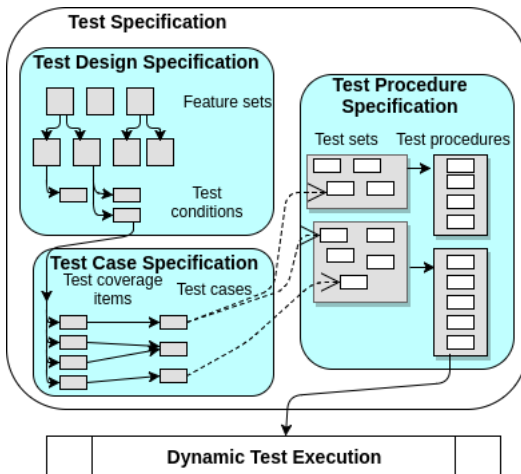
- testing standard represents written criteria needed for a specific process, test, or procedure and allows for test results to be repeatable and reproducible
- found 21 different testing standards in surveys
- chosen the 5 most known and used standards compared by important attributes:

	TMMi	TPI	CTP	STEP	ISO 29119
Maturity Structure	✓	✓	✗	✓	✗
Publication Year	2005	1999	2003	1988	2013
Detailed description	✓	✓	✗	✗	✓

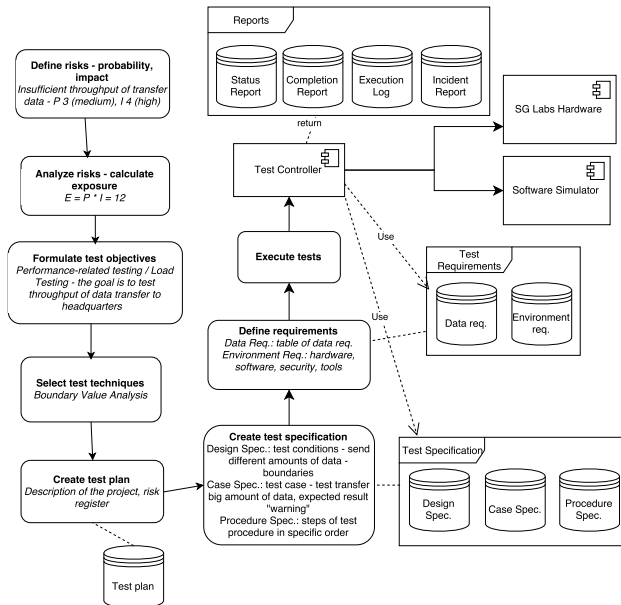
- internationally-recognised and agreed set of standards for software testing
- activities divided into three layers:



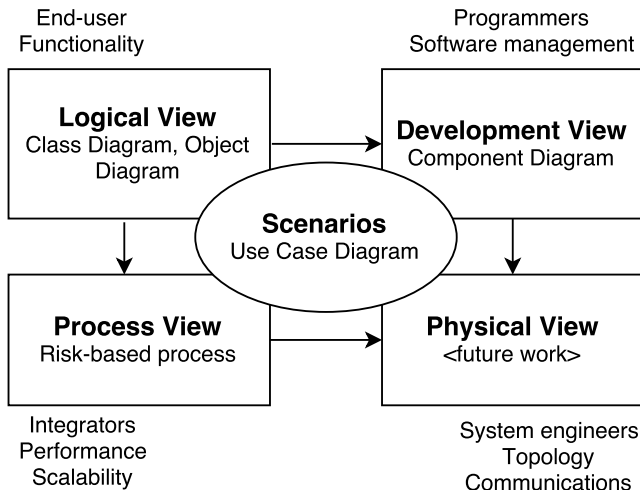
- Test Design and Implementation Process



Risk-based Testing Process

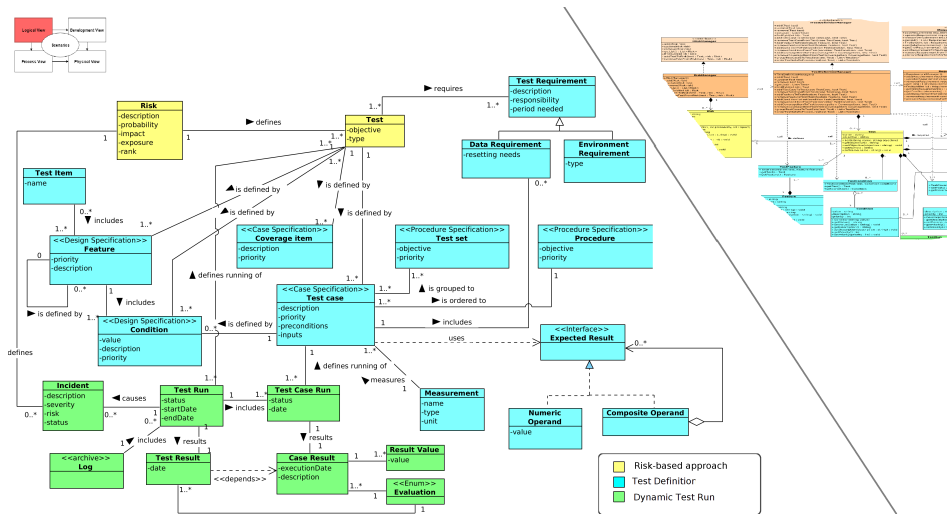


- follow 4+1 Architectural view model:



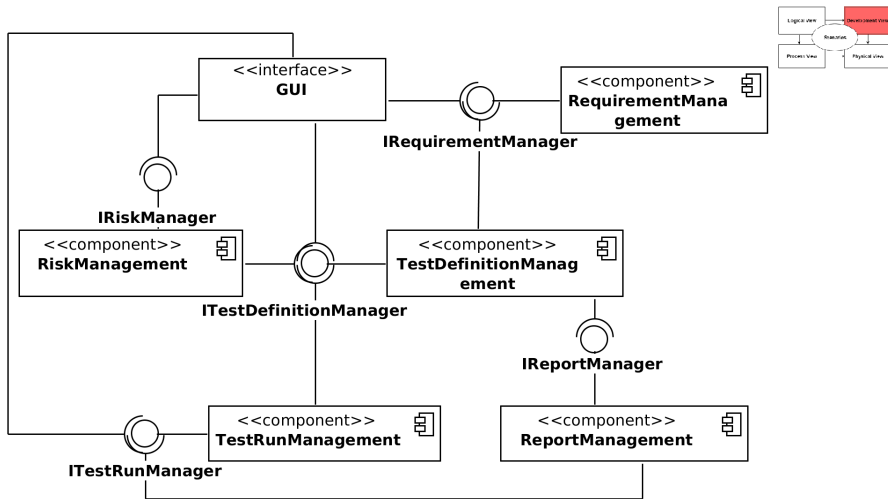
Architectural Support for Testing Process

Class Diagram



Architectural Support for Testing Process

Component Diagram



What are possible testing standards and/or frameworks that can be used in a SG Lab?

- provided the review of different testing standards, described the 5 most popular and chosen one according to the usage within the SG Lab

Which could be the domain model representation to support the testing system for a SG Lab?

- provided the domain model (analysis and design) of the system, which includes classes important for software development

How can the overall architecture of the testing system for a SG Lab be structured?

- represented by development view, which consists of several components communicating together through provided interfaces

Thank you for your attention!