

Graph-Based Test Management for Complex Systems with Many Variants

Sebastian Surmund

The background of the slide is a complex, abstract digital graphic. It features a dark blue base with various glowing elements: bright blue and yellow lines resembling circuit traces or data paths, several semi-transparent circular nodes in shades of blue, green, and yellow, and a large, bright yellow and white glowing shape on the right side that resembles a stylized arrow or a data packet. The overall effect is one of high-tech, futuristic connectivity.

Automotive Engineering: ADAS

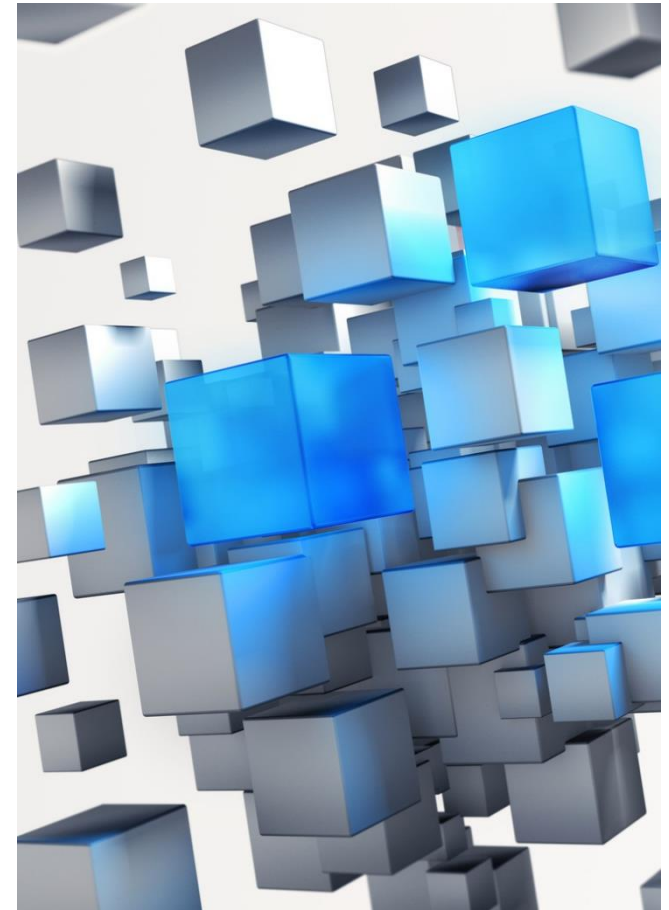
- Technologically advanced functions
- Functionality distributed to several systems
- High level of interconnection
- Increasing number of variants

- **High test effort**



ADAS Tests

- Validation of complex systems
 - High number of system variants
 - Maneuver based testing
-
- Large number of tests
 - Redundancies in tests
-
- **High effort to setup tests**
 - **High effort to maintain tests**



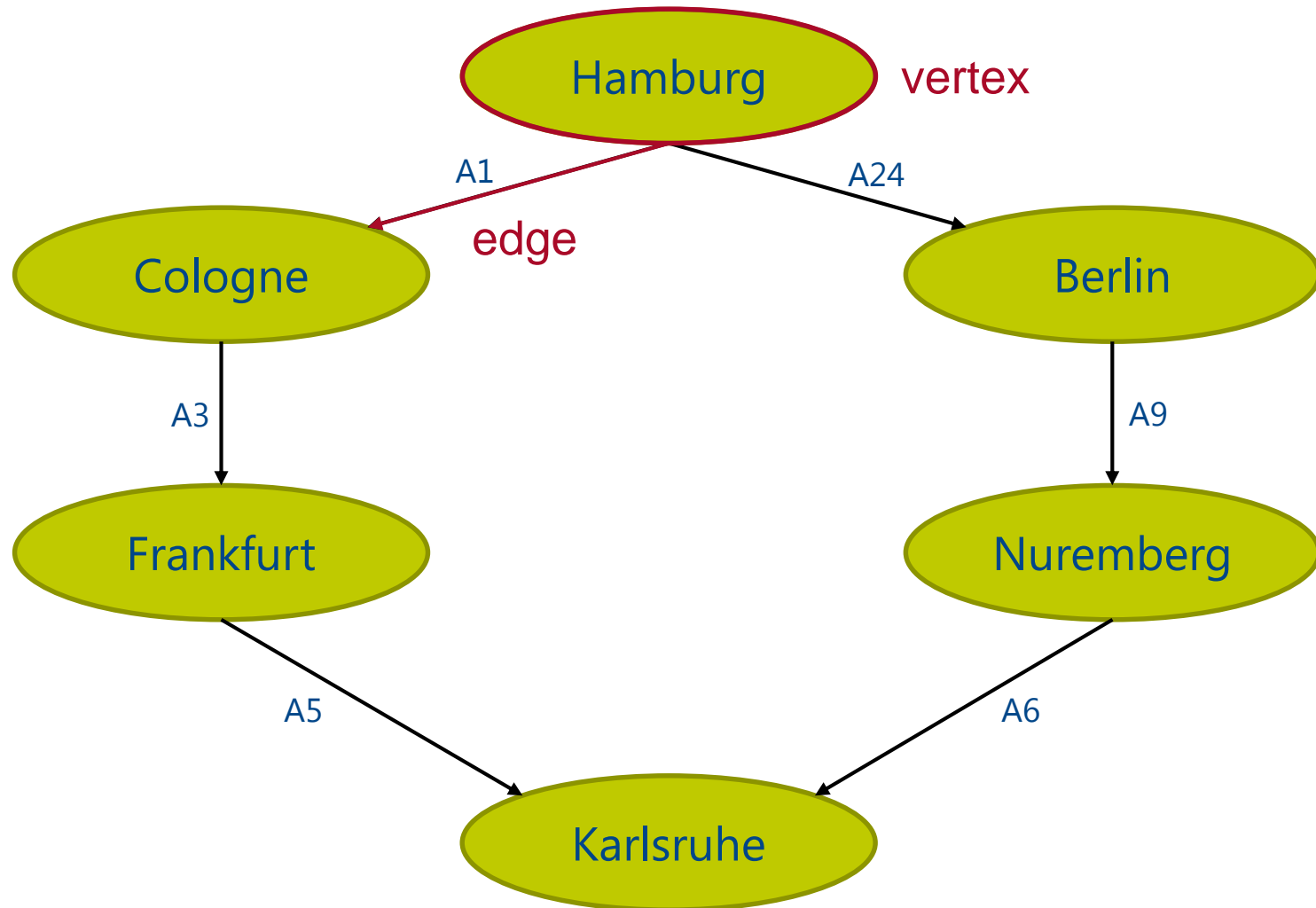
Graph-Based Test Management

- Reduce complexity of test variants
- Visualize test definition
- Reveal redundancies in test definition
- Avoid redundancies in test description

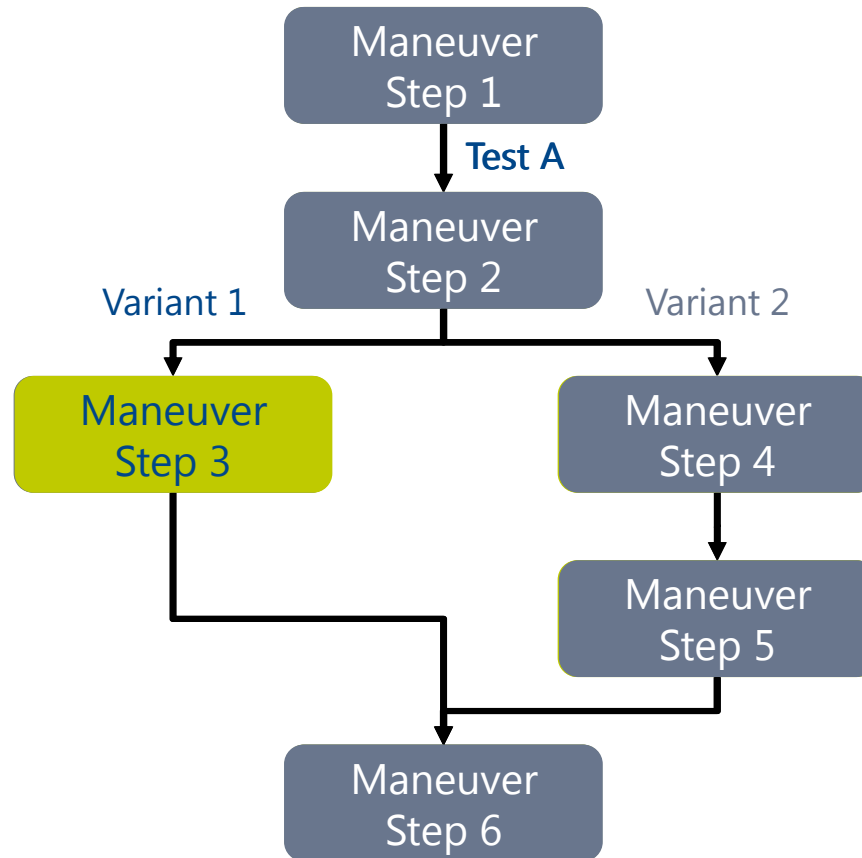
- Create tests based on graph-based description
- Separate test description from test implementation

- **Test generation based on graphical representation**

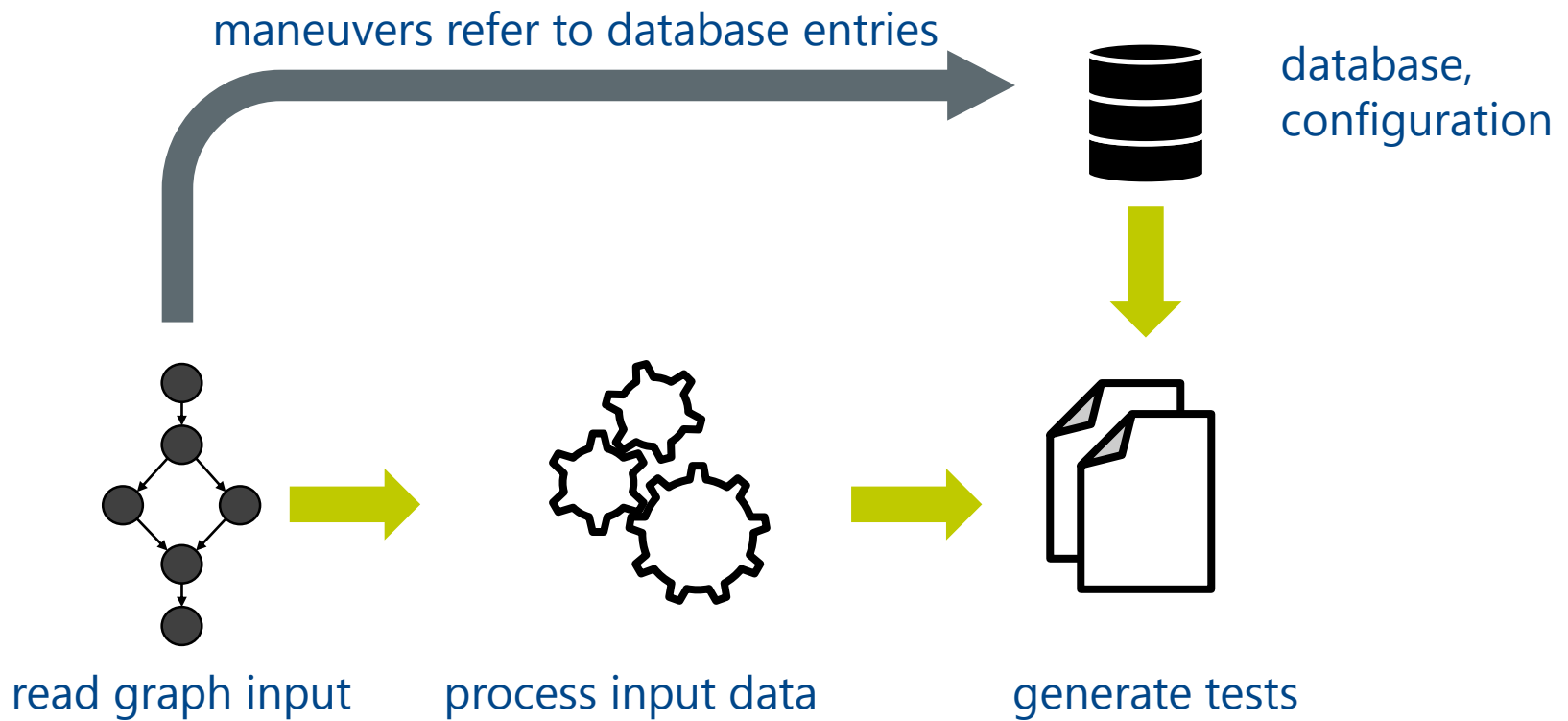
Short Introduction into Graphs



Use Graph Theory to Describe Tests



Use Graphical Representation to Generate Tests



AEB for Pedestrians

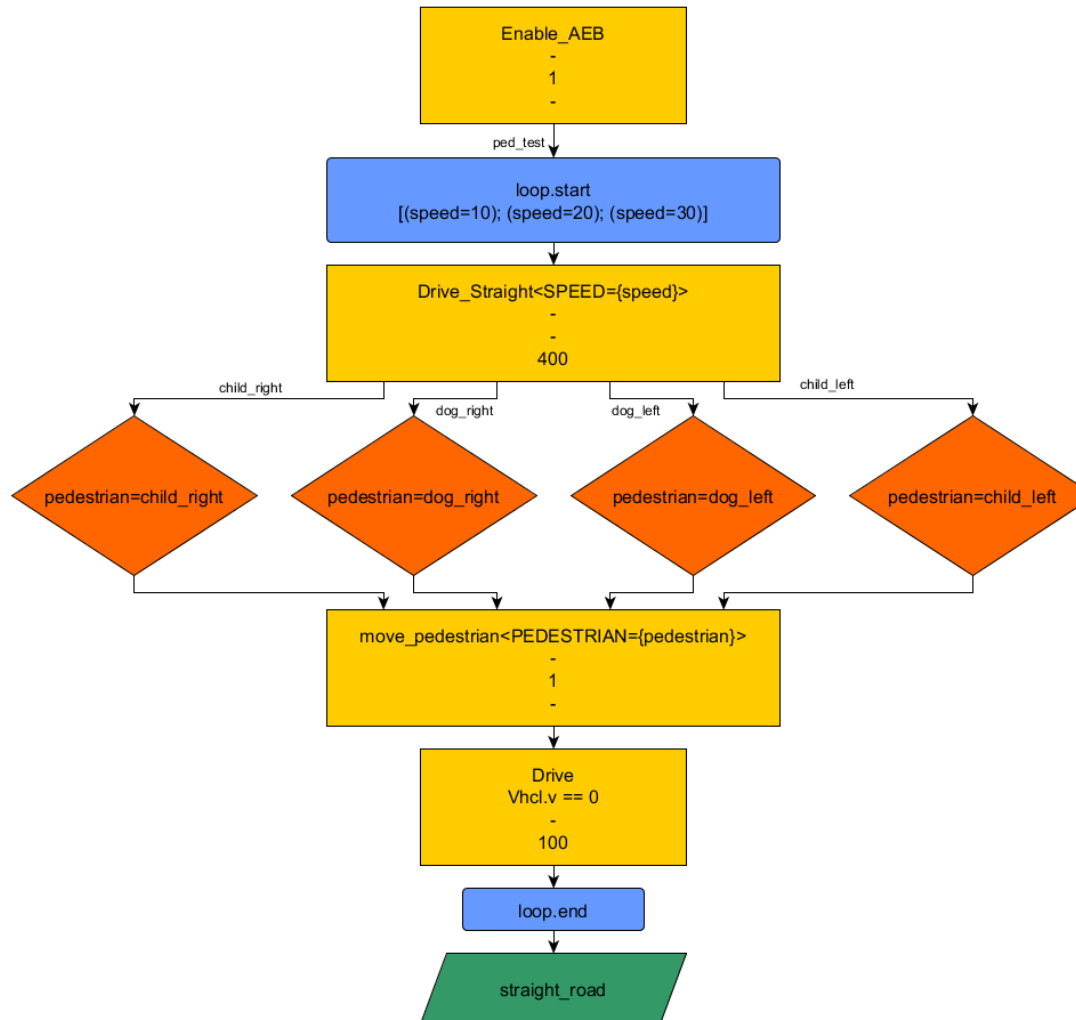
- Autonomous Emergency Braking
- Use Front Camera / Radar
- Avoid collision or at least reduce speed of collision

- Since 2016: Euro NCAP tests



Image source: <http://www.euroncap.com>

Test Graph for AEB Pedestrian System



Benefits of Graph-Based Test Management

- Reduce complexity caused by variants
- Avoid redundancies
- Visualize test definition
- Separate test description from test implementation

- **Reduce effort to setup tests**
- **Reduce effort to maintain tests**

