FORMForum
FUTURE OF ROAD MOBILITY 2023

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Link to the slides and papers:
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Navigating the Simulation-to-Reality Gap

Developing a Validation Tool for Optimizing the Use of Simulation Data in AI Models

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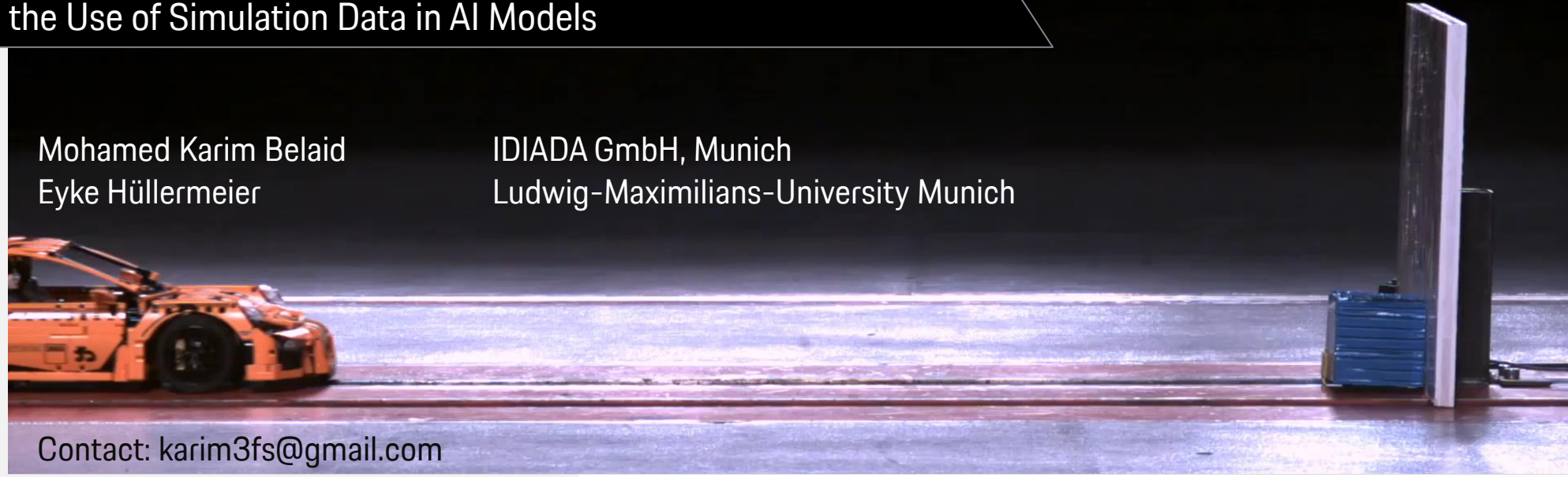

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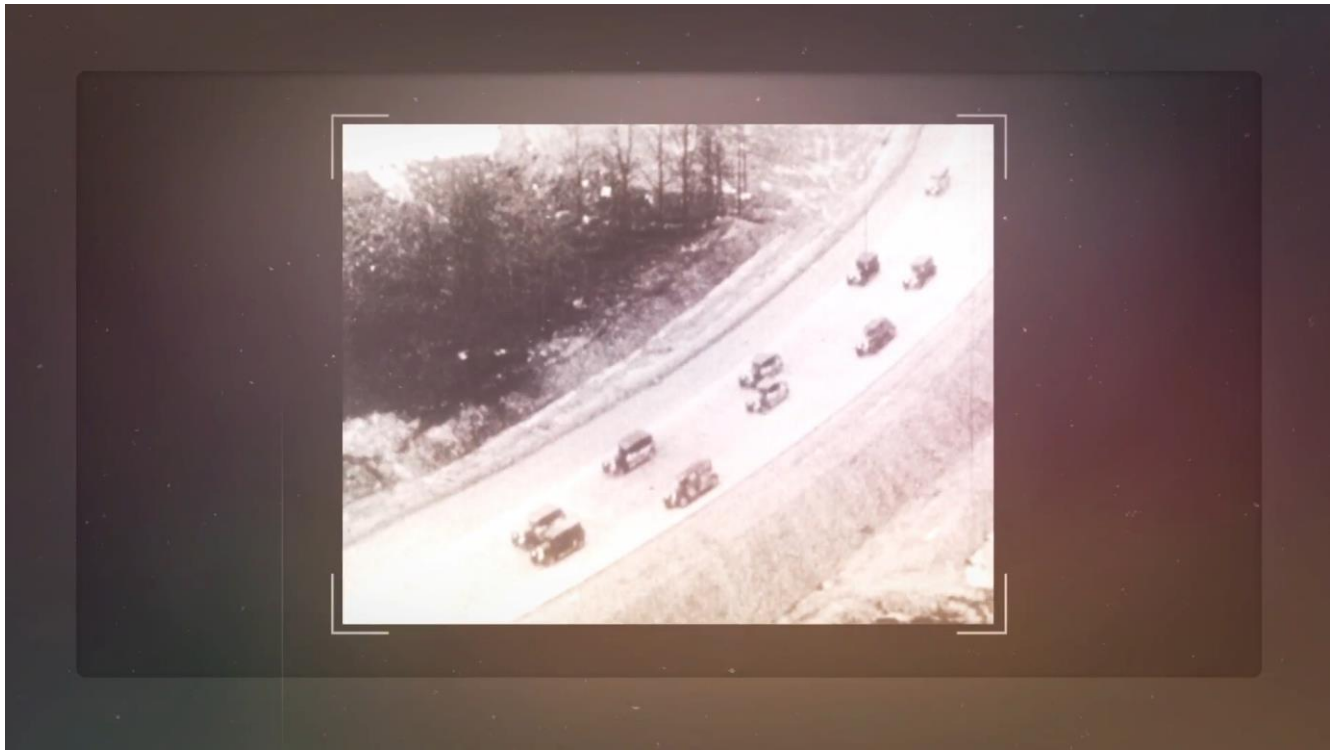
URL: https://youtu.be/dCPWPj4JHqg

Introduction: The Simulation-to-Reality Gap



Video: Applications of simulation tools in the automotive field

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URL: https://youtu.be/drJq89ksUjo

Research Problem

REAL

SIM

How can we leverage data interaction to narrow the gap between simulation and real-world outcomes in the automotive field?

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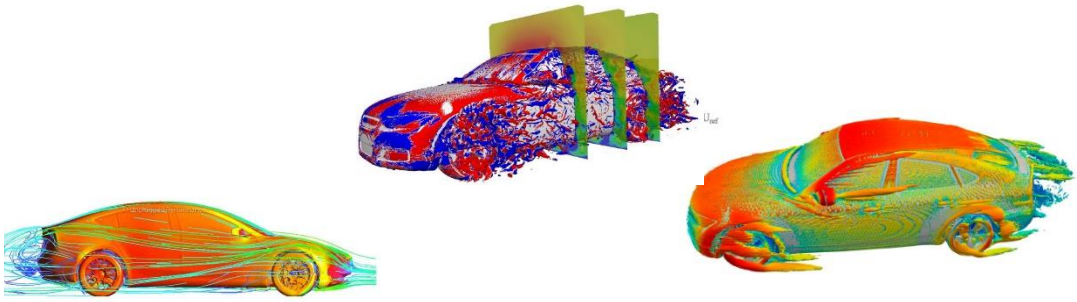
URL: https://youtu.be/5XI494nEJrQ

Research question 1

How to select the best simulation candidates?

» What criteria and methodologies can be employed to optimize the selection of simulation candidates for an accurate representation of real-world automotive performance?

Simulation space



Real space

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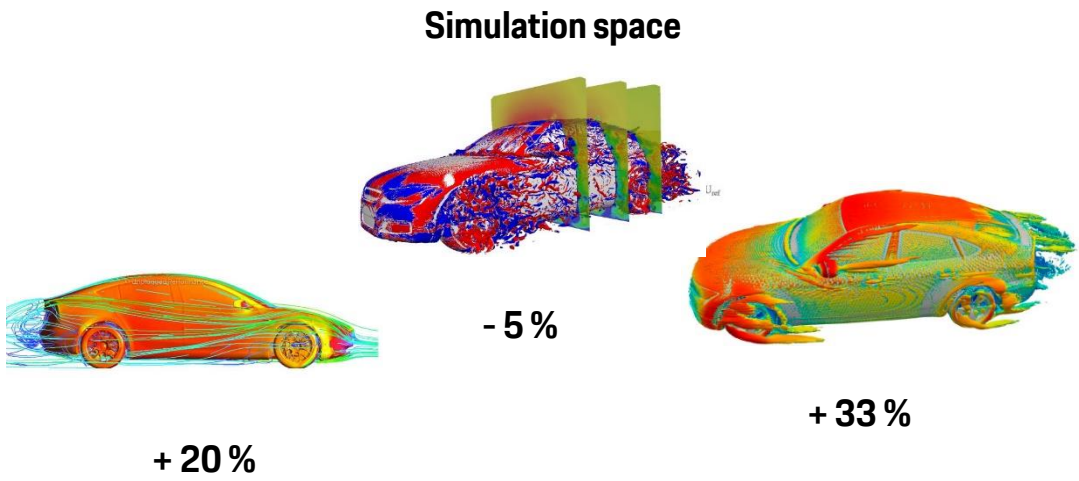
Research question 1

RQ.1: How to select the best simulation candidates?

- **Novel AI algorithm:**
  Data Valuation
- **Algorithm's goal:**
  Quantify the impact of each data point on enhancing the predictive capabilities of our machine learning models
- **Contribution:**
  Detect and remove redundant, corrupt or outlier simulations



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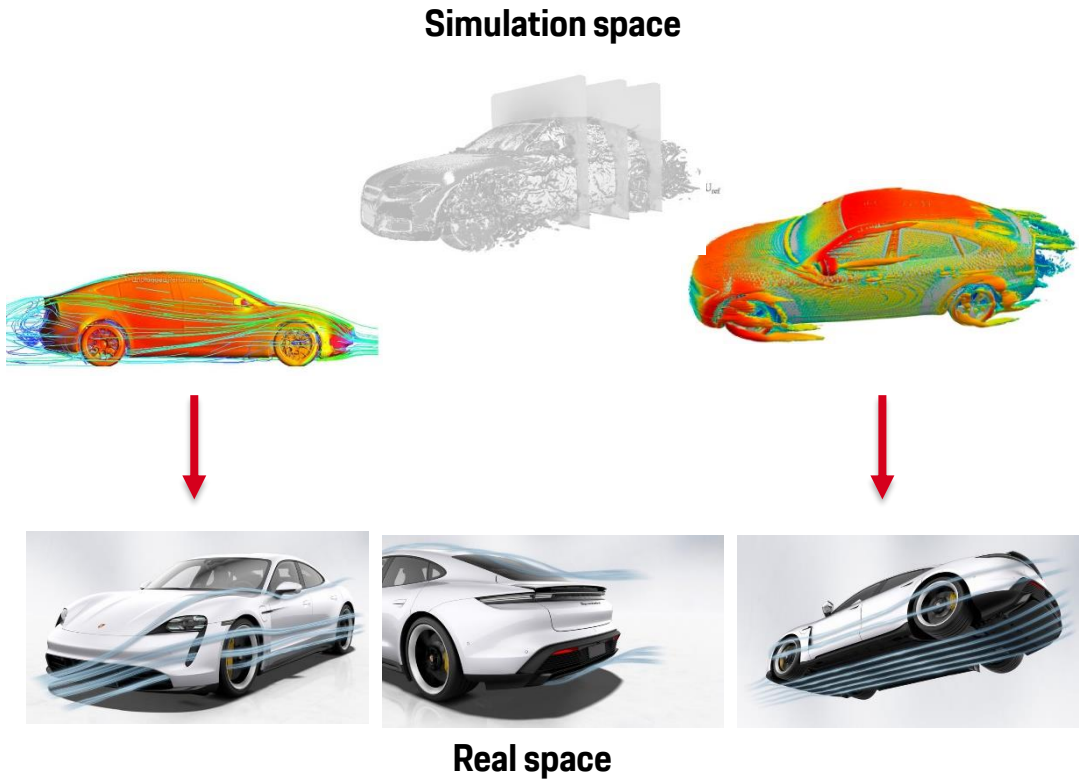
Research question 2

How to move from the simulation space to reality ?

» How can specific artificial intelligence techniques be leveraged to enable a seamless transition from computer simulations to effective real-world experiments?



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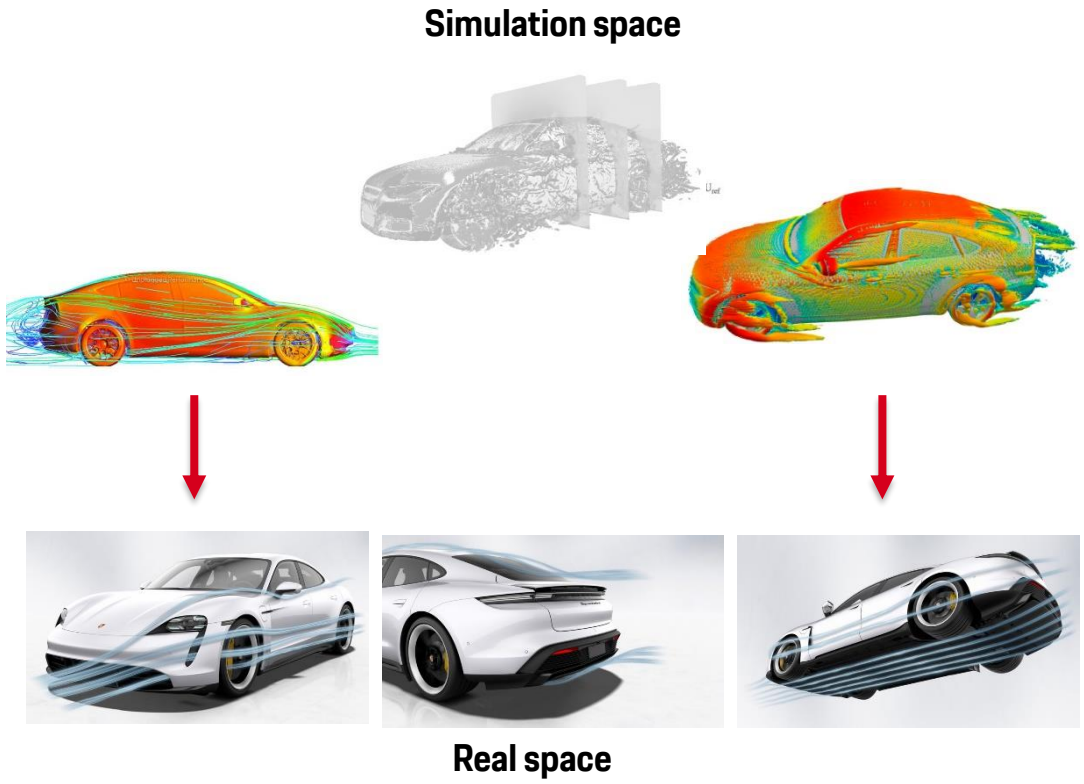
Research question 2

RQ.2: How to move from the simulation space to reality ?

- **Novel AI algorithm:**
  Pairwise Difference
- **Algorithm's goal:**
  Rather than learning to predict the direct output. Pairwise Difference learns the difference between two data points.
- **Contribution:**
  Learn to predict the difference between simulation and reality. Scale the training set to N^2



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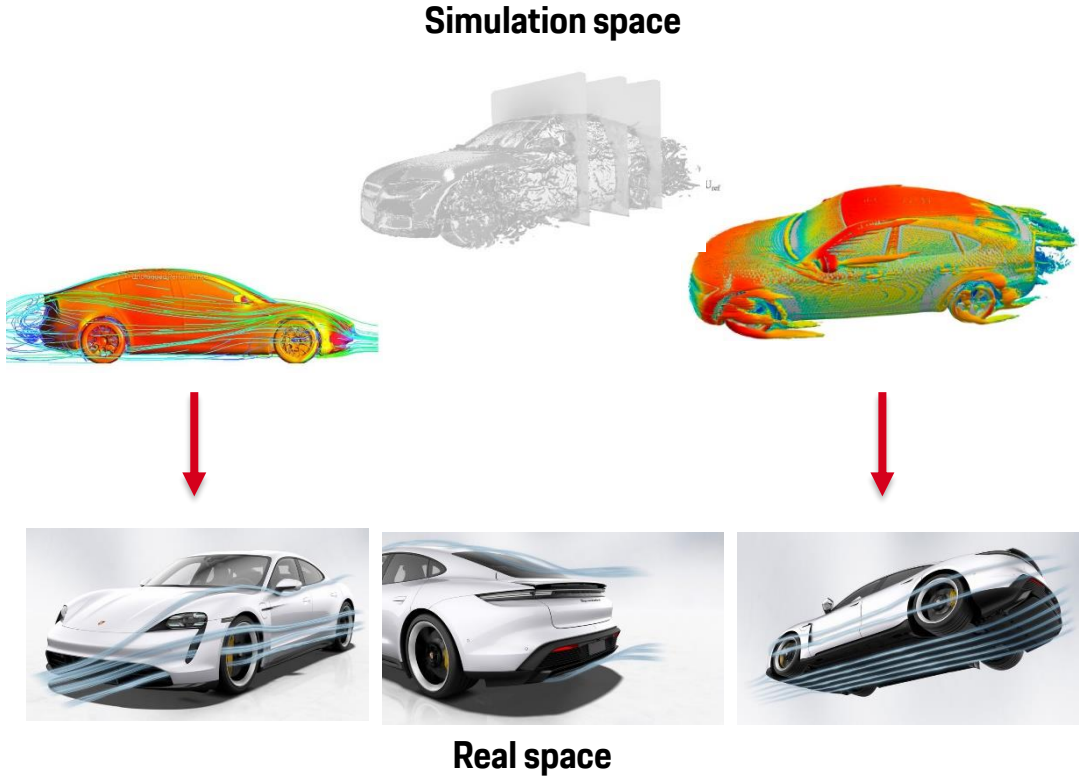
Research question 3

How to validate the obtained results from the AI tools ?

- What robust methodologies and best practices can be employed to ensure the validation and reliability of outcomes produced by AI tools?



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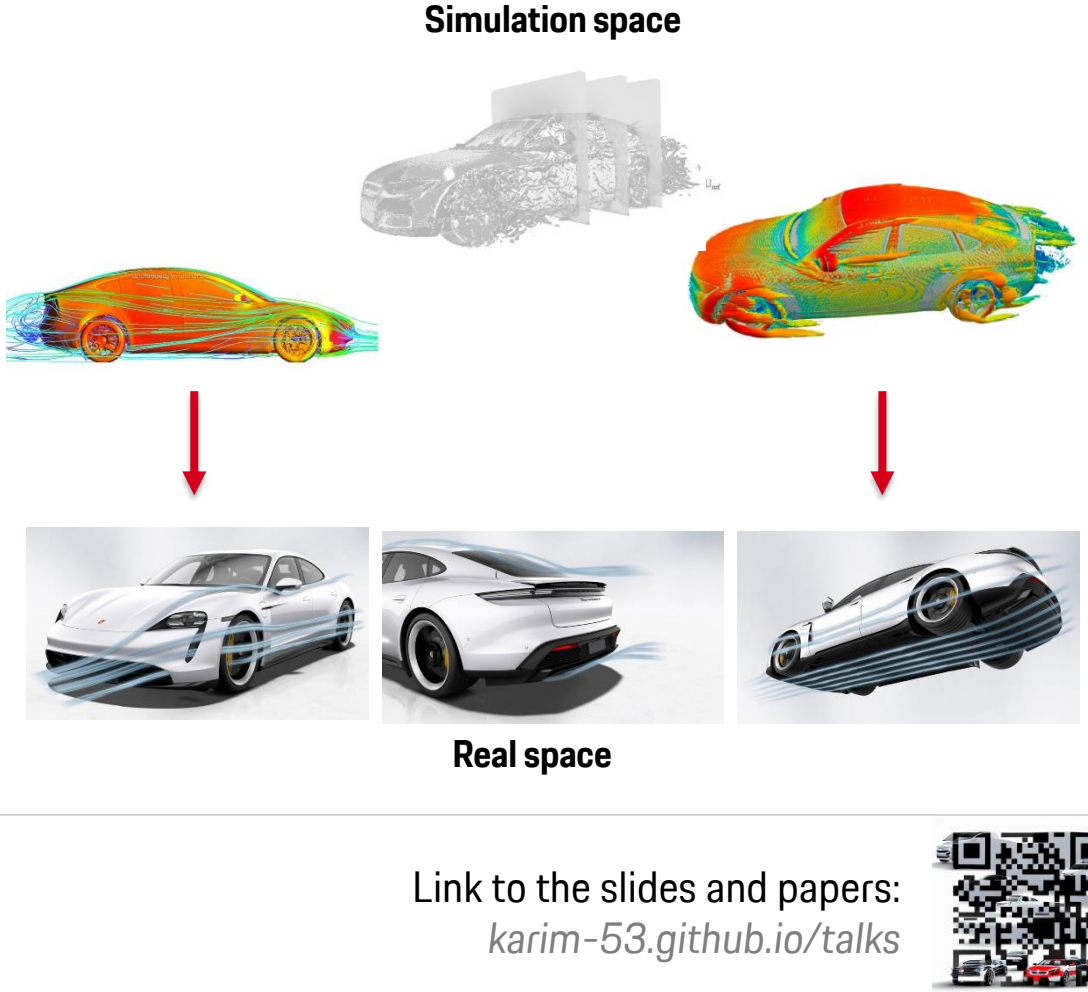
Research question 3

RQ.3: How to validate the obtained results from the AI tools ?

- **Novel AI algorithm:**
  Compare-xAI benchmark
- **Benchmark's goal:**
  Present to the data scientist the plus and minus of each explainable AI technique
- **Contribution:**
  Ensure a correct usage and interpretation of the state-of-the-art explainable AI techniques



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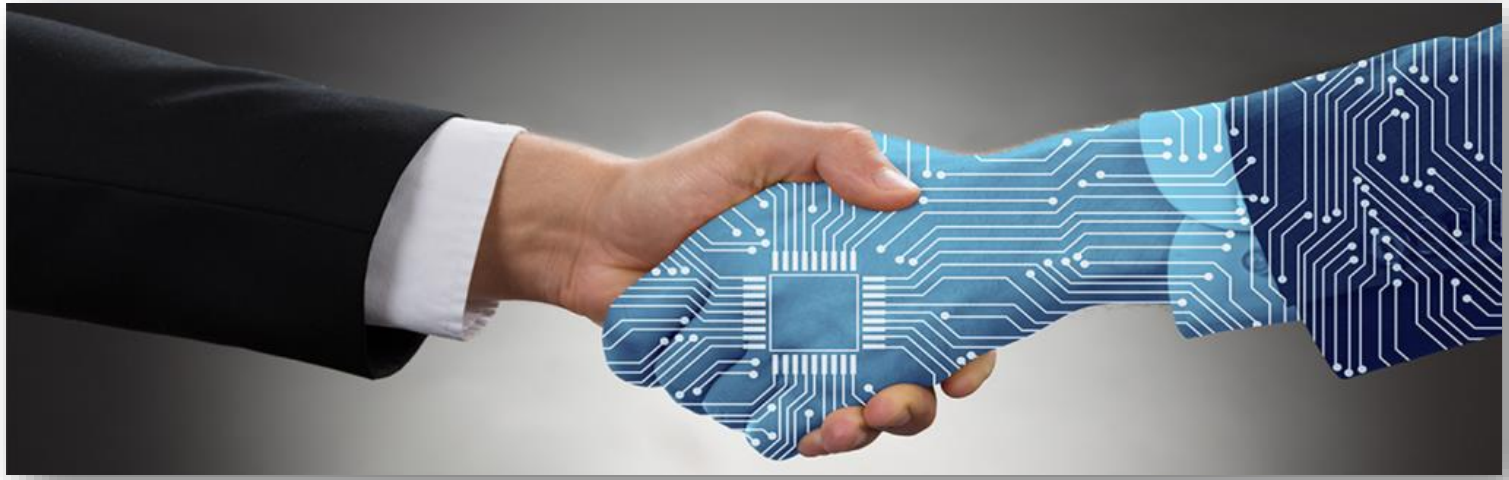
Vision: Use AI to reduce the Simulation-to-Reality Gap



- **Provide robust simulation results**
- **Reduce the number of real tests**
- **Reduce the costs**

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Thank you for your attention
Any questions ?

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