# ME 597 – Introduction to Uncertainty Quantification

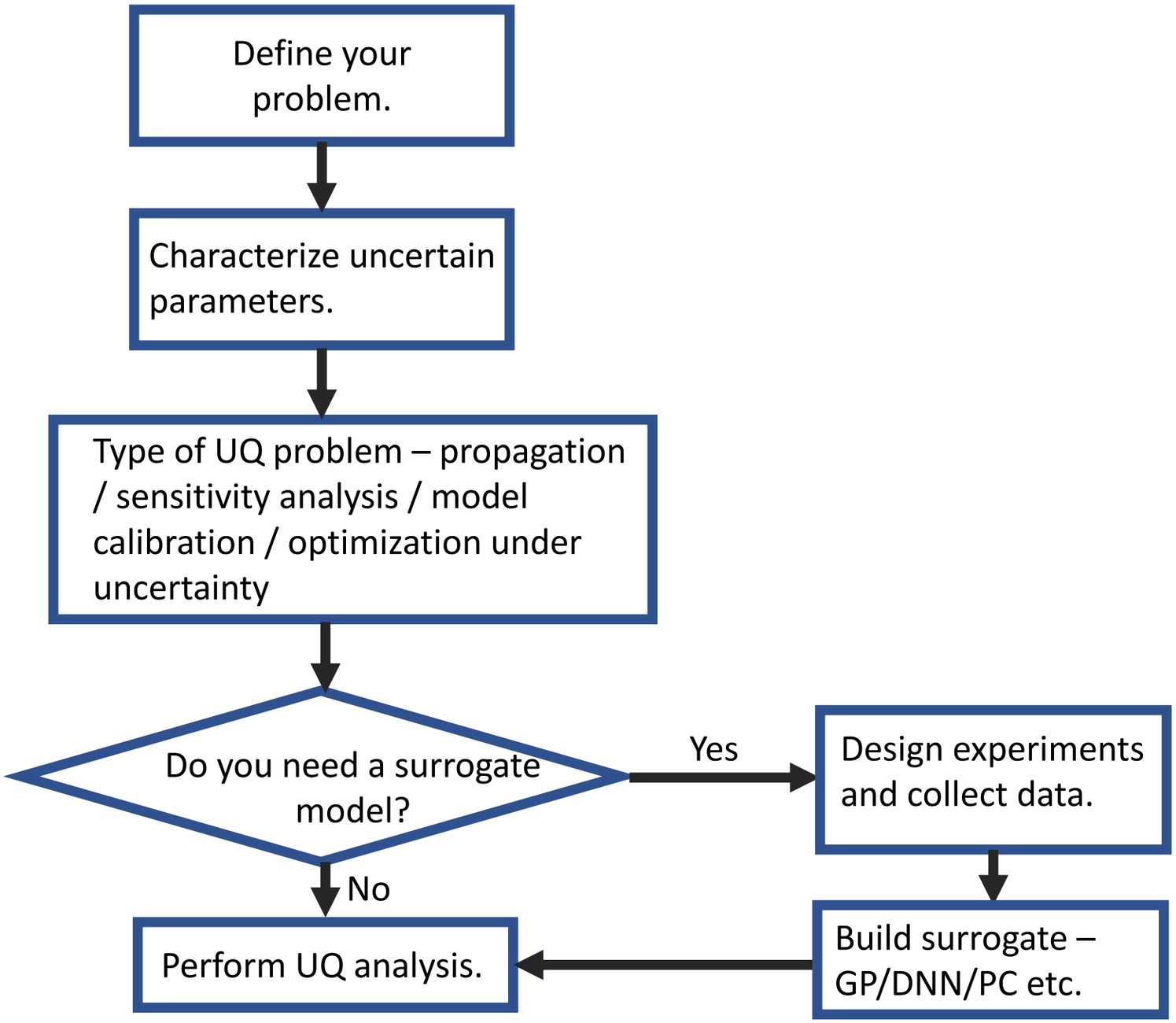
## Project Write-up

**Due: 5/4/2018 (May 5th 2018, 11:59pm)**

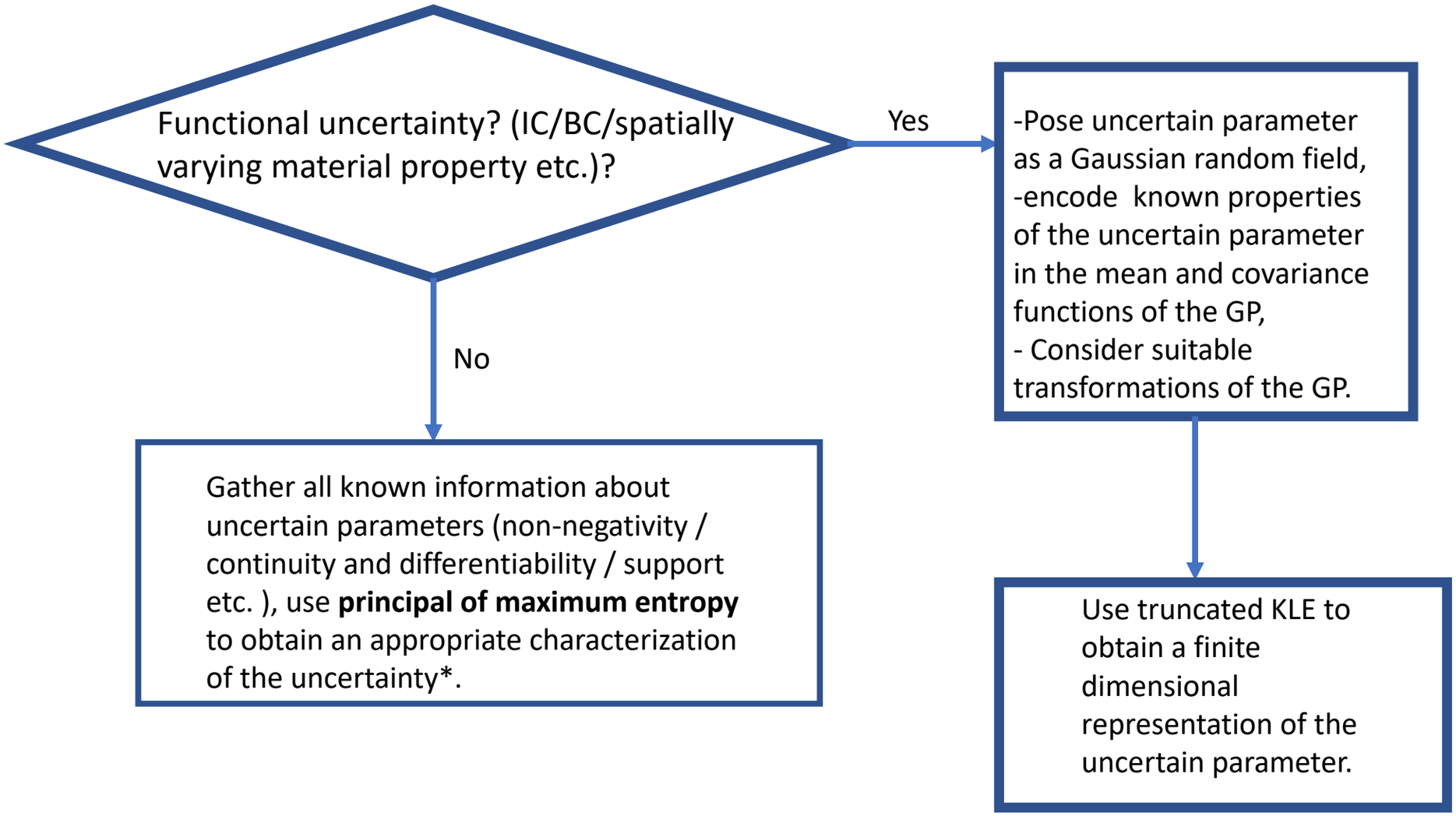
Submit on gradescope, a write-up for your project. The write-up should be, ideally, related to your research topic. Describe the importance of the problem you are dealing with, the sources of uncertainty in the problem and the category of uncertainty quantification (UQ) tasks your problem fits into – uncertainty propagation, optimization under uncertainty, model calibration. You may wish to revisit your abstract, modify it and/or reuse it for this part. If you are unable to figure out an appropriate category, consider simplifying your problem. Finally, describe your approach toward solving the problem.

As a guide you may refer to the flowcharts provided in proceeding slides. Please limit your submission to 2 pages (not counting references). Note that you are not expected to provide any results. However, if you do wish to do so, please limit your entire submission to 4 pages. Use the standard settings of word, but **with double spacing between the lines**.

# General workflow for UQ analysis

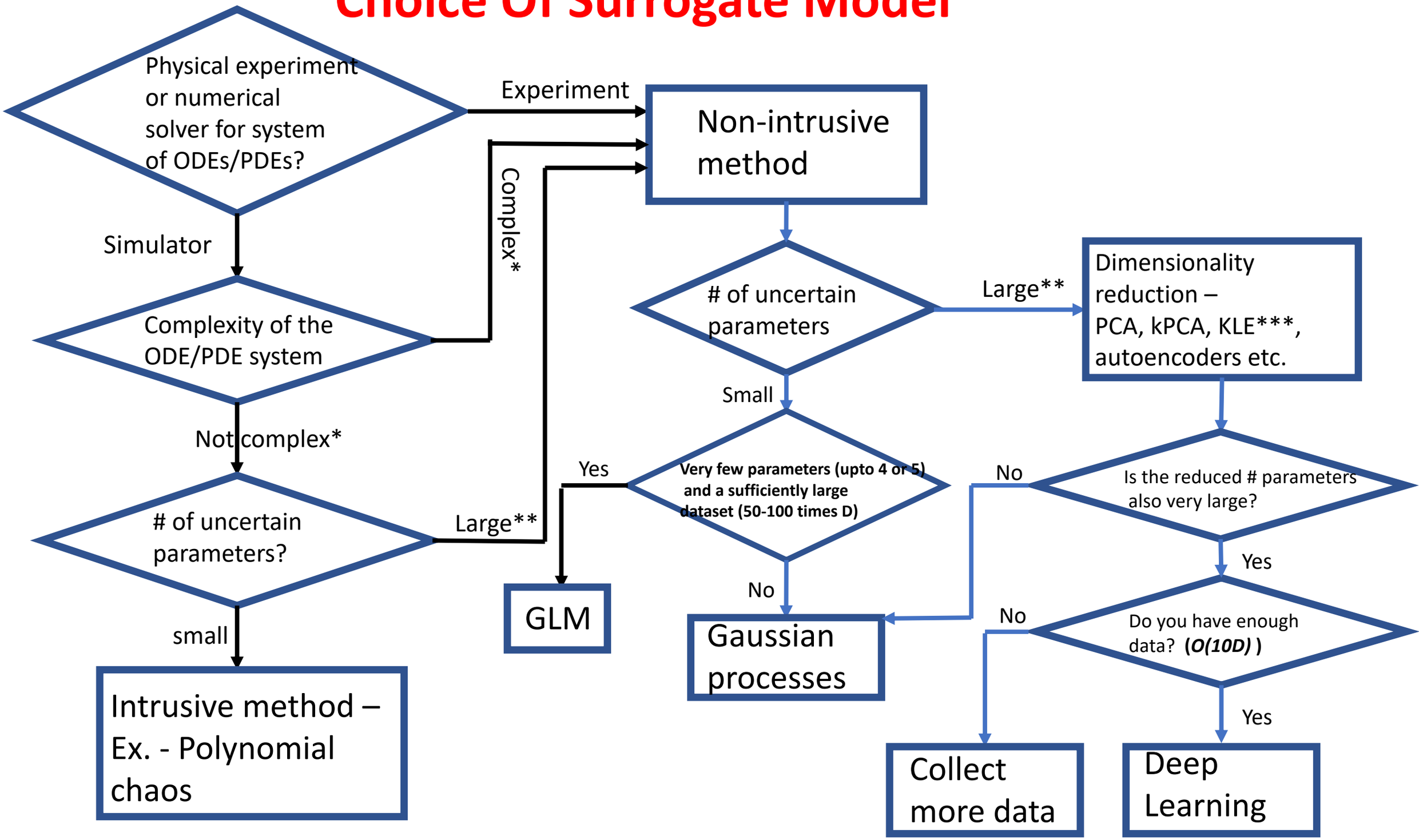


# Characterizing uncertainties




*** This Wikipedia page lists several common maximum entropy distributions corresponding to constraints on the parameters. In most cases, you ought to be able to find a suitable distribution for the uncertainties in your problem simply by looking up this page.**

# Choice Of Surrogate Model

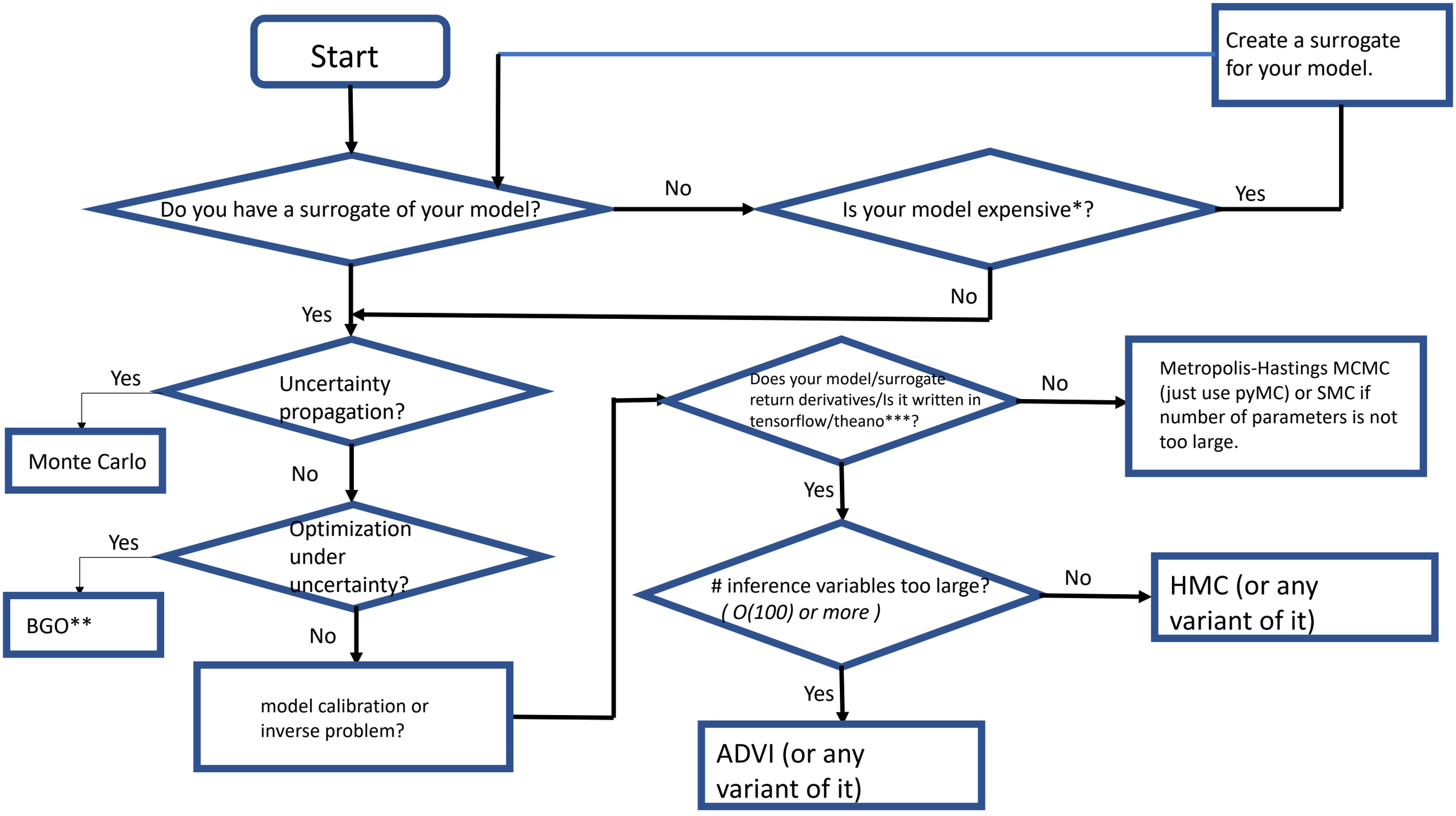



***A "complex" system would be something like the coupled mass, momentum and energy equations governing fluid flow and heat transfer. On the other hand, a system of 1st order ODEs such as the governing equations for a linear dynamical system, is considerably simpler.**

**** This is highly subjective. You need to think about this on a case-by-case basis.**

*****If uncertain parameter is a Gaussian random field.**

# UQ analysis




***"expensive" in terms of time and/or money to acquire information from the underlying model.**

**** Bayesian global optimization.**

***** Advanced inference algorithms require the gradient of the posterior which would require gradient of the model / surrogate.**