FF4EuroHPC Success Story

Accessible Acoustic Simulation Platform to Create Better Sound Experiences

Organizations

Trivium is an Icelandic acoustic consultancy SME focusing on acoustic simulation-aided design for buildings, noise mapping, and room acoustic measurements.

Treble Technologies is an Icelandic start-up that develops acoustic simulation software. Treble is an industrial cooperation partner of the Icelandic NCC.

DTU Compute - of the Technical University of Denmark - is a leading institute in HPC and simulation methods.

End User

Domain Expert

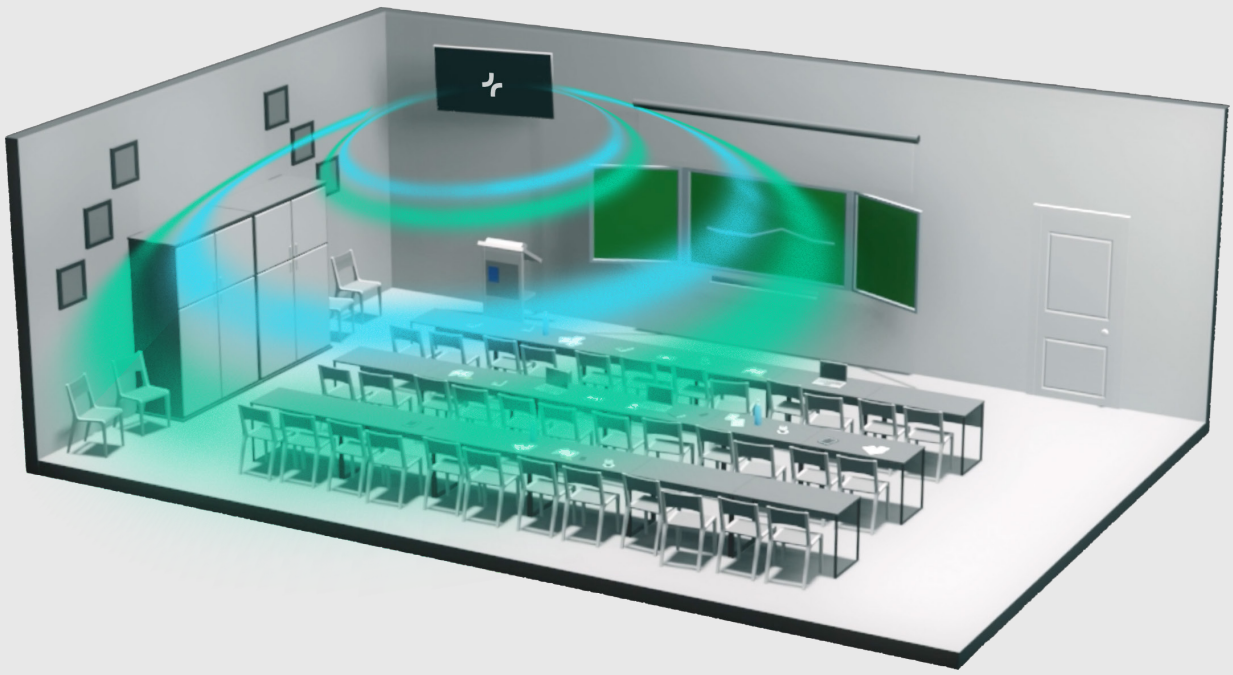
HPC Provider

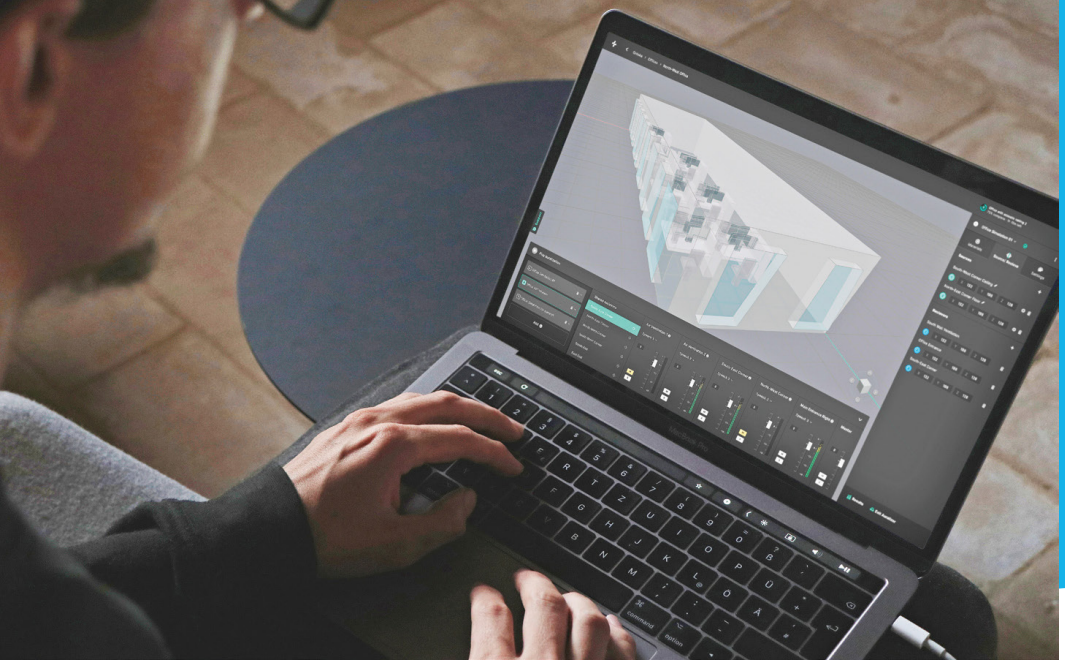
DTU Compute is a part of the Danish NCC.

The Challenge

Most room acoustic simulation tools are based on simplifying approximations. These can be acceptable for large rooms. But for small ones, this leads to more design iterations, overuse of expensive acoustic treatments, and frustrated customers.

For better results, one needs to simulate the acoustics by solving the true wave equation. This is possible with the Finite element method (FEM) but has not been feasible due to long simulation times.





Industry Sector
Civil Engineering

Technology used:
FEM Simulations

The Solution

The solution developed uses advanced FEM algorithms well suited for HPC and multi-GPUs. The tool gives Trivium cloud access to fast and accurate wave-based sound simulations from a web browser, with an optimised workflow, easy-to-use interface, and connections to leading 3D modelling tools. With HPC, the simulation time can be reduced to minutes - hours instead of days - weeks, facilitating the possibility of iterative designs and bulk simulations.

The Impact

The improved accuracy will give Trivium an advantage when it comes to fast and accurate acoustic designs, fewer design iterations, and better results for the customer. The modern user interface and workflow contribute to reducing the time required to finish a project by 30% compared to previously available solutions.

The results viewer and auralizer (a feature to realistically listen to simulations) were optimised during the experiment to best fit the needs of Trivium. These parts of the tool contributed significantly to the time reduction of a project since a large amount of time often goes into collecting and presenting results to the customer in a clear way.

The experiment also resulted in new know-how on the acoustic treatment of low-frequency noise. This part of audible noise is very important in all acoustical designs as it can be extremely disturbing. The tool leads to better-informed decisions when tackling the problem of low-frequency noise, which is estimated to improve customer satisfaction by 50% since low-frequency disturbance is the most common customer complaint.

Benefits

- The improved workflow will boost the productivity of Trivium for each employee by an estimated 25-50%.
- The software is estimated to increase Trivium's turnover by up to €15,000 per worker per year.
- The software can lead to time savings of up to 30% due to improved workflow and immediate feedback.
- The projected revenue for Treble Technologies from software sales exceeds €1M for 2024.