The first algorithm configuration procedure to optimize utility instead of runtime.

An anytime procedure that requires minimal parameter-setting from the user.

Comes with non-trivial, input-dependent theoretical guarantees that improve with time.

Error from Sampling
- Classic result from Bandits literature [2,3].
- Sampling introduces estimation error.
- Necessary and sufficient to take enough samples $m$ that:
  \[
  \sqrt{\frac{\log m}{m}} \leq \max\{\Delta_i, \epsilon\}
  \]
- Intuition: a large enough sample will be representative of the true mean

Error from Capping
- New, input-dependent result.
- Capping introduces error by censoring observations.
- Necessary and sufficient to take samples at a cap time $\kappa_i$ large enough that:
  \[
  u(\kappa_i)(1 - F_i(\kappa_i)) \leq \Delta_i + \epsilon
  \]
- Intuition: we don’t need to know about the tail if it contributes very little to expected utility.

Utilitarian Procrastination
- Anytime, adaptive procedure.
- Input-dependent bounds: $m$ and $\kappa_i$ only need to be large enough that:
  \[
  \sqrt{\frac{\log m}{m}} + u(\kappa_i)(1 - F_i(\kappa_i)) \leq \max\{\Delta_i, \epsilon\}
  \]