



## The role of global sensitivity analysis in simulation modelling

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Thursday, 23<sup>rd</sup> February 2017  
12:30pm Room 3-E4-SR03 Via Röntgen 1 Milano

### Abstract

Mathematical modellers and regulatory agencies worldwide share the belief that sensitivity analysis is a key ingredient of the quality of a model-based study. According to the European Commission "[...] sensitivity analysis can be used to explore how the impacts of the options you are analysing would change in response to variations in key parameters and how they interact". The term interaction is also used in the guidelines for modellers of the US environmental Protection Agency: "Sensitivity analysis methods should preferably be able to deal with a model regardless to assumptions about a model's linearity and additivity, consider interaction effects among input uncertainties [...], and evaluate the effect of an input while all the other inputs are allowed to vary as well.

In spite of this call for the use of global tools for sensitivity analysis, plenty of cases are found in the literature where local sensitivity analysis is employed. In local analyses factors' importance is investigated by derivative of the output with respect to that input; such derivatives are informative only at the base point where they are computed, but do not provide for an exploration of the rest of the space of the input factors unless some conditions are met in the mathematical formulation under analysis.

In this talk we will illustrate the properties of global sensitivity analysis approaches and will discuss variance-based methods, among the best practices available today.