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15th Edition
ELECRAMA
Powering the Future of Energy

eTECH nxt
20-21 February, 2023
ELECRAMA, Hall 2 & Hall 4

Electrifying Your Product Portfolio

Practical Design Strategies and Enabling Technologies

Vishwanath Rao | Managing Director
Altair

Electrification is a Mega Trend

- For a more **sustainable future,** reduce CO2 emissions
- Build **more energy efficient** systems
- Impacts almost **all industries**
- Enabled by **Electric Machines** & **Power Electronics**

To transform enterprise decision-making by leveraging the *convergence* of simulation, high-performance computing, and artificial intelligence.

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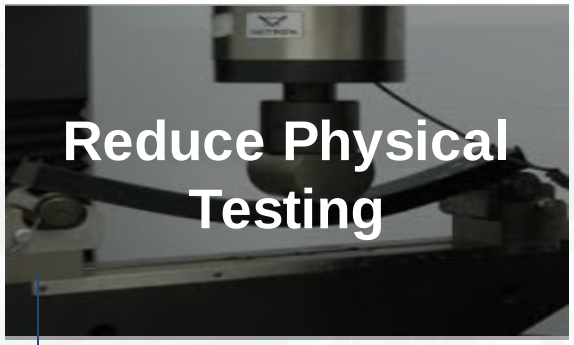
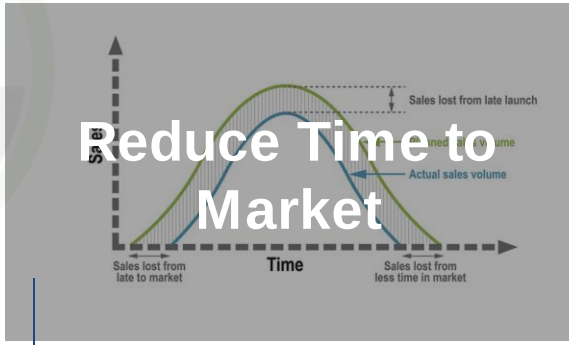
Addressing the Main Challenges of Electrification

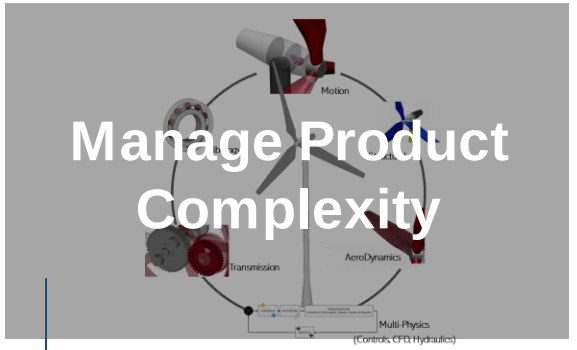
Optimize the **energy efficiency of electric systems**, reduce weight and material usage



Virtualize test efforts of electric systems in use of **accurate simulation involving all physics**



Streamline **multi-physics optimization** processes to make more-informed design decisions earlier and speed-up development



Simulate complete systems with all components comprehensively, involving all physics in purpose-driven fidelity (1D-3D)

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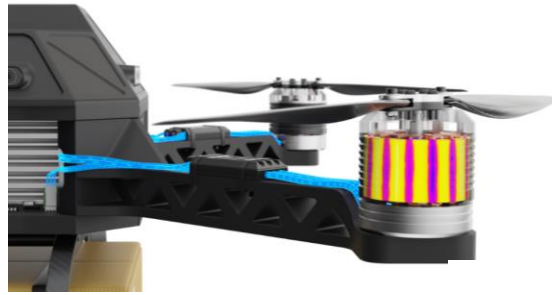
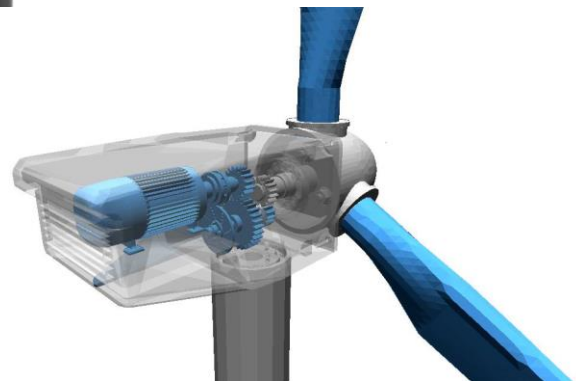
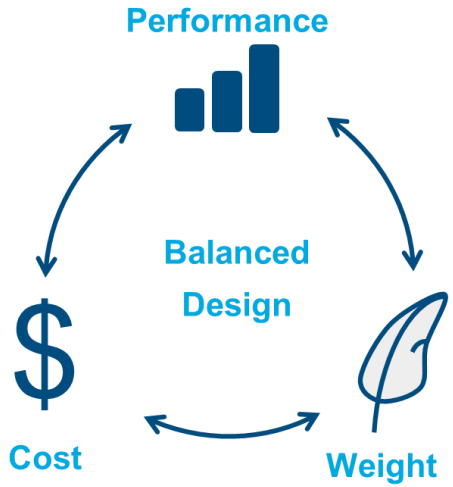
Design High Efficiency Electric Machines Faster

Helping motor designers to

- **Maximize motor efficiency** along duty cycles
- Get high **power and torque densities**
- Create **lightweight, compact** solutions
- **Lower costs** of material and manufacturing







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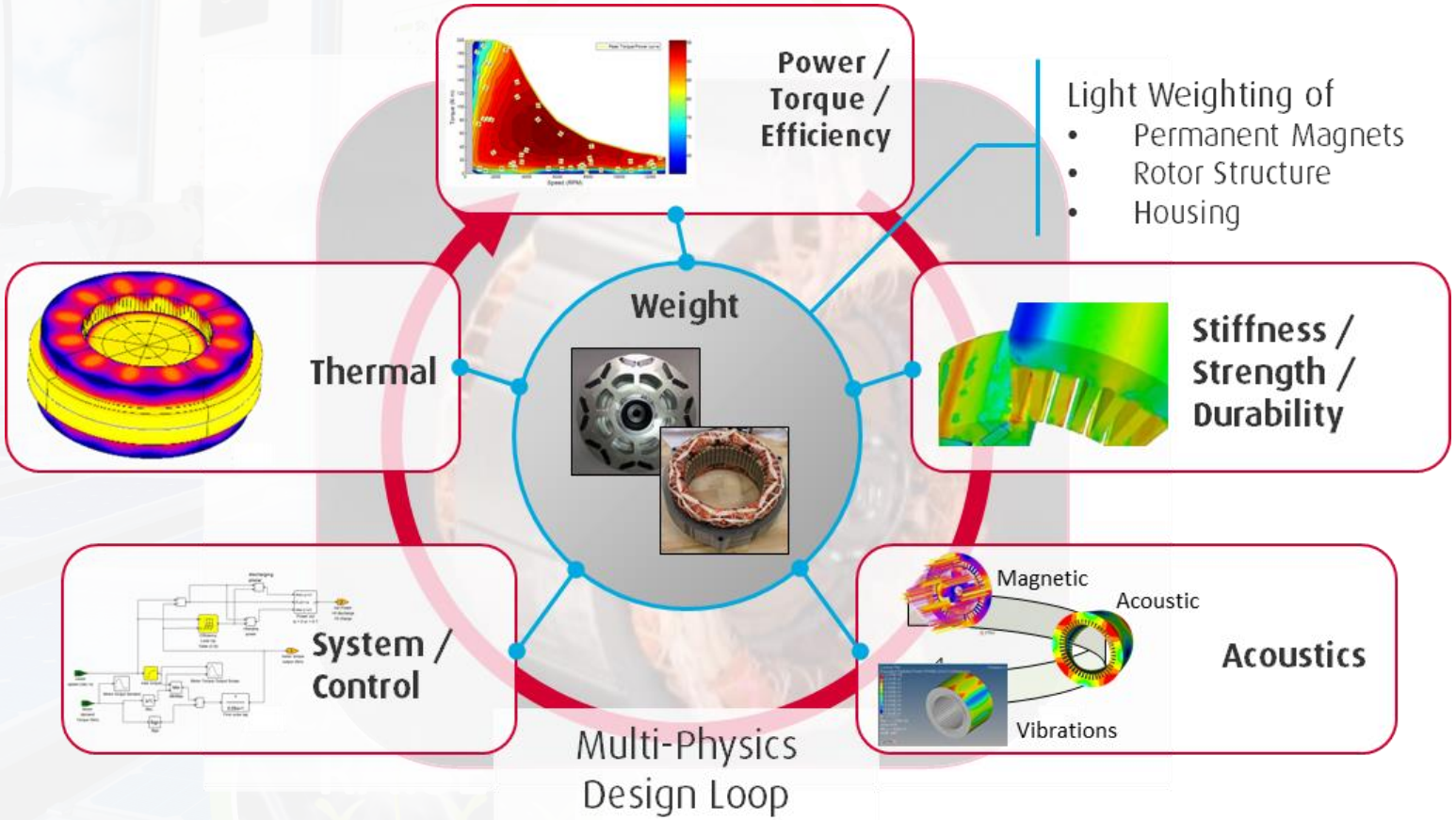
Multiphysics Optimisation of Electric Machines



Reduce the number of iterations needed to meet all constraints

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Driving Innovative E-Mobility

EVR MOTORS DEVELOPS NEW, SIMULATION-AIDED E-MOTOR TOPOLOGY

Challenge

Differentiate with a new motor topology for e-mobility applications

Solution

Accurate multiphysics simulation solution

Use of optimization

Result

Innovative solution in a short time

High-power density motor

Reduced number of prototypes

Learn more here

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ZF and Altair develop a Solution for the Optimization of modular Motor Platforms

Challenge:

Finding **optimal motor platforms.**

Using common parts

Maximizing performance of motors.

Solution:

Unique optimization platform able to account for a database of DOE data, constraints for multiple motors and options to define parts commonality constraints

Benefit:

"The ability to systematically and optimally develop modular motor platforms from the ground up allows to incorporate synergies and a common parts approach from the outset, resulting in flexible system solutions that are not simply technically advanced but also cost-effective."

Helmut Schmid, ZF, Schweinfurt, Germany

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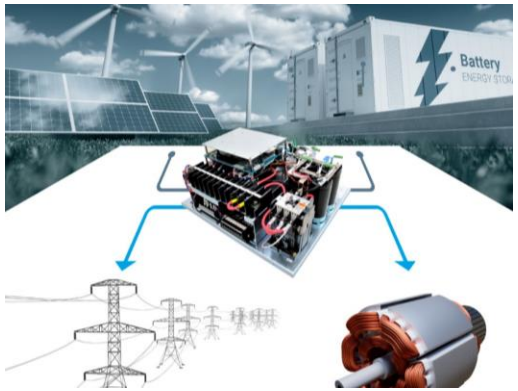
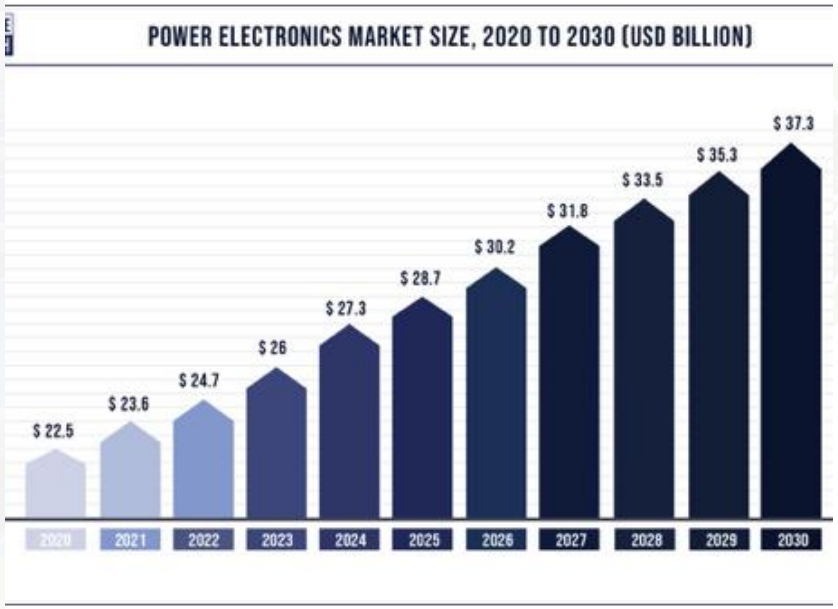
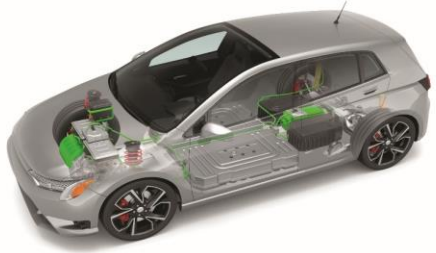
Power Electronics

A Key Enabling Technology for Electrification

- Power converters are in all industry segments
- 80% of all electricity will be handled by power electronics by 2030*
- Power electronics market size is expected to grow to $37.3Bn in 2030*







*Source: Office of Energy Efficiency & Renewable Energy (energy.gov)

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Addition of PSIM to the Altair Portfolio

Market Leader in Power Electronics

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Altair Expands Electronic System Design Technology with Acquisition of Powersim

Proven technology and experienced technical team will amplify Altair's power electronics solutions

TROY, Mich - March 3, 2022 - Altair (Nasdaq: ALTR), a global leader in computational science and artificial intelligence (AI), acquired Powersim, a market-leading provider of simulation and design tools for power electronics, including power supplies, motor drives, control systems, and microgrids. This acquisition expands Altair's electronic system design technology into the domain of power electronics.

"Powersim has established a powerful solution that has proven to reduce development costs and time-to-market for thousands of customers around the globe including major companies in the automotive, aerospace, consumer electronics, and industrial applications sectors," said James R. Scapa, founder and chief executive officer, Altair. "The addition of Powersim's technologies and experienced technical team, who has deep domain knowledge in power electronics, rounds out Altair's offerings for electric motor design and many other applications."

This acquisition includes PSIM, Powersim's flagship product for design and simulation of power

- Leading design and simulation solution, PSIM, for power electronics and motor drives
- Key industries being automotive, aerospace, energy, oil & gas, washing machines and air conditioners / HVAC
- Main applications are: electrification / motor drive development, industrial drives, and large power converters used in renewable integration and smart / micro-grid

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Key Industries & Applications

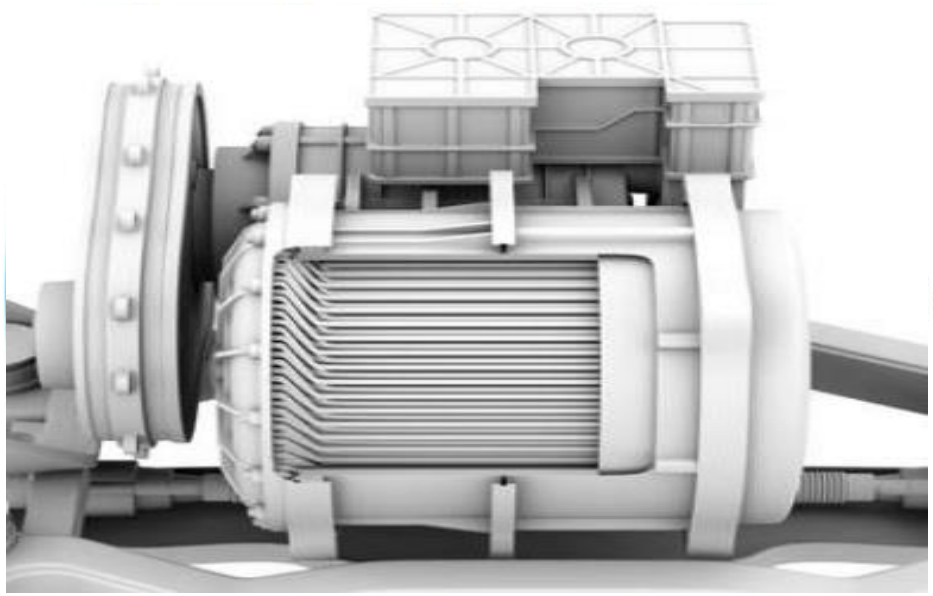
Automotive, Aerospace, Energy & Home Appliances

- Electrification/Motor drive development
- Industrial drives
- Large power converters (>3kW)
  Solar, Renewables, Smart/micro-grid

Altair Helps Optimize Power Converters & Electric Drives

High Efficiency

High Power



Silent

Compact

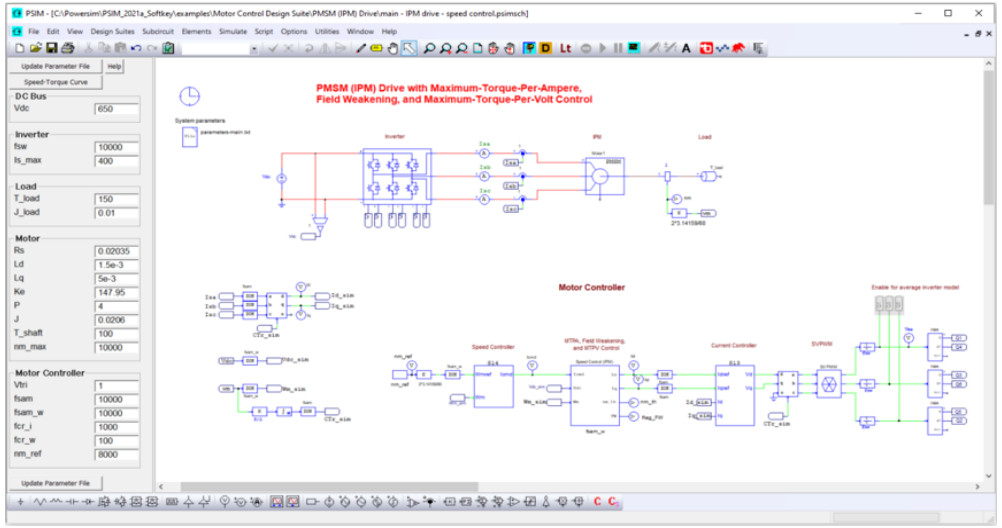
Cost Effective

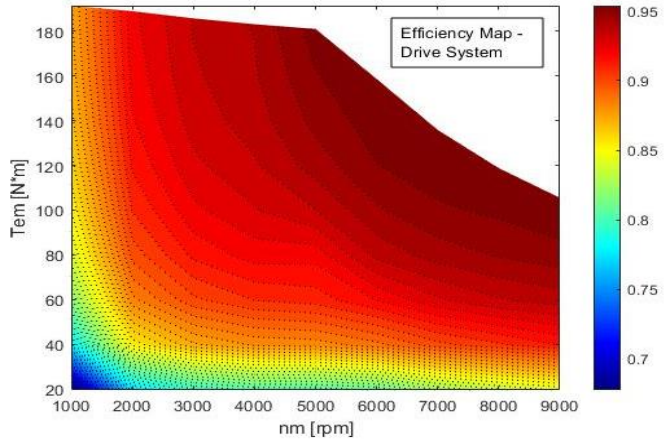
Optimized Control

Inverter Design and Motor Drive Development

Power electronics simulation with Altair PSIM

- Select optimal **converter topologies**
- Virtually test new **component technologies** (SiC/GaN)
- Tune **control strategies** for optimal power conversion
- Solve thermal and EMI issues





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PSIM is a highly valuable and unique tool.

I use it to study all aspects of a motor drive, especially how the devices interact with the motor.

Kevin Lee – Chief Engineer – Eaton, Industrial Controls Drives

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Powering Business Worldwide

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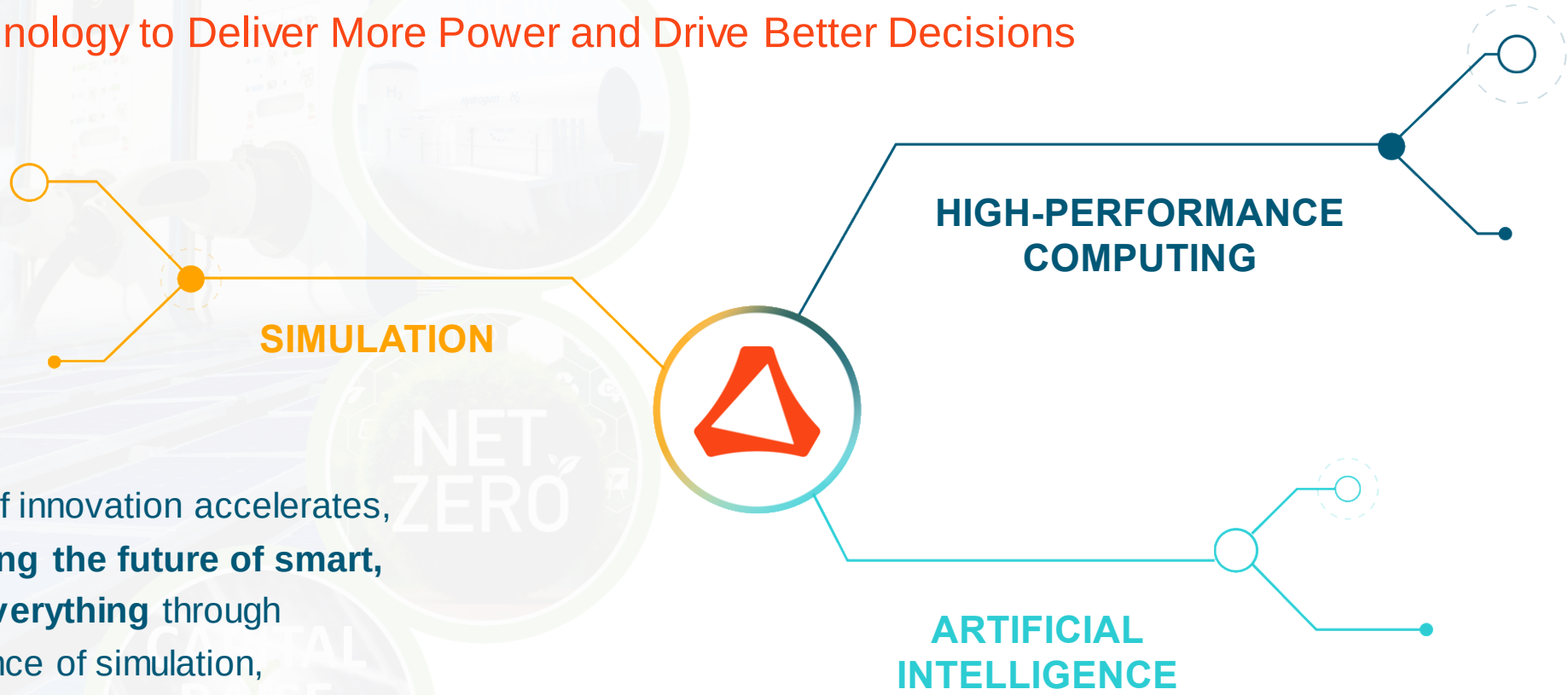
SUMMARY & OUTLOOK

Where Simulation, HPC, and AI Converge

Democratizing Technology to Deliver More Power and Drive Better Decisions



As the pace of innovation accelerates, **Altair is driving the future of smart, connected everything** through the convergence of simulation, HPC, and AI solutions.

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Thank You

Small-group presentations on our Booth **#8A, Hall 4**

- Simulation Solutions to Boost Electrification
- Projects Leading-edge Electric Motors and Drives
- Development PowerGrid Equipment Design
- Design of Power Electronics and Motor Drive Systems