



# Rating (Environment) Simulation Solutions

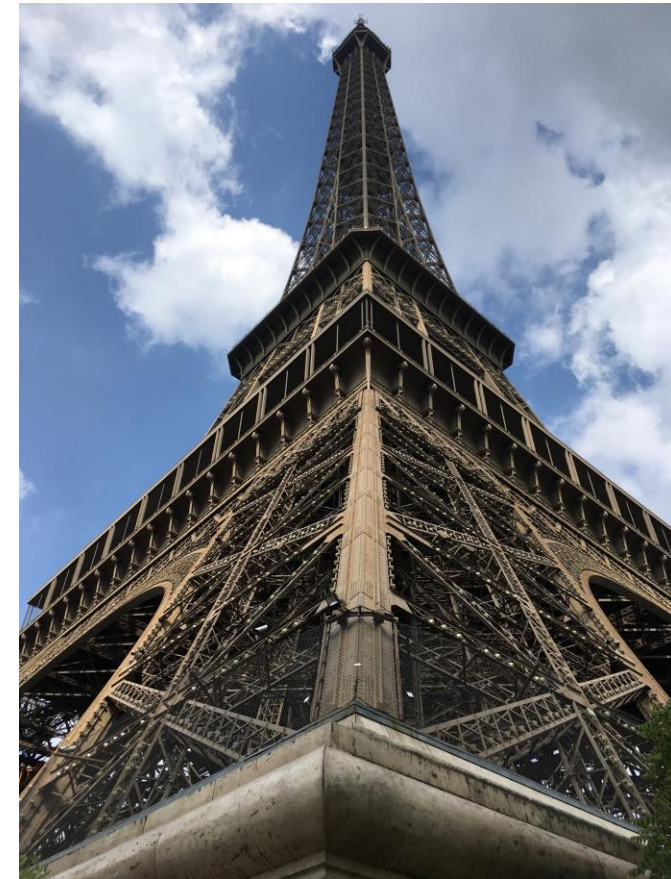
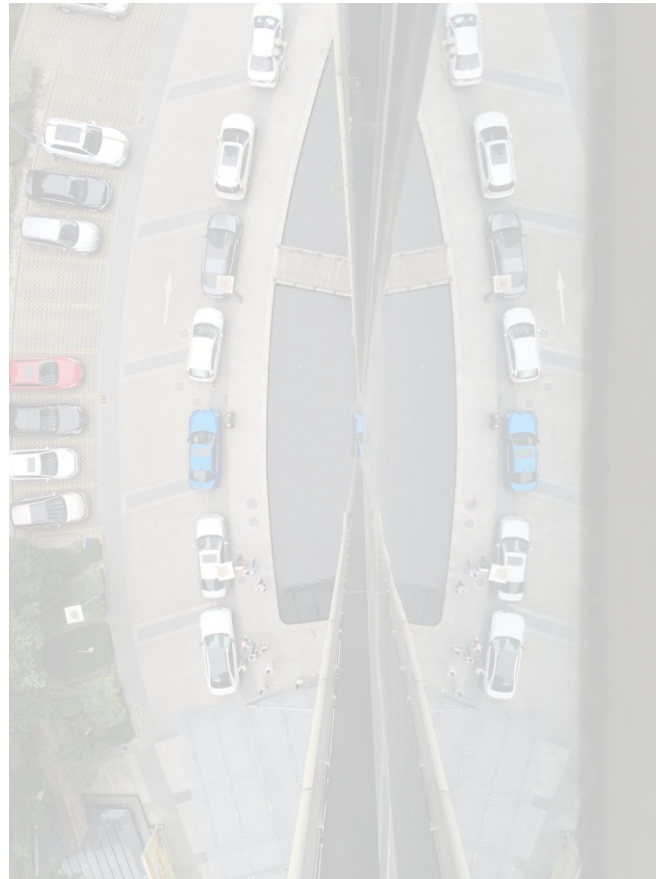
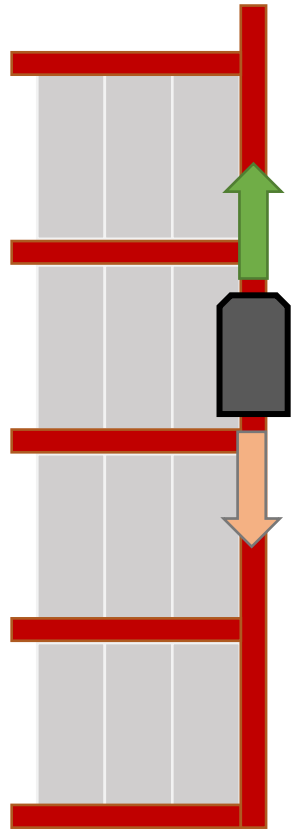
*Marius Dupuis – SimCert.org*

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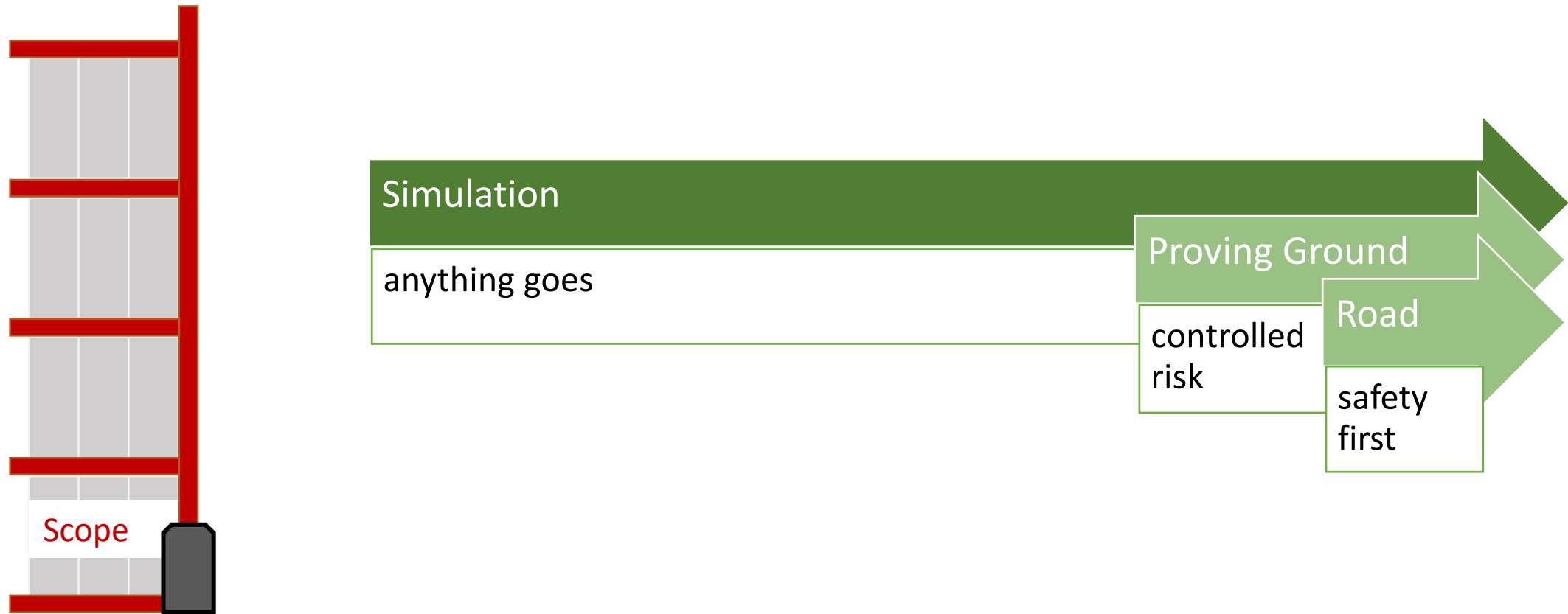
# 12-Minute Pitch

Top Down

Bottom Up



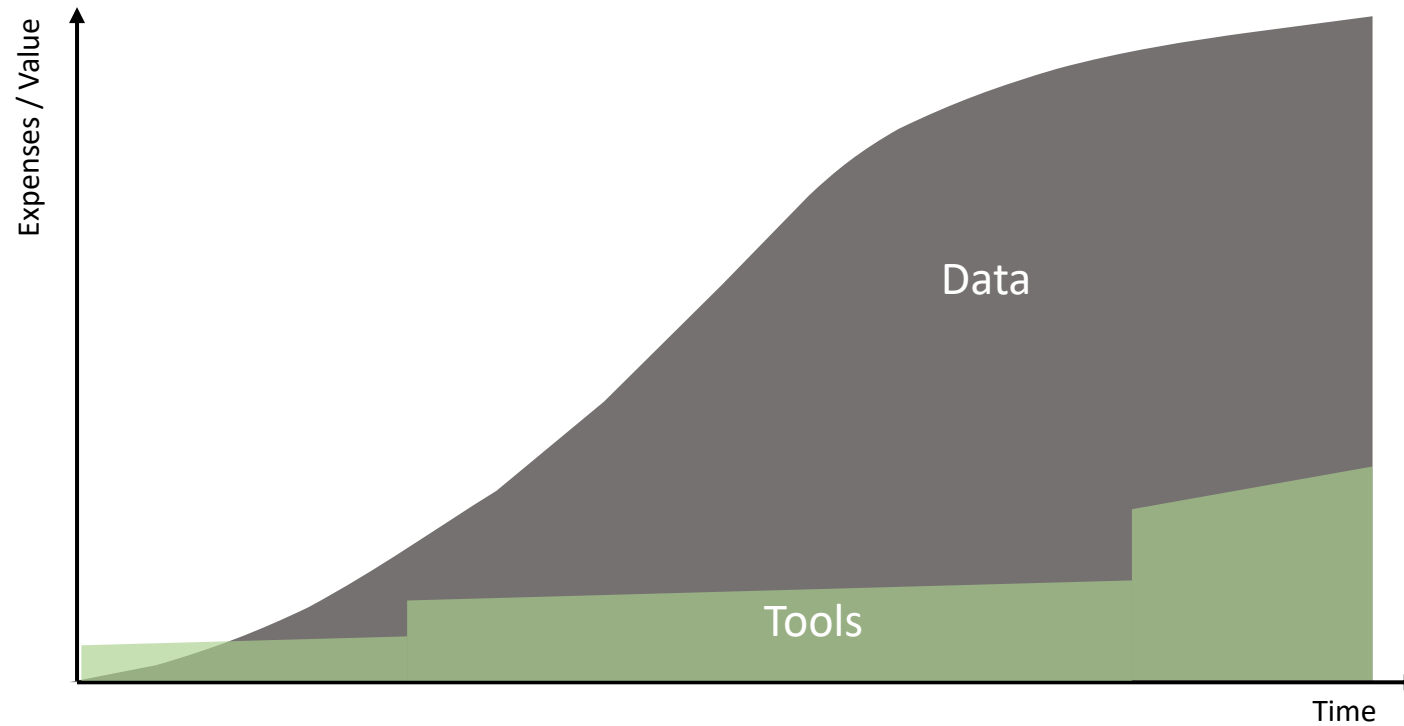
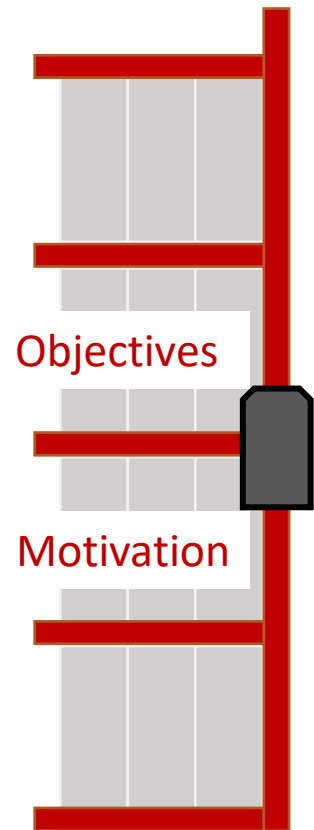
# Developing and Testing ADAS/AD Systems



# The Simulation Ecosystem



# Development Lifecycle



## Assets

- Tools are a (small) fraction of the investment
- Tools may change over time
- Data created with tools become long-term assets

# What the Market Needs

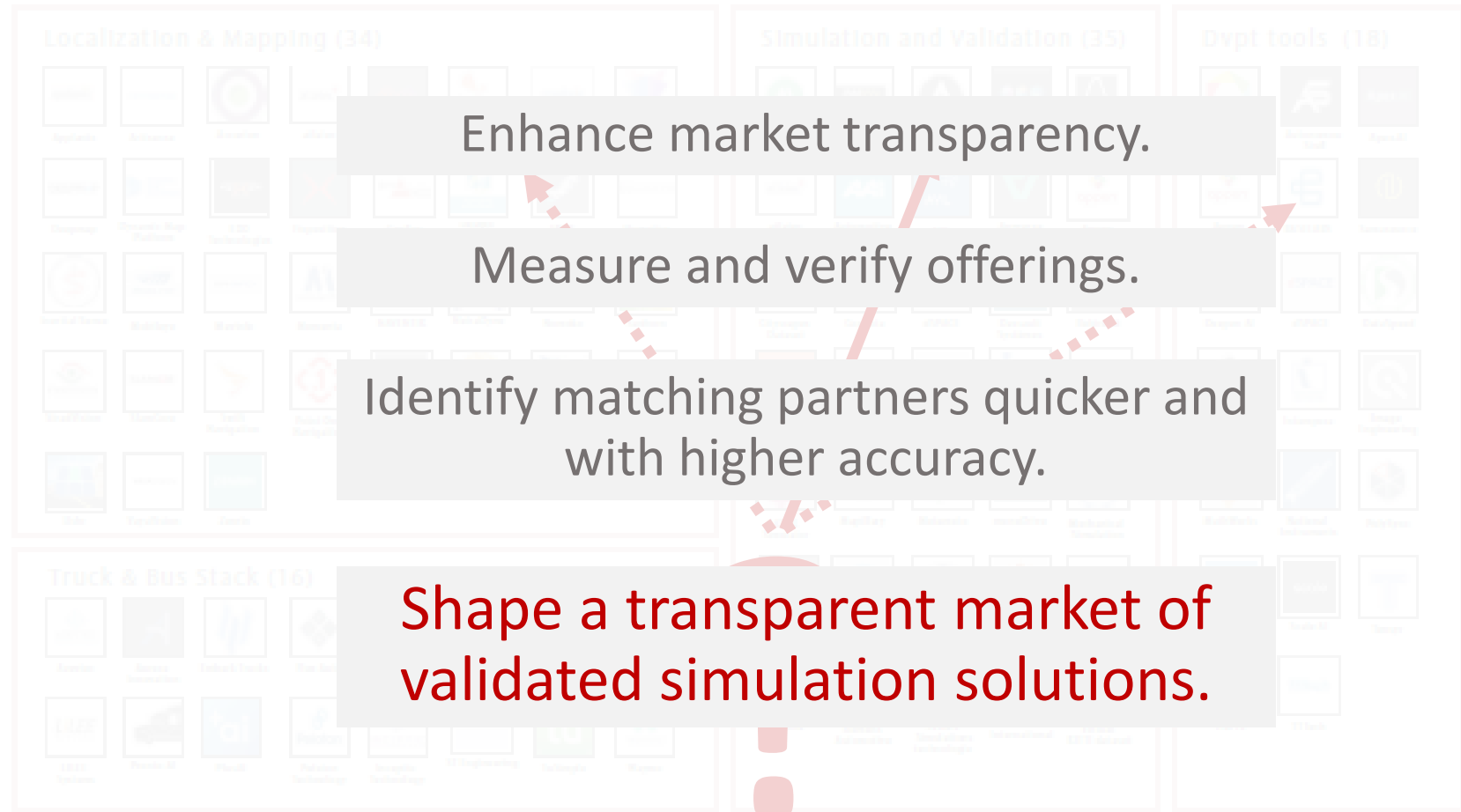
Objectives

Enhance market transparency.

Measure and verify offerings.

Identify matching partners quicker and with higher accuracy.

Shape a transparent market of validated simulation solutions.



Source: <https://www.topionetworks.com>

# The Sim | Cert Method



Method



## Public Data

- Product website
- Product data sheets
- Product manuals
- Training videos
- Webinars
- Conferences

## Interviews

- Demonstration by product owner
- Questionnaires
- Q&A sessions with product owner
- Q&A sessions with users

## First-Hand Product Experience

- Download and installation of free products
- Evaluation licenses of commercial products
- Testing along rating guideline

## Rating table

- 19 top-level rating criteria
- 198 second-level aspects
- 875 third-level topics
- 1063 values

[www.simcert.org](http://www.simcert.org)



**Pros:**

- Free software for all kinds of use
- Excellent online documentation
- Nice graphics (Unreal Engine)
- Rich instruction set (Python Scripts)
- Considerably large sensor library included
- Traffic model allows for dense traffic conditions
- Heavy examples available with the product
- Bridges for ROS, SDDS and PTV Visum
- Scalable solution, cloud deployable
- Direct import and visualization of OpenDRIVE data
- Supports OpenSCENARIO via Scenario Runner application

**Cons:**

- Not all of the test installation prerequisites need to be fulfilled
- No graphical user interface
- Cycle based sensor models
- Single-track mode
- No buses, semi-trucks, tractors, trams etc.
- Non-deterministic components in-renderer
- Limited parallelization and scalability

**SUMMARY**

CARLA is the tool of choice for many people who enter the space of simulation for ADAS/AD. It is relatively easy to utilize and provides an easy means to integrate and control via Python scripts. Unfortunately, it lacks a GUI for configuration and operation that would make it a much more valuable tool with good usability. CARLA provides some level of determinism but this seems to be limited to the Traffic Manager. The renderer and its physics effects do not appear to provide full determinism. Support is arranged in GitHub but the times for new issues being appointed to someone or being taken care of seem to be too long in many cases.

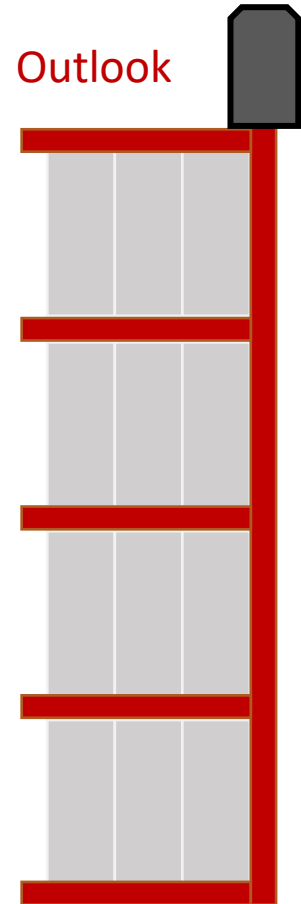
CARLA seems to be a good fit for the following ADAS/AD development use cases:

- algorithm development for controllers and basic sensor fusion
- simulation for planning and control (subject tests)
- sensor setup and configuration (technical parameters of sensors)
- creation of basic training sets for camera-based ML systems

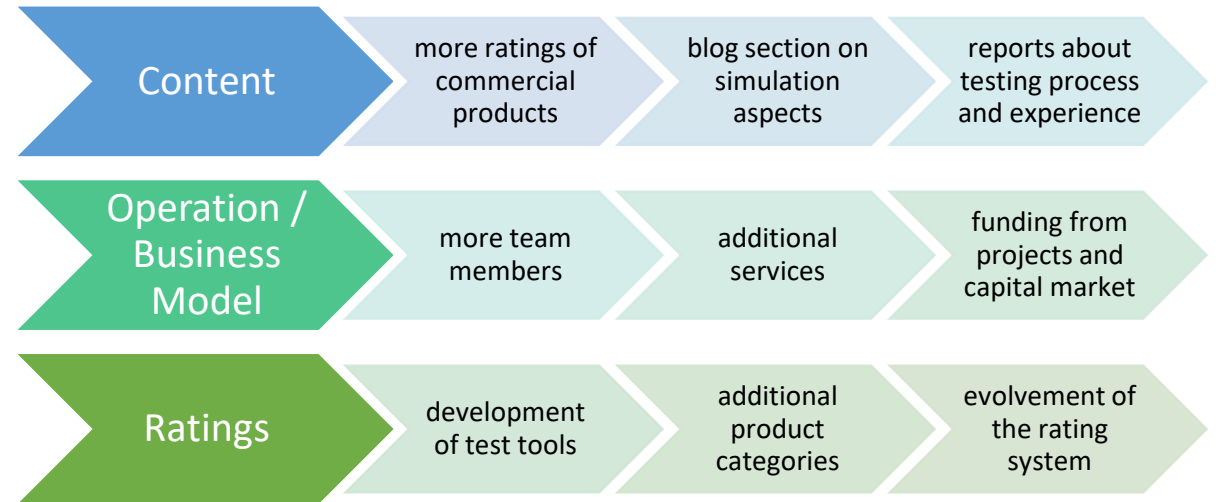
It has limited value for the following use cases:

- realistic sensor raw data generation and injection across all wavelengths
- hardware-in-the-loop testing under real-time conditions
- verification and validation of ADAS/AD systems

# The Future

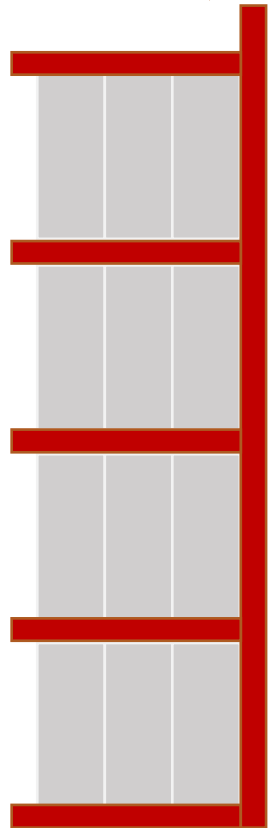
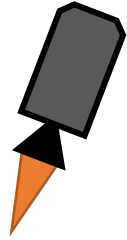


Round table  
„Quantifying  
Simulation Quality“





Lift-off



# The Opportunity is Now!



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**Thank you!**

**Q&A**

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