

Under Uncertainty

Umberto Alibrandi & Khalid M. Mosalam

Scope and Methodology

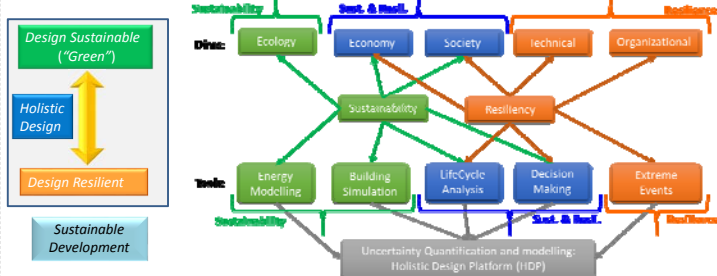
- Development of a multi-disciplinary risk-based integrated framework for sustainable and resilient urban communities: *Holistic Design Platform (HDP) under uncertainty*, including *human systems, energy systems, environmental systems and urban systems*.



The whole is not the sum of the parts

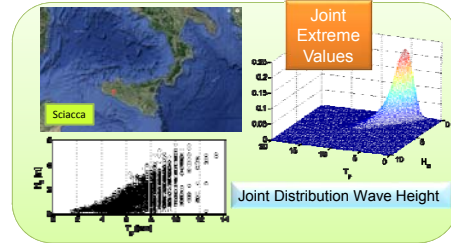
To guarantee the societal well-being of the urban communities and the social institutions, the built environment should be:

- > **Sustainable** to provide inter- and intra-generational fairness;
- > **Resilient** to the disruptions induced by the extreme events.

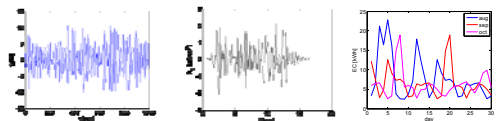


1. Uncertainty Quantification

U. Alibrandi & K.M. Mosalam. The Kernel Density Maximum Entropy with Generalized moments applied to Seismic Fragilities, *International Journal for Numerical Methods in Engineering* (under review)



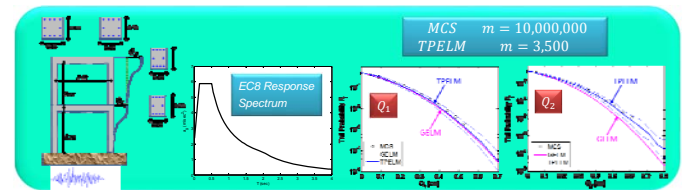
- Earthquake
- Wind
- Flood
- Haze
- Human Hazard
- Temperature
- Solar Radiation
- Human Occupancy
- Energy Consumption
-



Modelling of Stochastic Processes and Random Fields

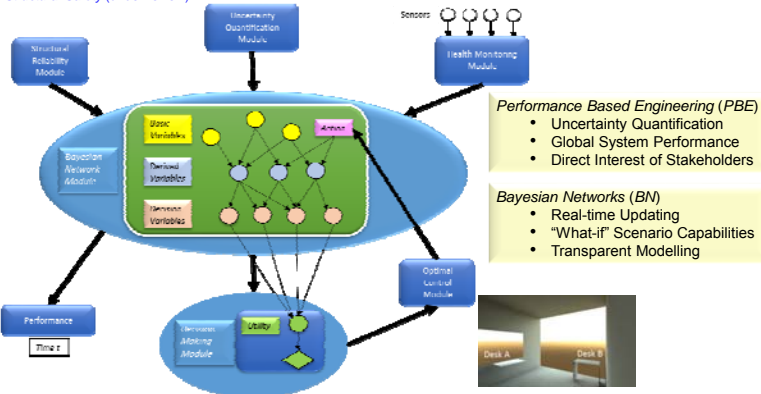
2. Structural Reliability – Extreme Events

U. Alibrandi & K.M. Mosalam (2017). Equivalent Linearization Methods for Stochastic Dynamic Analysis using Linear Response Surfaces, *Journal of Engineering Mechanics*



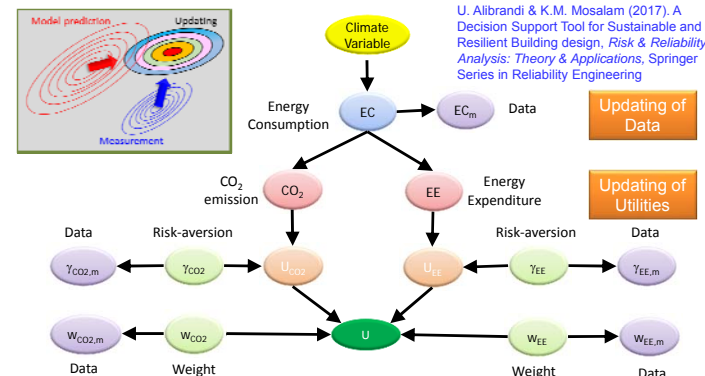
Holistic Design Platform (HDP) Under Uncertainty

K. M. Mosalam, U. Alibrandi, H. Lee & J. Armengou 2017. Performance-based Engineering Approach for Holistic Building Design *Structural Safety* (under review)



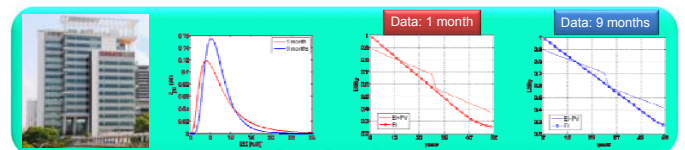
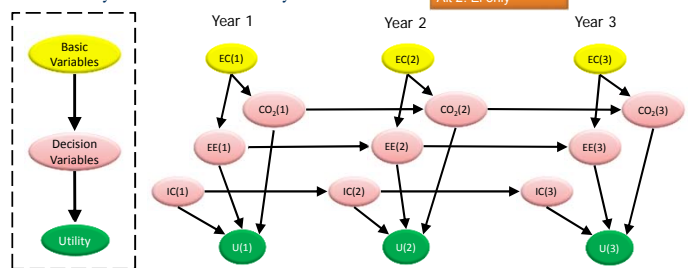
3. Decision Making with Bayesian Updating

U. Alibrandi & K.M. Mosalam (2017). A Decision Support Tool for Sustainable and Resilient Building design, *Risk & Reliability Analysis: Theory & Applications*, Springer Series in Reliability Engineering



4. Lifecycle Holistic Analysis

Alt 1: EI + PV panels
Alt 2: EI only



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