Probabilistic Analysis of Power and Temperature Under Process Variation

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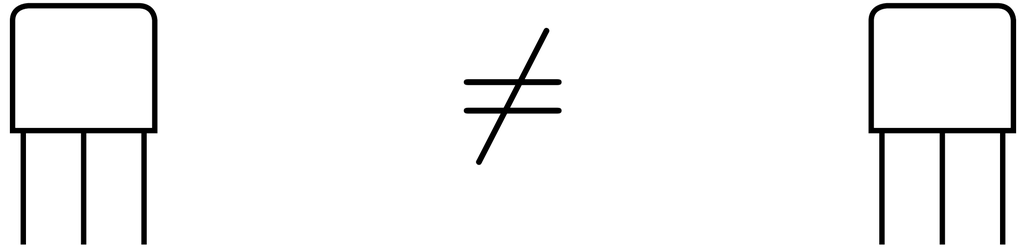
March 2015

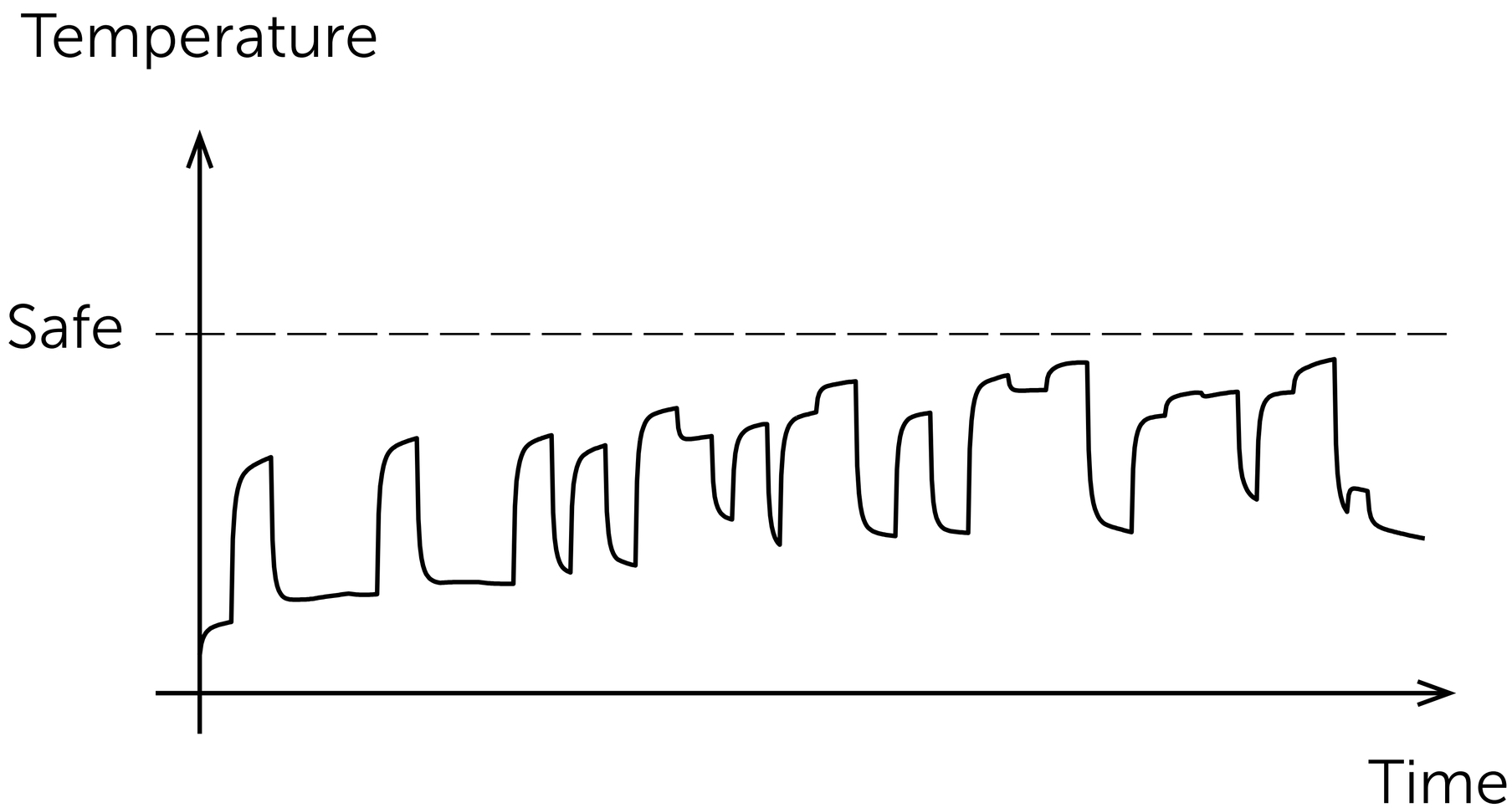
Overview

* Process variation
* Uncertainty quantification

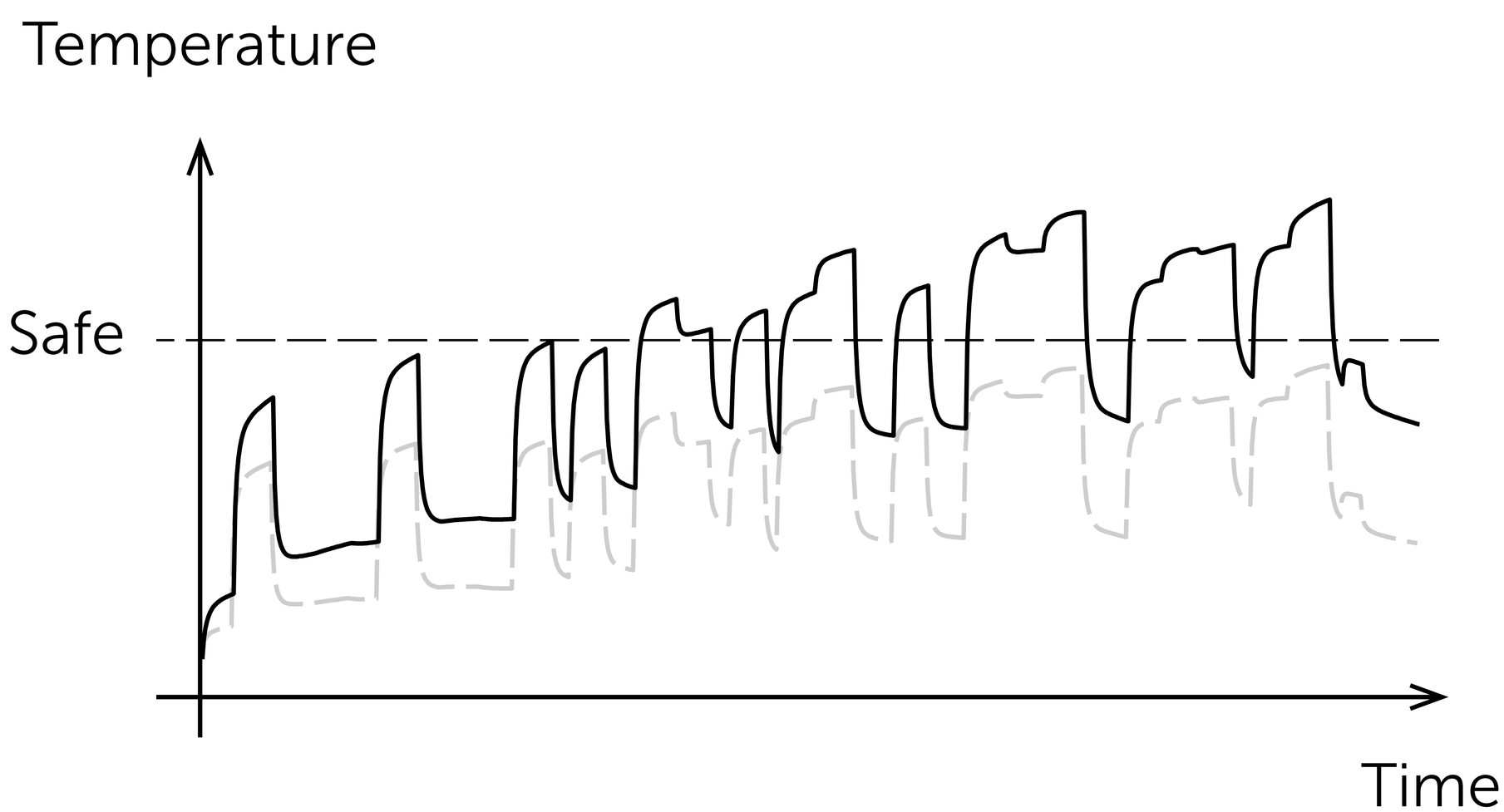
Process Variation



Process Variation



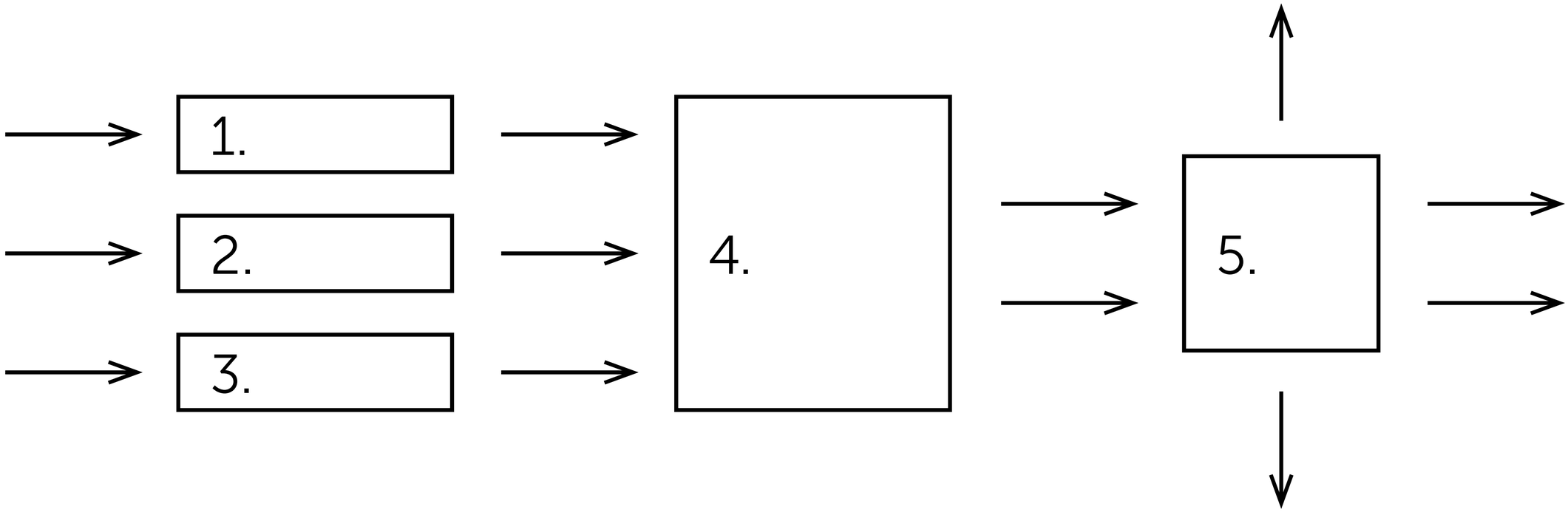
Process Variation



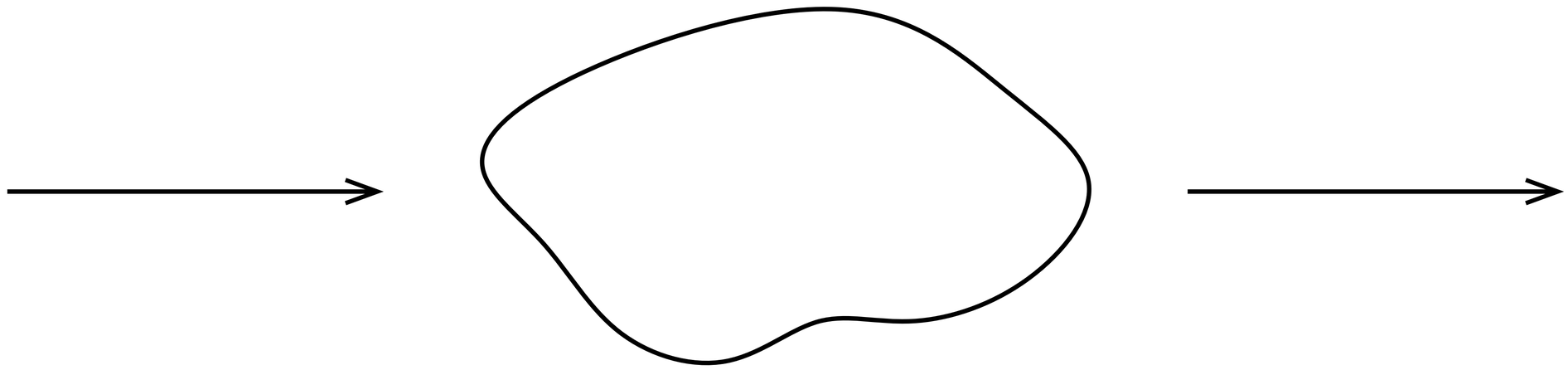
Goal

* Power-temperature analysis considering process variation

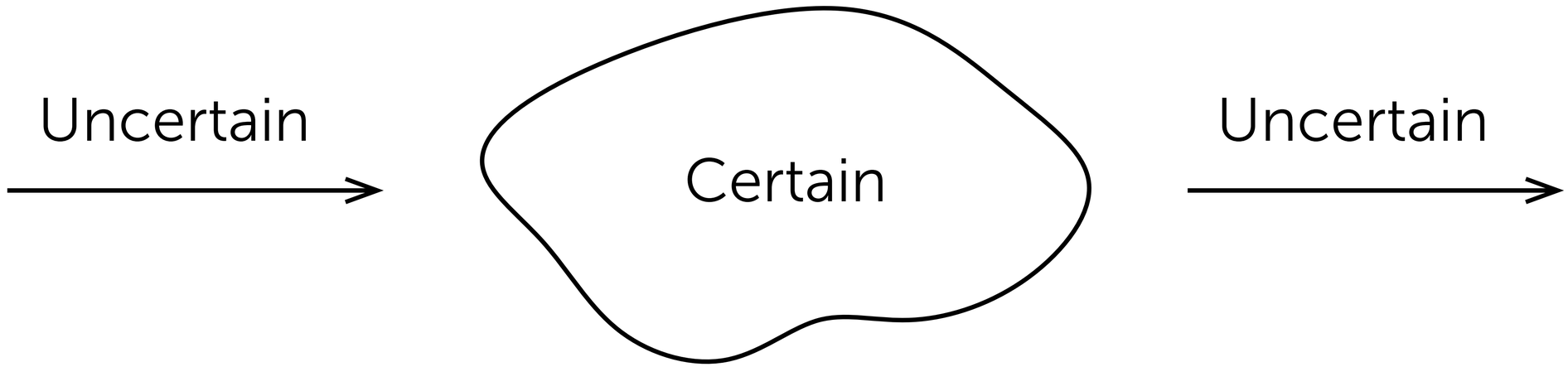
Proposed Framework



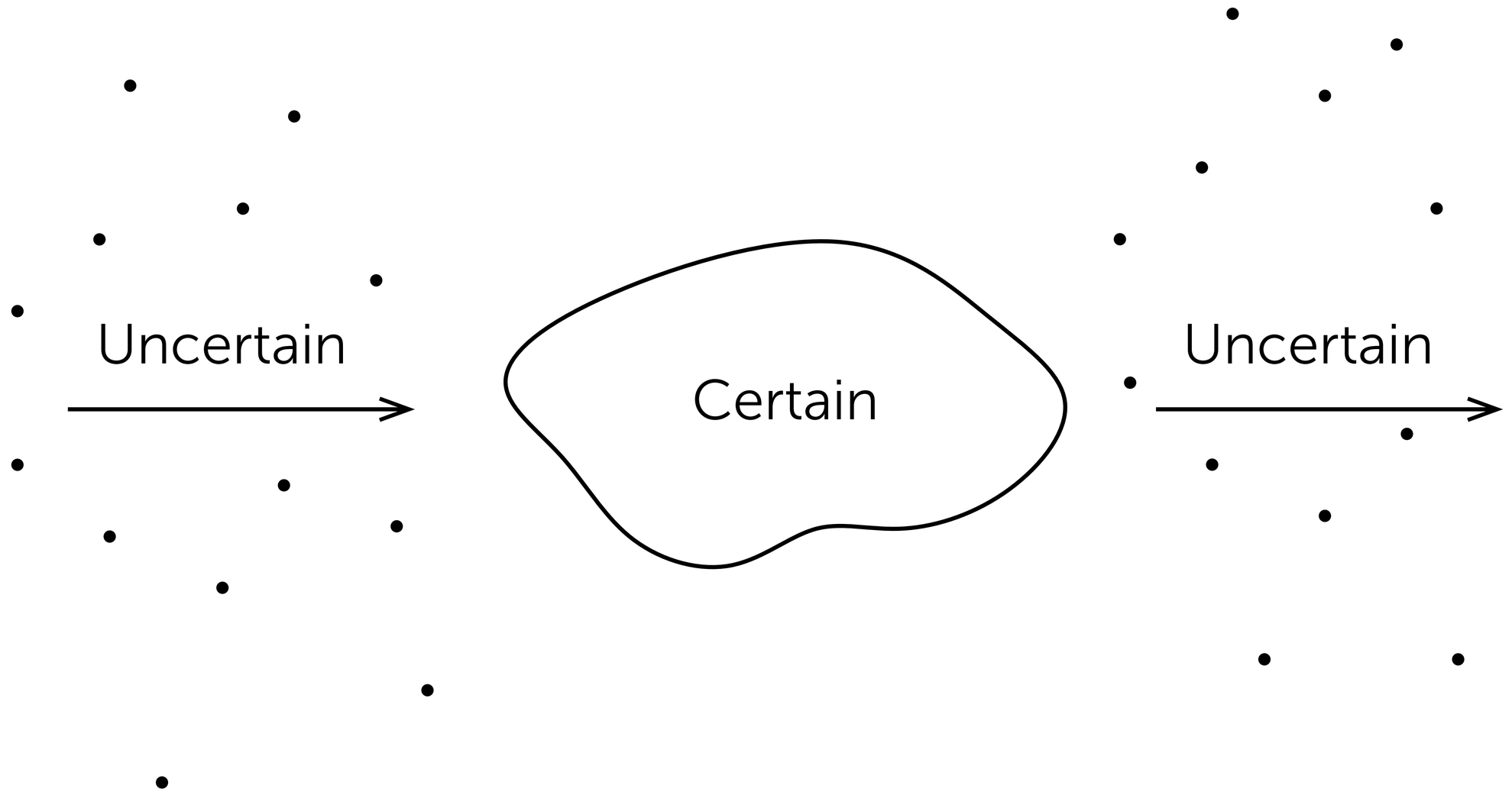
Uncertainty Quantification



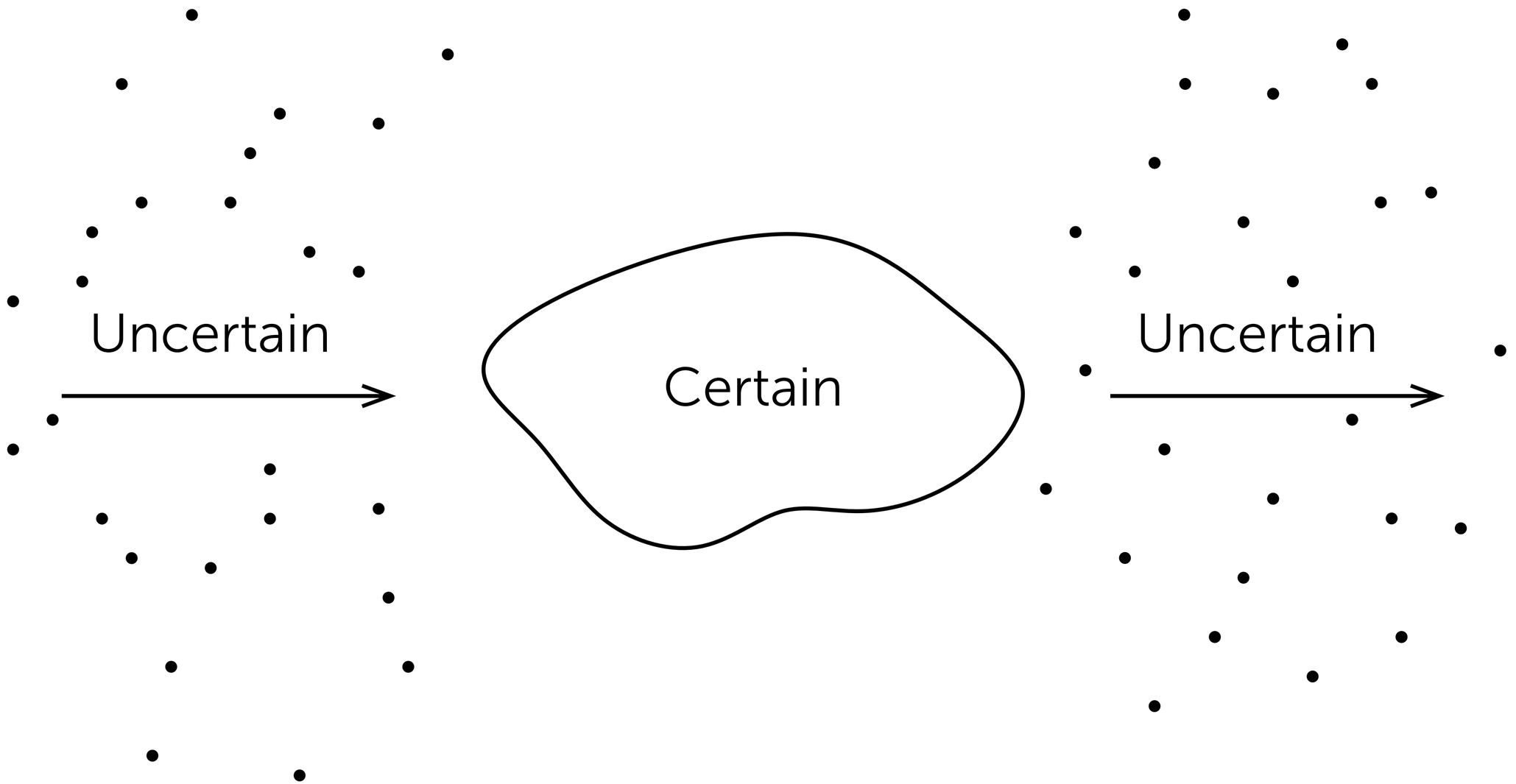
Uncertainty Quantification



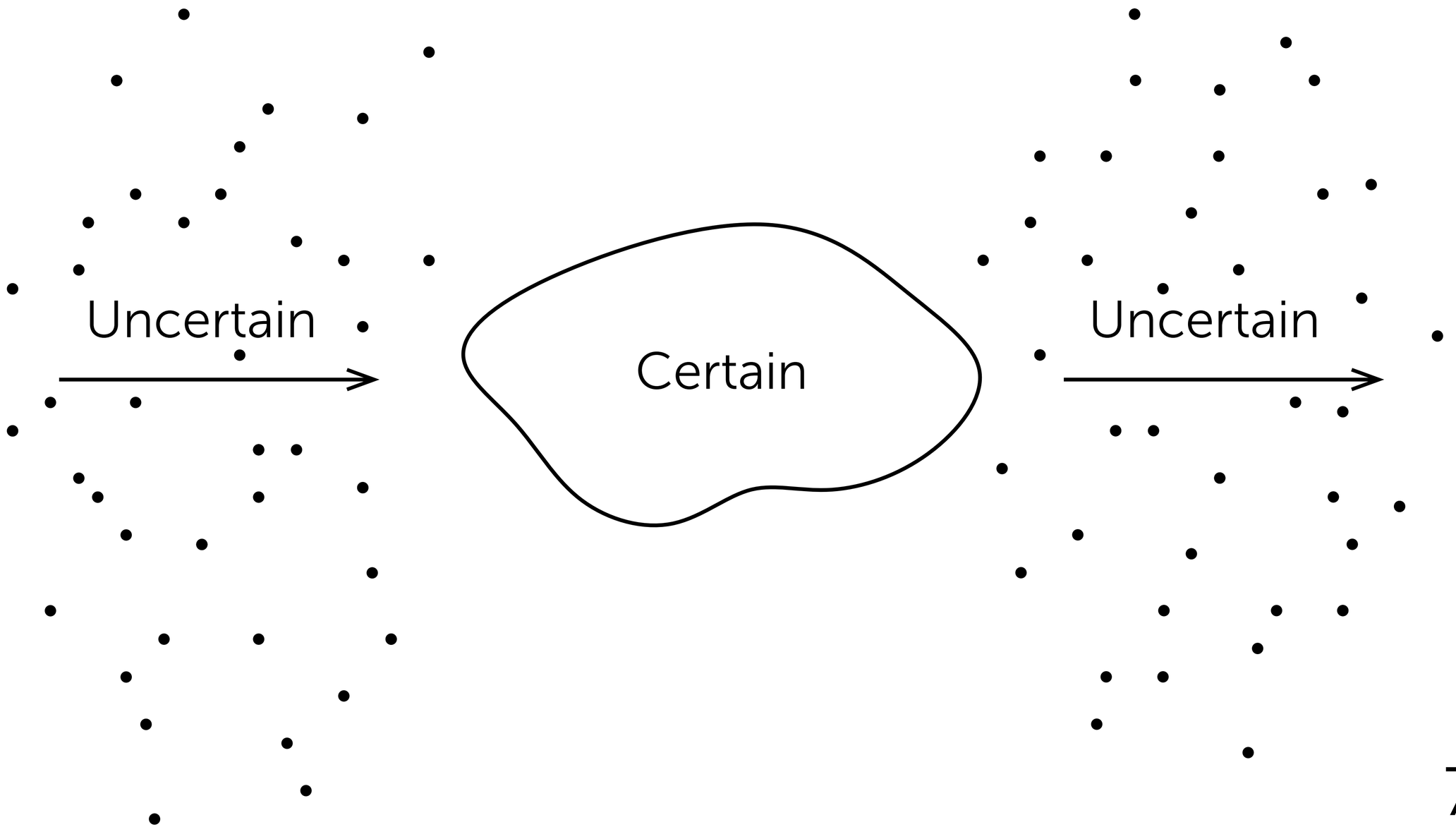
Monte Carlo



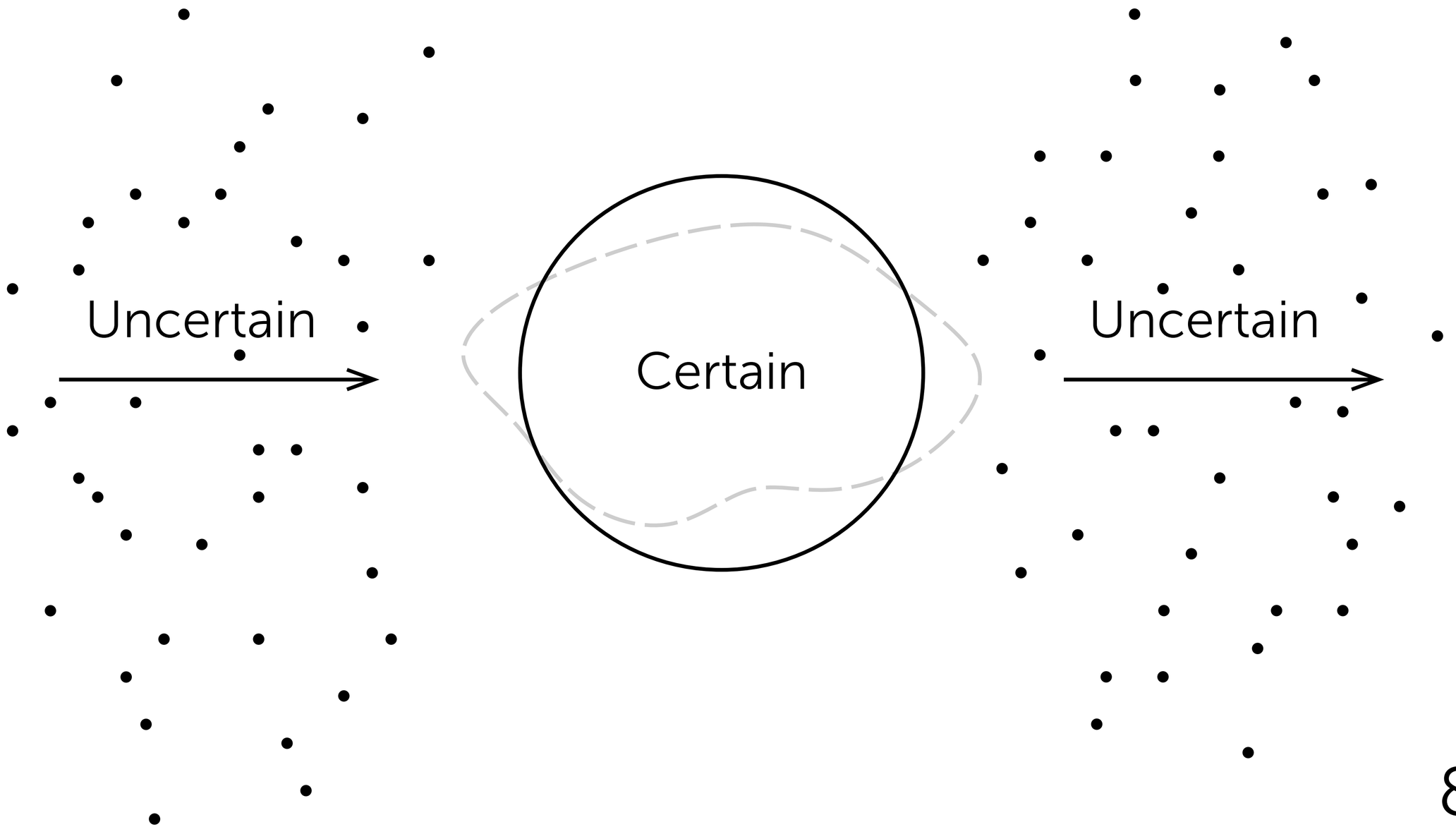
Monte Carlo



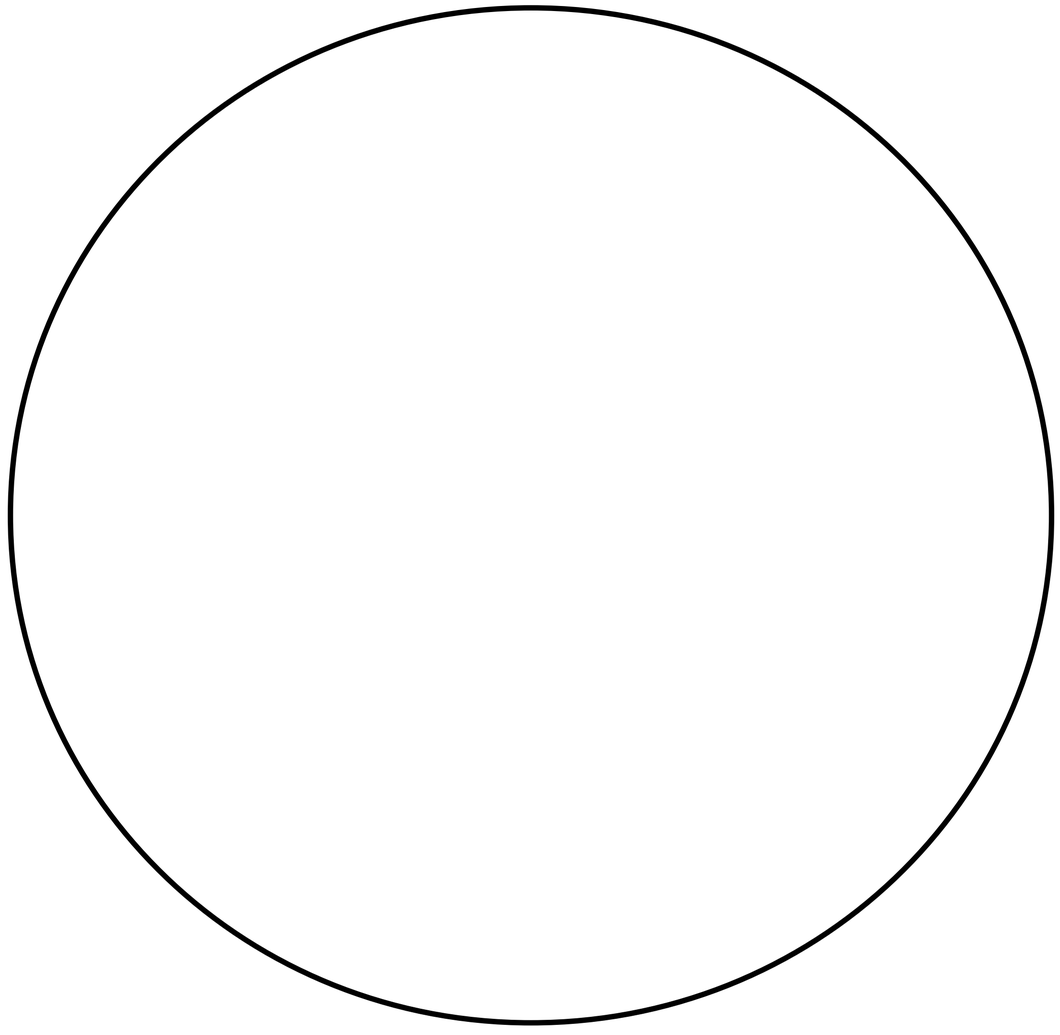
Monte Carlo



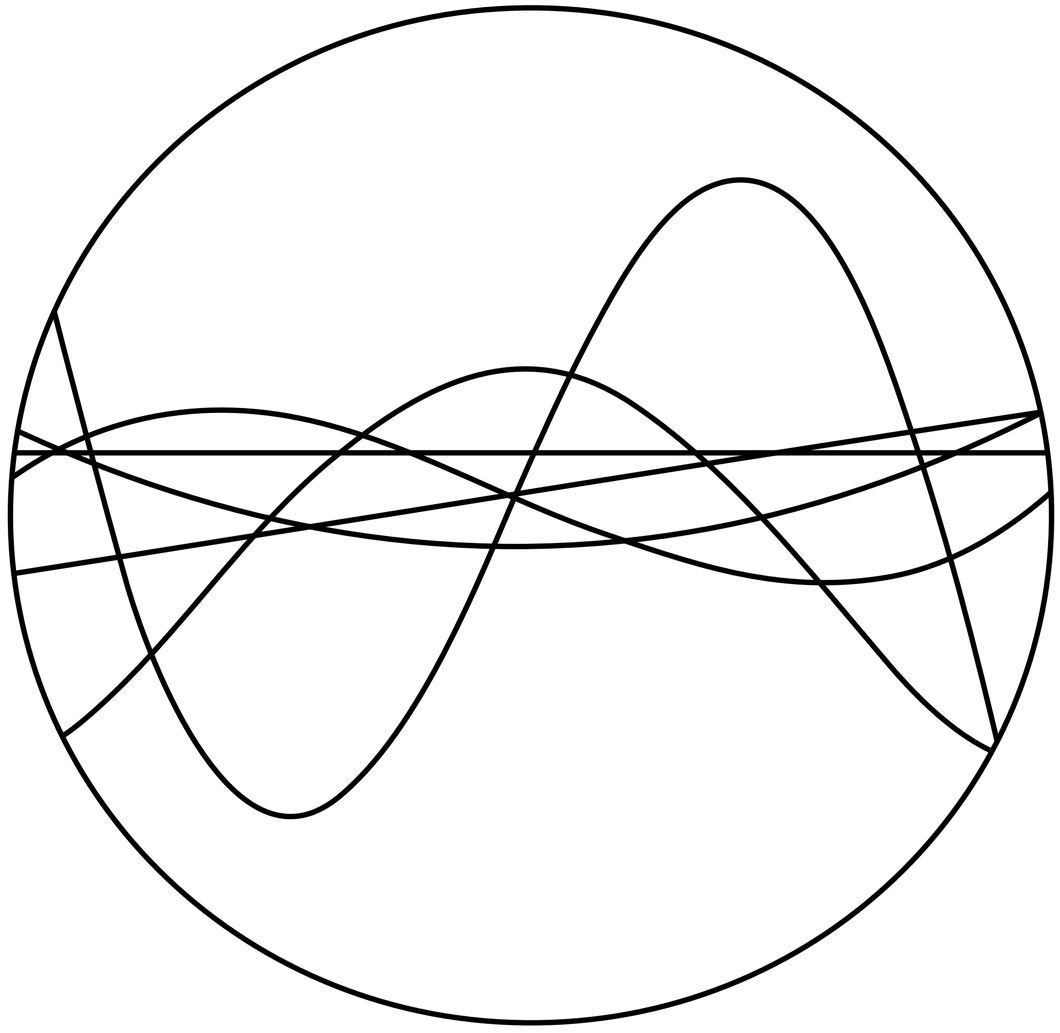
Solution



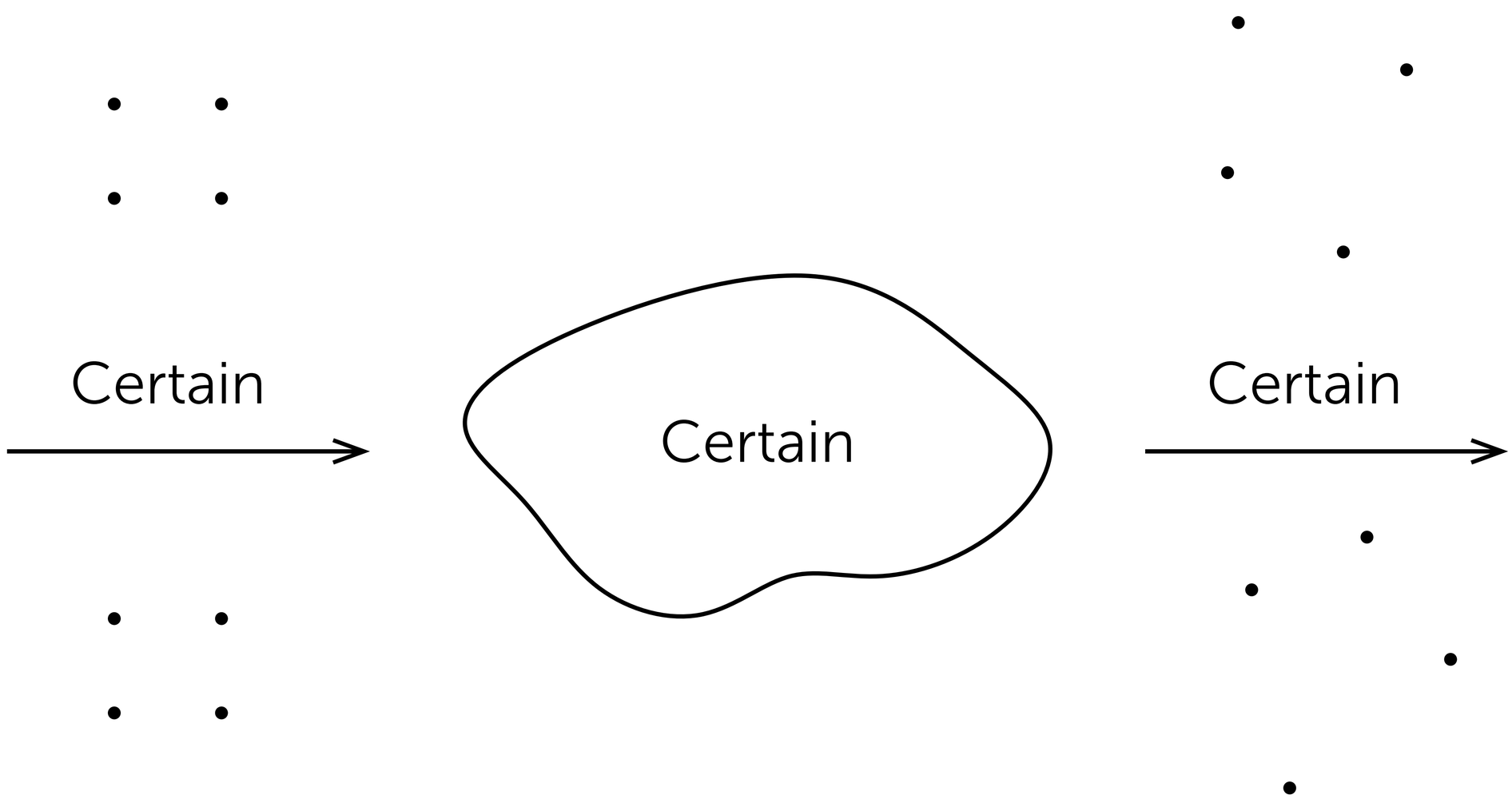
Polynomial Chaos



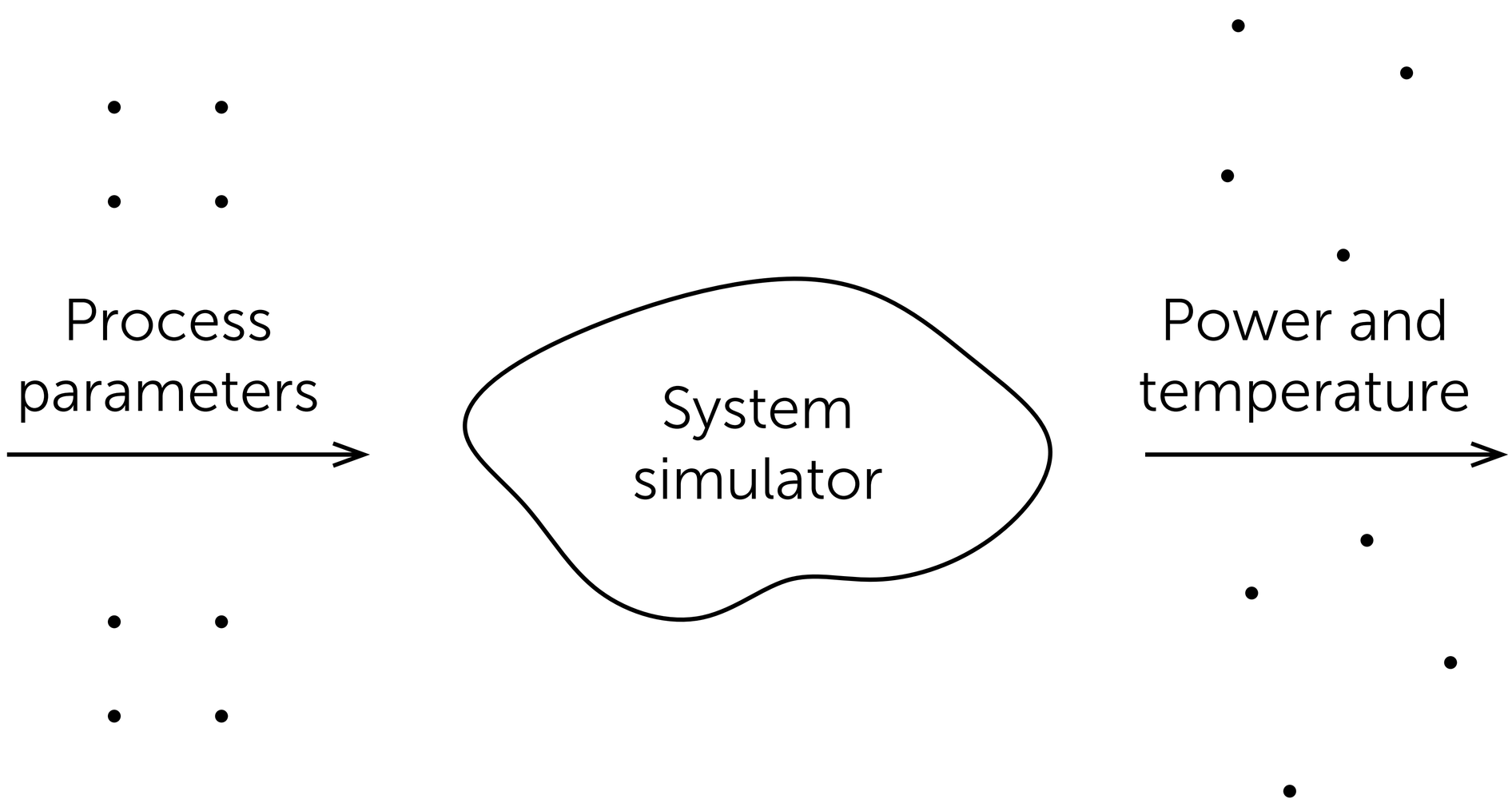
Polynomial Chaos



Polynomial Chaos



Power and Temperature

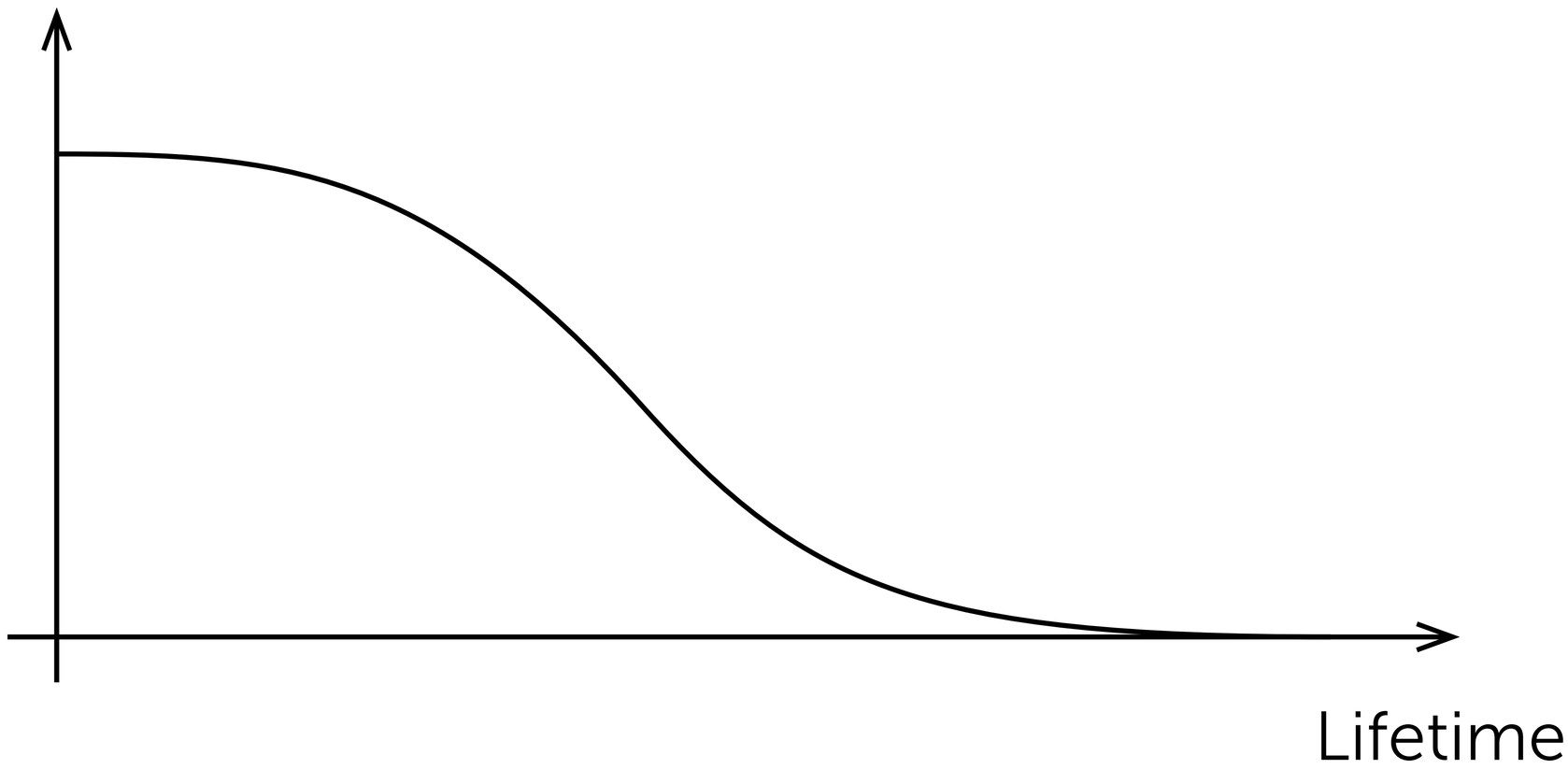


Quantities of Interest

* f(Power)
* g(Temperature)
* h(Power, Temperature)

Reliability

Survival function



Design-Space Exploration

Minimize:

* f(Quantities of interest)

Such that:

* g(Quantities of interest)

Thank you! Questions?

* Ukhov *et al.*, "Probabilistic Analysis of Power and Temperature Under Process Variation for Electronic System Design," IEEE TCAD, 2014.

* Ukhov *et al.*, "Temperature-Centric Reliability Analysis and Optimization of Electronic Systems Under Process Variation," IEEE VLSI, 2015.