SUPPORTING DECISION MAKING IN SOFTWARE TESTING

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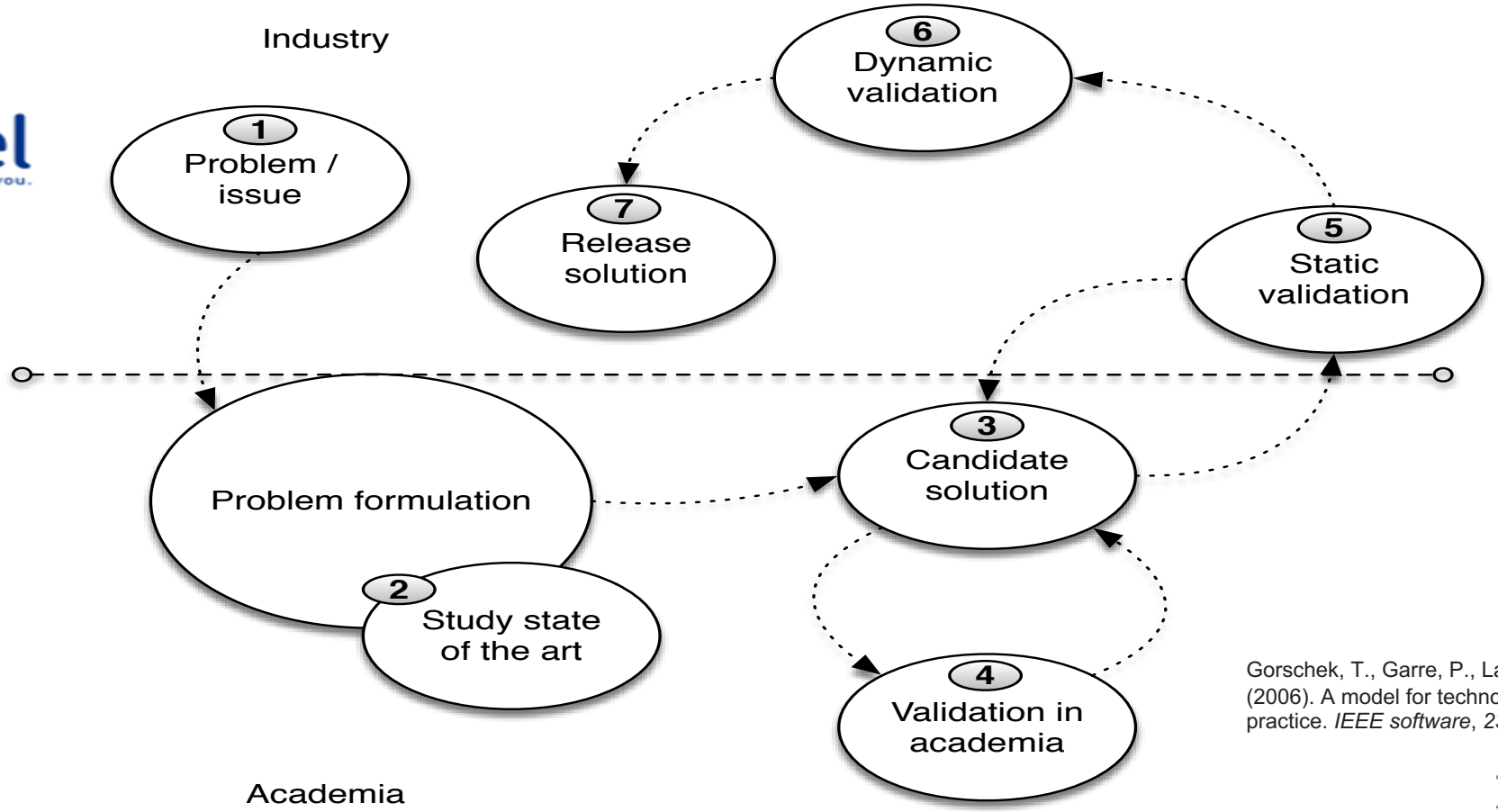
WAY OF WORKING

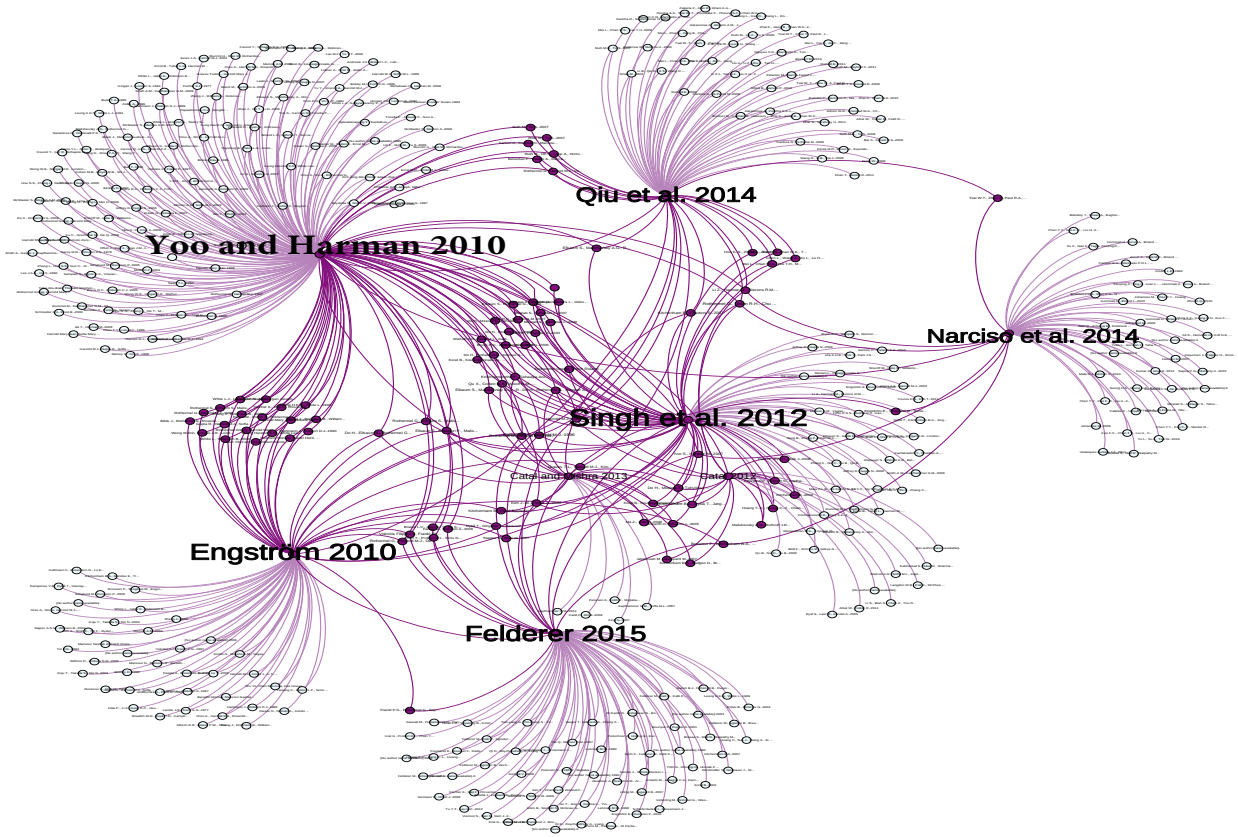


Gorschek, T., Garre, P., Larsson, S., & Wohlin, C. (2006). A model for technology transfer in practice. *IEEE software*, *23*(6), 88-95.

REGRESSION TEST SELECTION

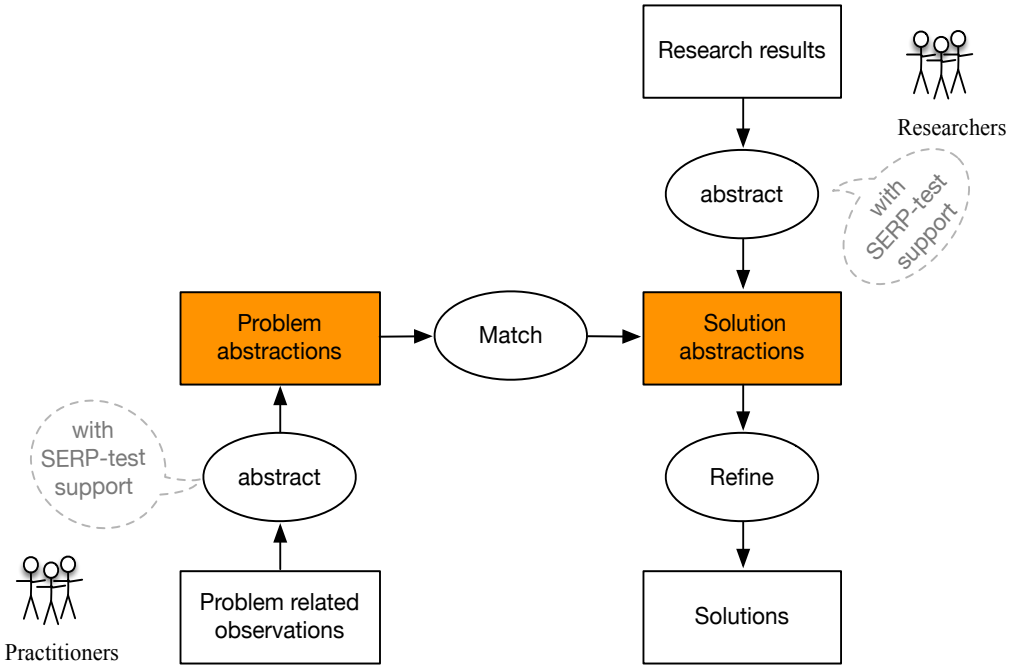
- Challenge
  - Context:
    - Growing test suite (large-scale and heterogenous systems)
    - Short time to market
    - Continuous integration and deployment
- Importance of quick feedback
- **Need:**
- Help to prioritize, select test cases and to minimize the test suite

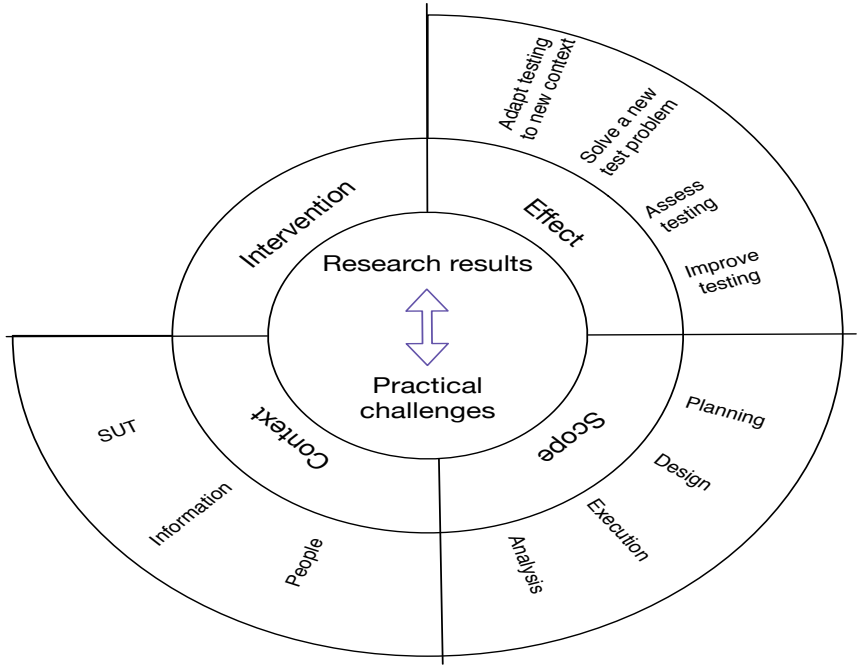
From several systematic literature reviews - 1068 papers



AIM:

- Supporting operational decisions regarding selection, prioritization and minimization of regression test cases





SOLUTION

Technological rules:

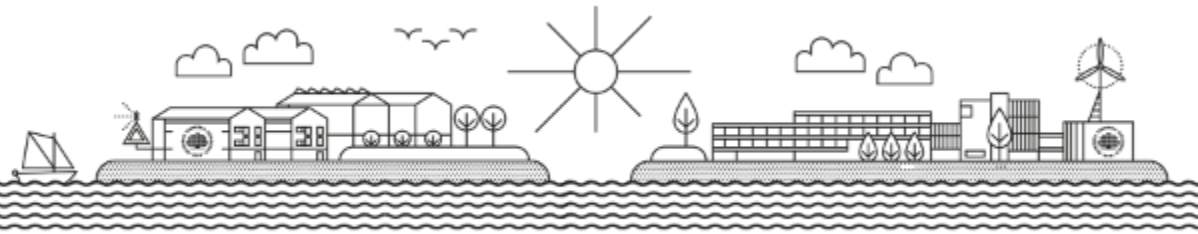
"To achieve **<effect>** in **<context>** apply **<technique>**"

Technique	Ref.	Scope			Addressed context factors			Desired effects			Utilised information (entities)								
		Selection	Prioritization	Minimization	System-related	Process-related	People-related	Test coverage	Efficiency and Effectiveness	Awareness	Requirements	Design artefacts	Source code	Intermediate code	Binary code	Test cases	Test execution	Test reports	Issues
TEMSA	[55–60]	✓	✓	✓	✓		✓	✓	✓			✓				✓		✓	
History based prioritization (HPro)	[68]	✓	✓		✓	✓	✓		✓	✓						✓		✓	
classification tree testing (DART)	[61, 62]	✓			✓	✓		✓	✓			✓				✓			
I-BACCI	[51–54]	✓			✓				✓						✓				
Value_based	[75]		✓		✓	✓			✓		✓					✓		✓	
multi-perspective prioritisation (MPP)	[37, 38]		✓		✓	✓		✓	✓							✓		✓	✓
RTrace	[63]		✓		✓				✓		✓					✓			
Echelon	[71]		✓		✓				✓						✓	✓	✓		
[illegible]	[39]		✓		✓				✓					✓					

VISUAL ANALYTICS FOR SOFTWARE TESTING

- Purpose of testing
  - Confidence in the quality of a product

  - **Release readiness/ready to deliver** – can we release the product to the customer
  - **Test scoping** - Intermediate test results are used to inform where to direct additional test efforts
  - …



CHALLENGE

Interpret and make sense of the large amount of data

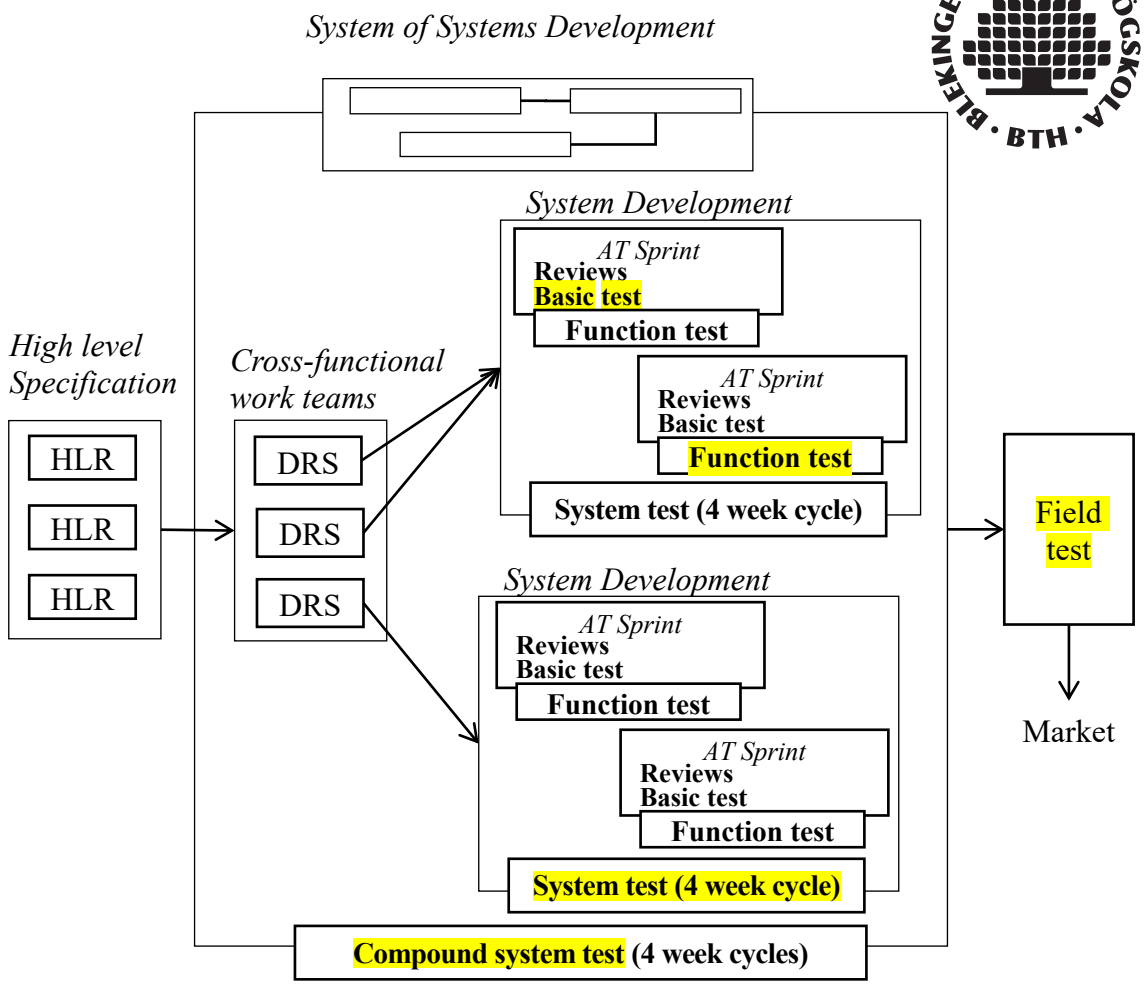
- From the **increasing number** and
- Frequency of test executions
- At multiple test levels
- Across organisational/team boundaries

Aggregate and contextualize information from several sources

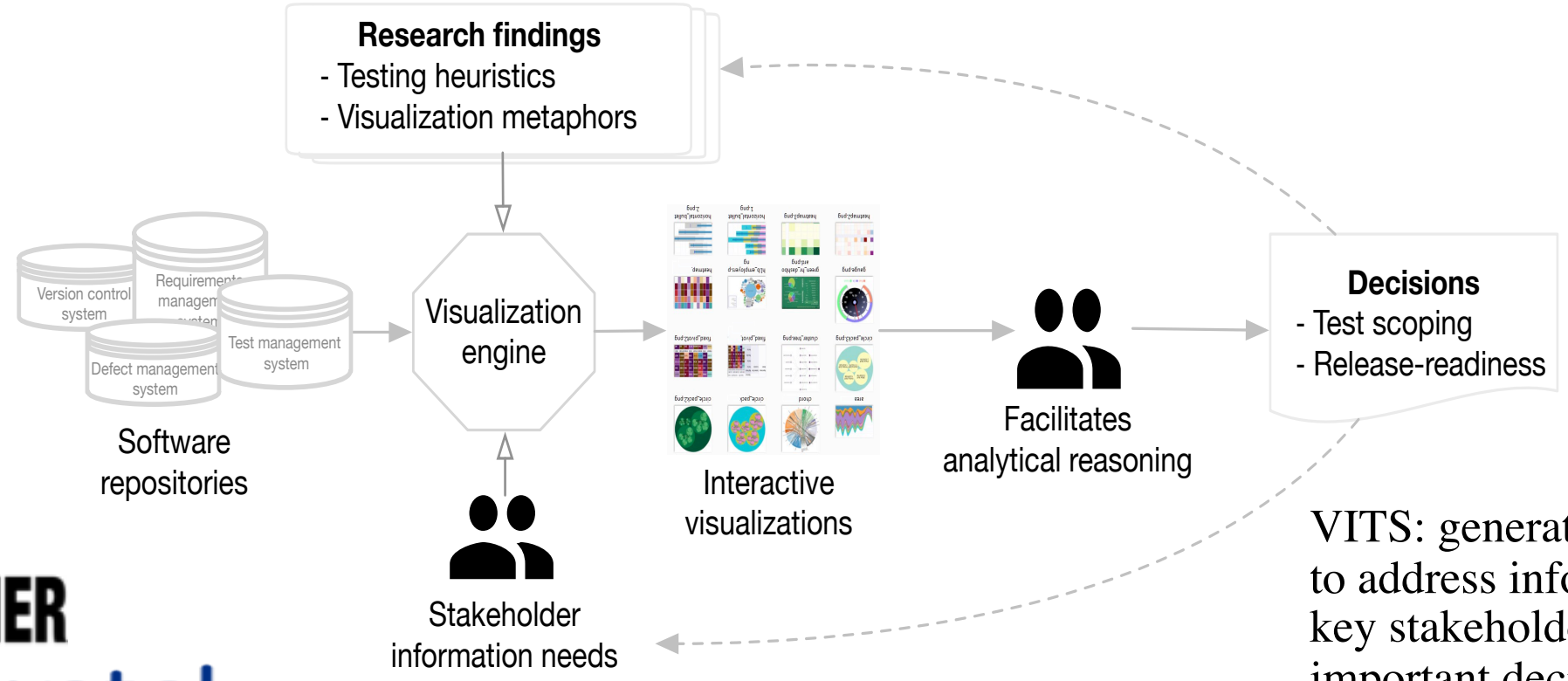
- From test management system
- Additional internal sources (e.g. changes in source code, objective/subjective risk assessment about system components)
- External sources (feature/requirement priority)
- Defect data

Different roles have different needs

- Developers – facilitate debugging, fault localization
- Testers/test managers – where to focus the test efforts
- Product owner – confidence in the quality of the system



PROPOSAL



VITS: generates visualizations to address information needs of key stakeholders to support important decisions

BOMBARDIER

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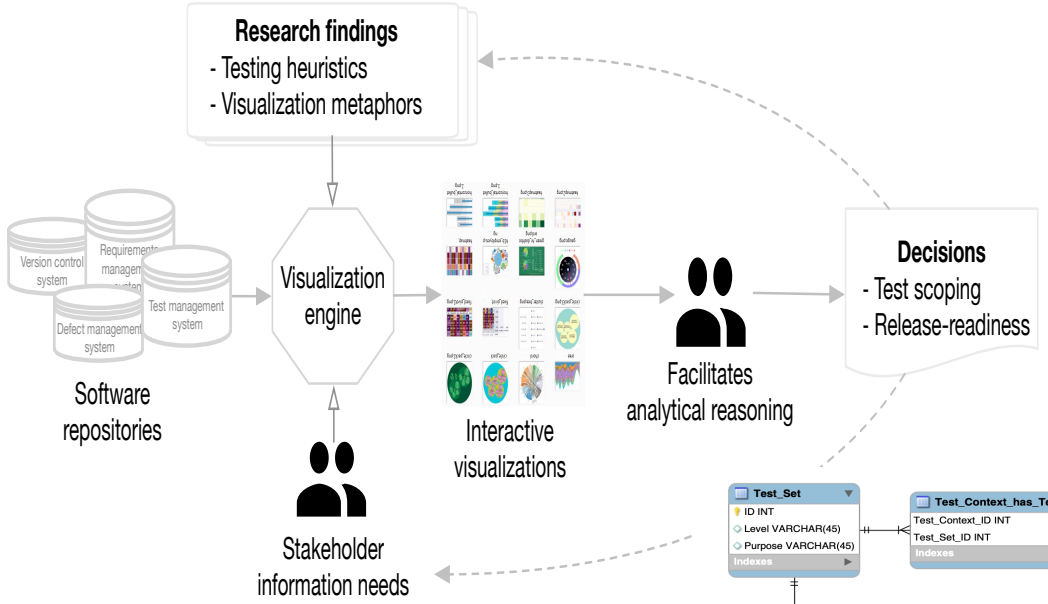
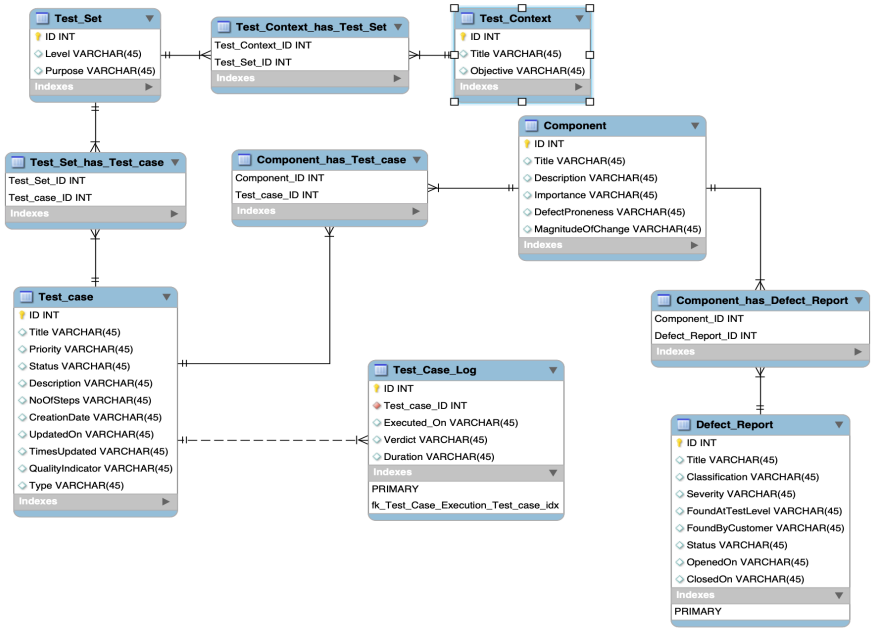
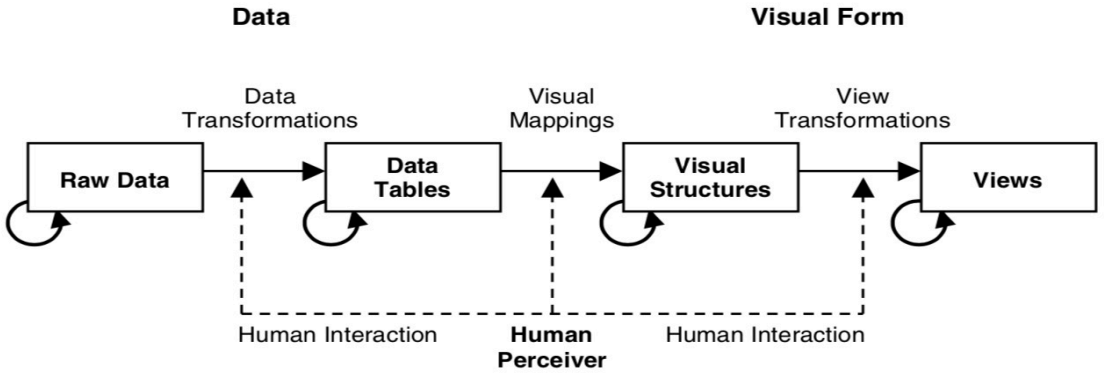
AXIS COMMUNICATIONS

APPROACH

- Understanding Information needs
- Sufficient data schema
- Using and proposing visualizations
- Operationalization

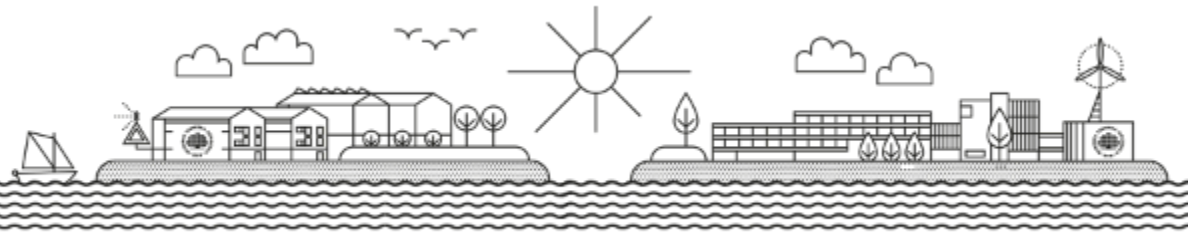






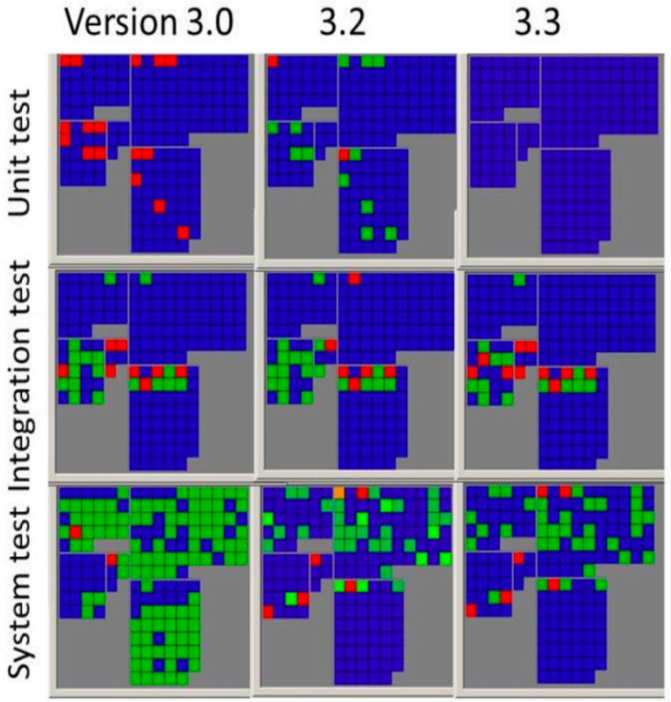
COMPLEMENTARY USES OF VISUALIZATIONS

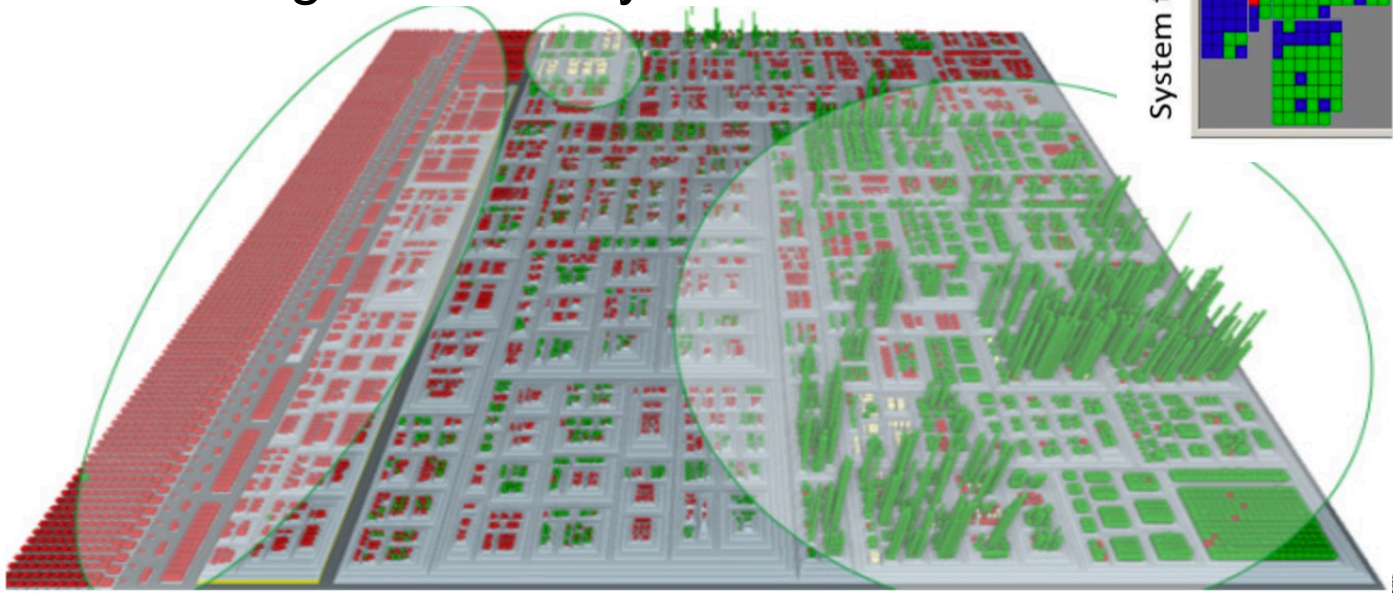
- Assessing product quality
  - Ready to deliver?
  - Quality trends
  - Historical view
- Assessing test quality
  - Test case aging
- Supporting communication across roles and boundaries
  - What has changed?
  - What was tested and why?
  - What were the results?



PRODUCT QUALITY

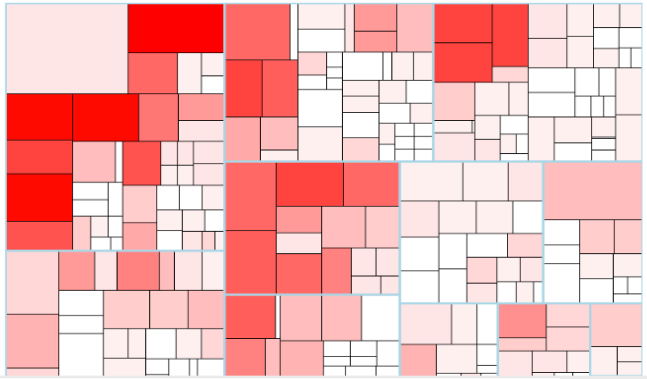
- Ready to deliver (new functionality and achieved quality [equally influential])
- Trend
- Project and process view
- Learning from history

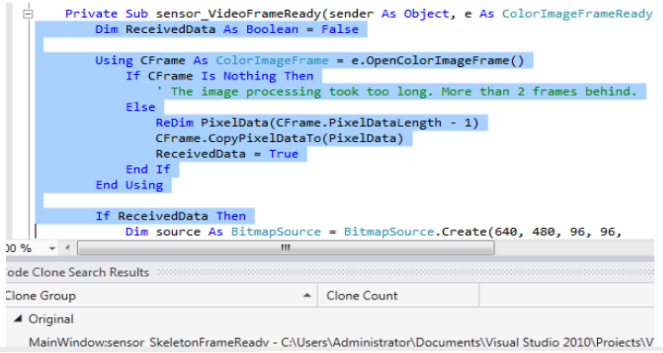


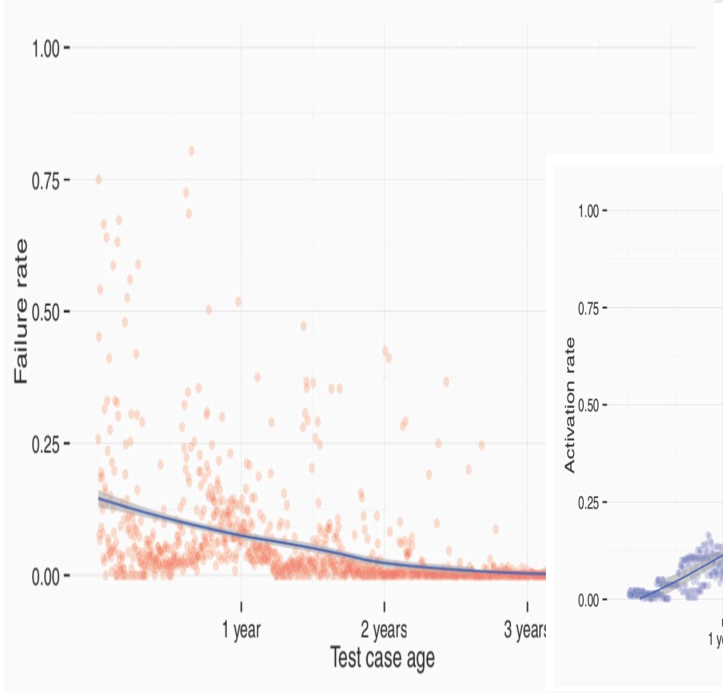


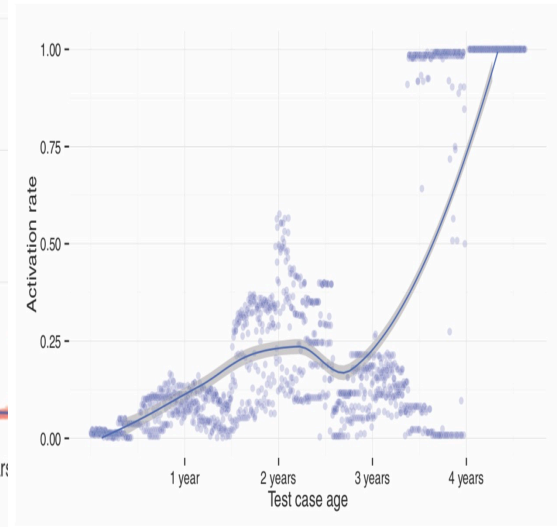
TEST QUALITY

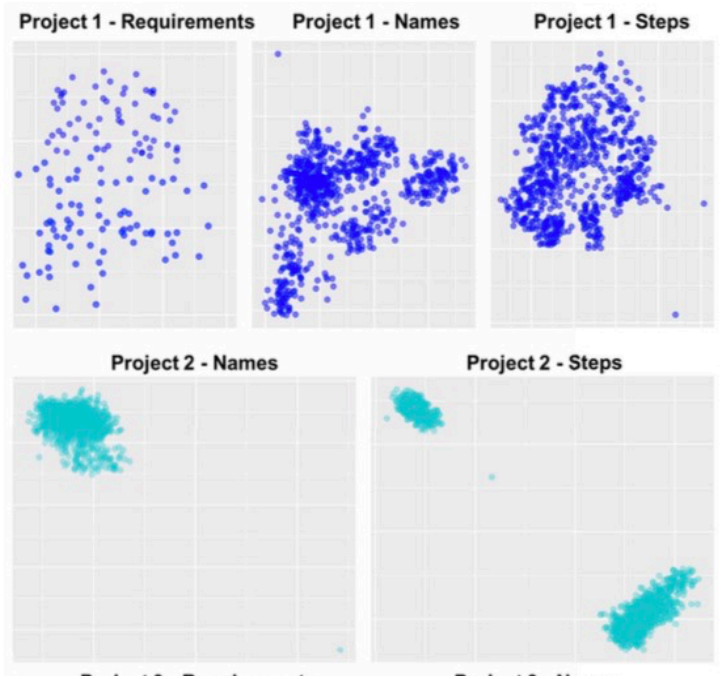
- Aging
- Coverage
- Results
- Execution
- Redundancy (duplicates, clones)
- Flakiness (e.g. indications of the extent of flakiness)

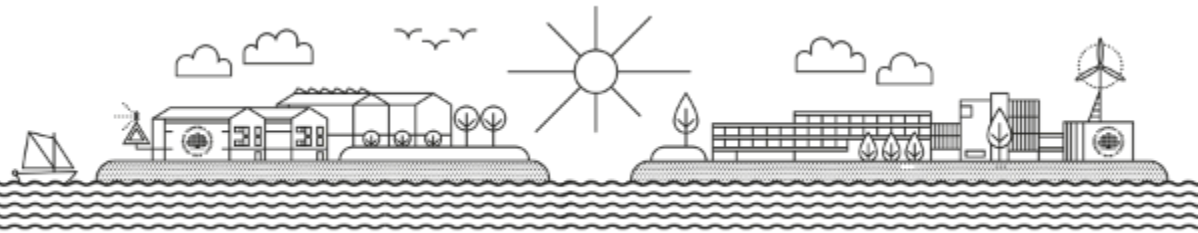












THANKS!

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