

Democratization and Knowledge Management of a Simulation based Design Process using core tenets of SPDM and Analytics

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**ABSTRACT**

A plethora of factors like complexity of building designs, reduction in time from design to completion, constraints imposed due to energy management and sustainability, lead companies to adopt simulation based design as a cornerstone of their design development process. As simulation and modeling capability matures, the impact of simulation is felt across the lifecycle of designing from early stage conceptualization to smart buildings.

Adoption of simulation further leads to a more holistic design approach where architects, designers, structural simulation engineers and energy simulation engineers are all involved in the decision-making process using simulation as a backbone.

This presents a challenge of enabling effective use of simulation based design tools, simulation data and analytical decision-making methods such as optimization and machine learning to various stakeholders in the design development cycle.

In this workshop we explore the use of a web-based collaboration and simulation data management platform to democratize virtual design development workflows. We explore the ability of such a platform to enable decision making by using mathematical optimization and analytical decision-making techniques based on mathematical modeling and AI. The platform also enables traceability and knowledge management of design decisions, supporting models and workflows in an intuitive web-based interface.

The workshop further explores an easy no code way of creating a web app to democratize your simulation models for access and execution through a light front end web app.

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The process begins with creating an automated process of your simulation models either by integrating a Grasshopper Script in our platform or individual simulation tools for energy modelling like EnergyPlus or commercial codes like EDSLtas.

These workflows can then be published on a web based SPDM platform to enable versioning, data management and democratized execution. The execution enables users to run and compare various single runs, but also enables mathematical design exploration techniques like design of experiments and optimization to be applied.

These exploration techniques are augmented with statistical data analytical methods. Such methods enable the user to apply objective decision-making techniques on generated data and also share the same with collaborators and decision makers.

The web-based platform enables democratization of complex simulation processes and the tenets of SPDM framework enable knowledge management over the lifecycle of the simulation and optimization.

The final step would entail developing a web app through a no code environment allowing designers to self-generate a quick app which can be published for access by other collaborators.

### **What would you learn?**

This 3 hour workshop is designed for designers, architects, building physics engineers and energy modelers. The participants will walk away from the workshop with a clear understanding of how Simulation Data Management, Collaboration and Democratization would help them generate more value from their simulation based design process.