VTT ProperTune®

Accelerating design of novel materials and processes

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What if…

- you could cut the development time & cost of new material solutions by 50% or more?

- your competition could do it?

- you would better understand causal relations impacting material performance?

- you could optimize performance by running fully virtual "what-if" scenarios for future applications with differing performance needs?

- you could test the durability of materials in extreme conditions by simulating hundreds of millions of computational experiments

- you could replace harmful materials without adding cost nor deteriorating performance?

- the current boundaries in material development are already history?

VTT ProperTune® is Multiscale and Multiphysical

VTT ProperTune is a toolset, a collection of software libraries and tools for solving multiscale materials and multiphysical modeling problems. It enables one to <u>efficiently and rapidly set up novel modeling workflows and solvers</u> to address materials modeling and simulation challenges.
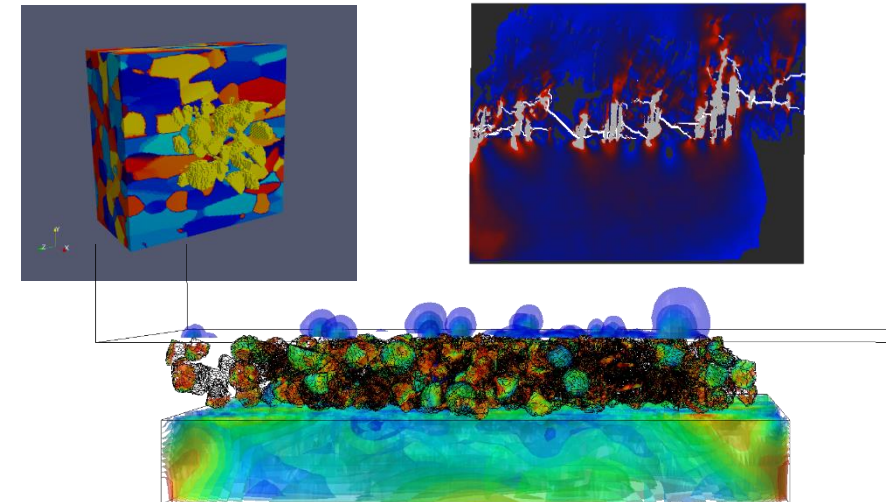
MULTISCALE

MULTIPHYSICAL

Couplings, concurrencies, interfaces and data across scales and physics
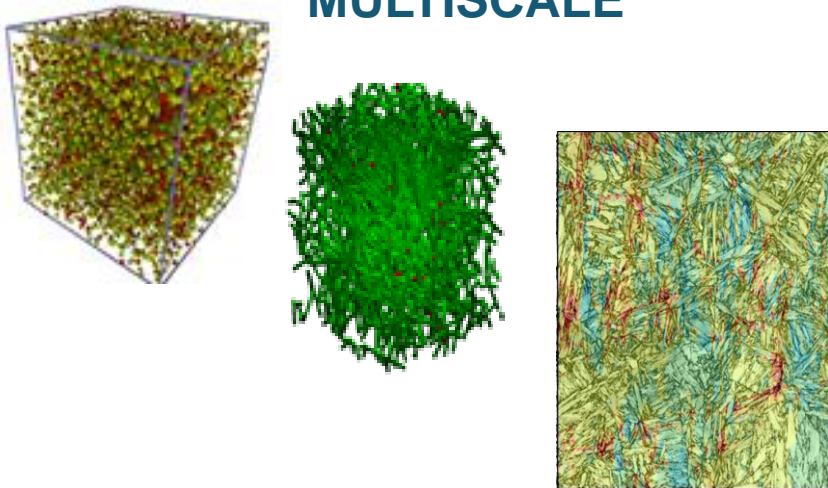
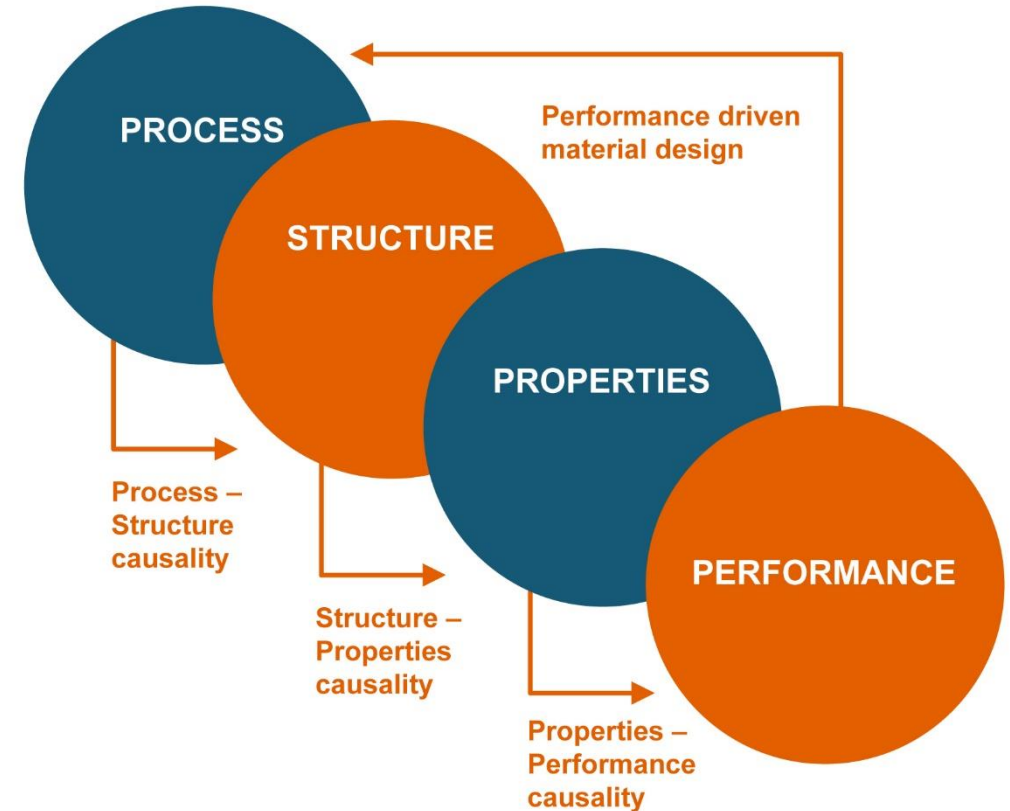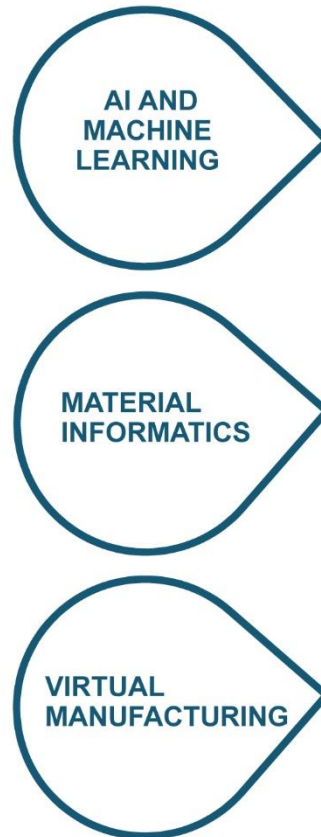From atomistic to microstructural and to product performance and lifetime

Material properties, manufacturing processes, solidification processes, damage and failure, thermodynamics and kinetics, chemical reactivity, electrochemistry, transport phenomena, electromagnetism, dynamics, process models, ….

VTT ProperTune®
Performance driven material design

**VTT ProperTune®
optimises material
design, replacing
expensive, time
consuming testing
and shortening time-
to-market for new
products by an
average of 50%.**

AI AND MACHINE LEARNING

MATERIAL INFORMATICS

VIRTUAL MANUFACTURING

PROCESS

STRUCTURE

PROPERTIES

PERFORMANCE

Performance driven material design

Process – Structure causality

Structure – Properties causality

Properties – Performance causality

VTT ProperTune® reference cases

Use case type: Optimize a material solution (microstructure)

- Optimization of protective composite coatings

Outcome: performance +40%, TTM -60%, what-if-capability

Use case type: New steel grade design

- Discovery and design of new high performance steel grade

Outcome: durability +200-250% , TTM & R&D cost -50%, material & mfg cost: unchanged

Use case type: New material discovery for extreme conditions

- Novel materials for the first wall of fusion reactors

ARPA-E (Advanced Research Projects Agency – Energy) research program (press release)

VTT ProperTune® has been developed together with our industrial partners and applied to their materials and products.

Useful links for more information

- **Computational material design –VTT ProperTune®**

- **Virtual materials design – a new source of competitiveness**

- **Revolutionary soft materials with VTT ProperTune®**

- **How does computational material design support the maintenance business?**

- **Finnish VTT in historic collaboration with US entities – commercial fusion energy closer than ever**

- **Scientific articles on VTT ProperTune®**

- **VTT Technical Research Centre of Finland**