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ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS
ONLINE TRAINING BY KRISHNAJI PAWAR
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MODULE 7

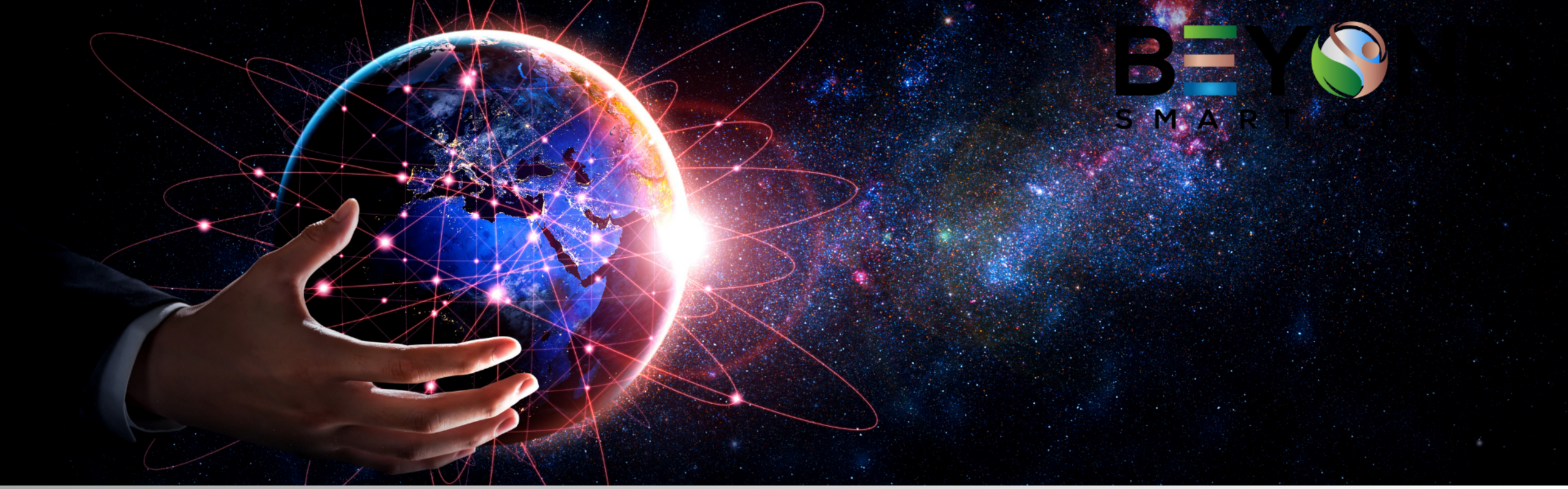
How can results from UBEM be calibrated?

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FUNDAMENTALS OF URBAN BUILDING ENERGY MODELING OVERVIEW

UBEMs depend on building operations and physical factors. However, access to such data is often limited, and existing generalization approaches from discrete data sources increase model uncertainty. Model characteristics like occupancy profiles are inherently unknown, therefore no model can properly reflect their time fluctuations.

Learning Objectives

- Introduction
- How can results from UBEM be calibrated?
- How do you collect and use local weather data for UBEM?
- What's new in the field of UBEM
- How can results from UBEM be calibrated?
- What are some examples of applications of UBEM?
- Summary and Resources
- UBEM Quiz_Test Your Knowledge!

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INTRODUCTION

- The approach to calibrating and refining the model varies in existing research, but two common methods can be distinguished. An iterative process of adjusting the model parameters and comparing the results with energy use data is commonly used in many studies.
- Due to the simplicity of the method and its flexibility in adapting data with various spatial and temporal resolutions, it seems like a straightforward approach to use.
- The second approach applies statistical methods, in particular Bayesian statistics and Bayes' theorem, to predict the uncertain parameters and calibrate the model appropriately.
- Nevertheless, model calibration methods do not suffice for reflecting on the overall accuracy of an UBEM. In this respect, validation of the model against actual energy use data seems to be the only way to confirm the result of the model.

HOW CAN RESULTS FROM UBEM BE CALIBRATED?

- Extensive energy modeling requires the use of numerous assumptions and default data, as information regarding individual structures in cities is generally scarce and not publicly accessible.
- For specific structures, there are well-established manual and automated model calibration procedures.
- While it is possible to utilize the automated calibration methods to calibrate the UBEM directly, doing so will necessitate a greater number of simulations in proportion to the number of structures.
- The results of numerous simulations performed to calibrate certain buildings in the UBEM could potentially be utilized to accelerate the calibration process for other buildings.



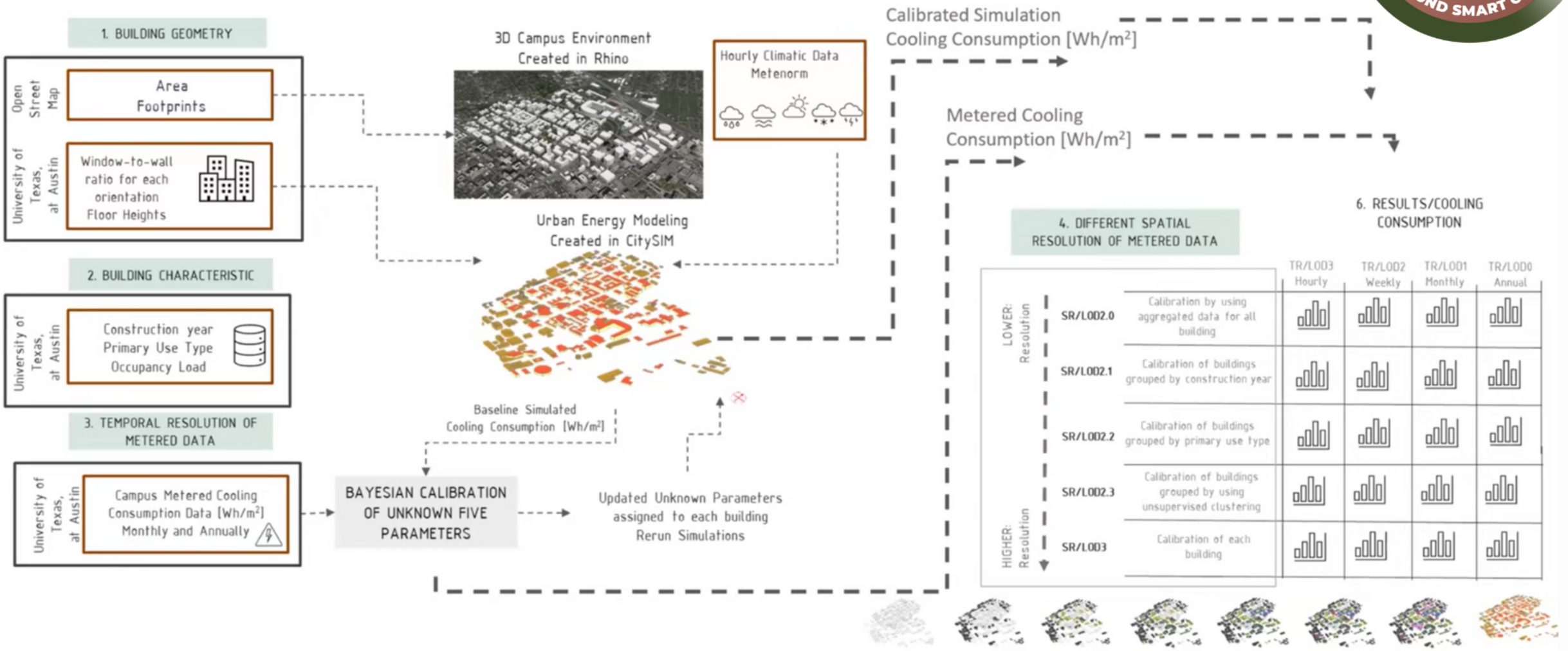
HOW CAN RESULTS FROM UBEM BE CALIBRATED?

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- The existing body of research on UBEM calibration is limited.
- Sokol, Cerezo Davila, and Reinhart, 2017) introduced a technique for defining unknown or ambiguous parameters in an archetype as probability distributions and calibrating those distributions using Bayesian calibration and measured energy data.
- In order to generate polynomial regression models for individual buildings using the coarse grid parametric results obtained from EnergyPlus, a meta-modeling procedure was devised.
- The simulation results can be substantially impacted not only by the behavior of individual buildings, but also by the behavior of a cluster of buildings within an urban district.



Bayesian Calibration



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