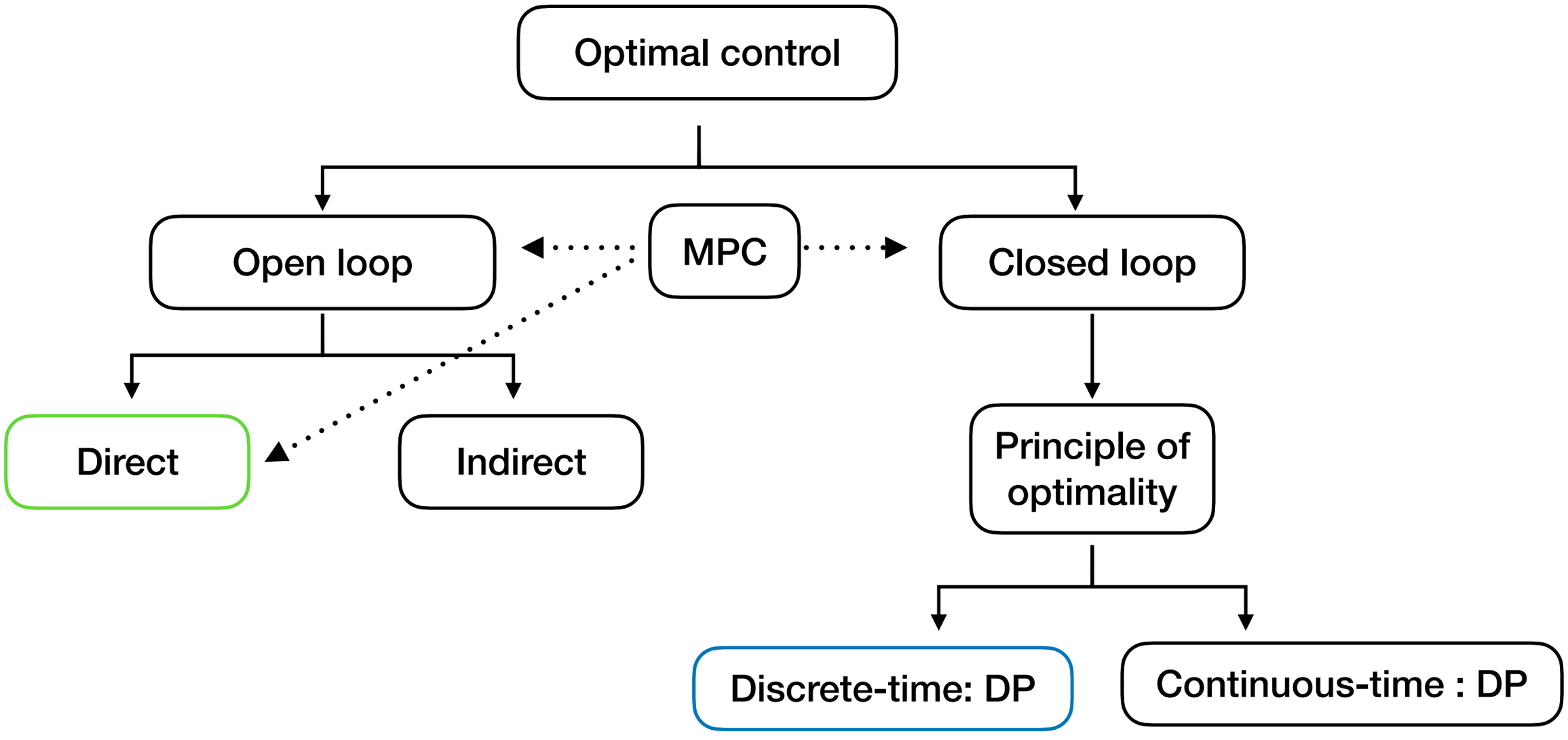
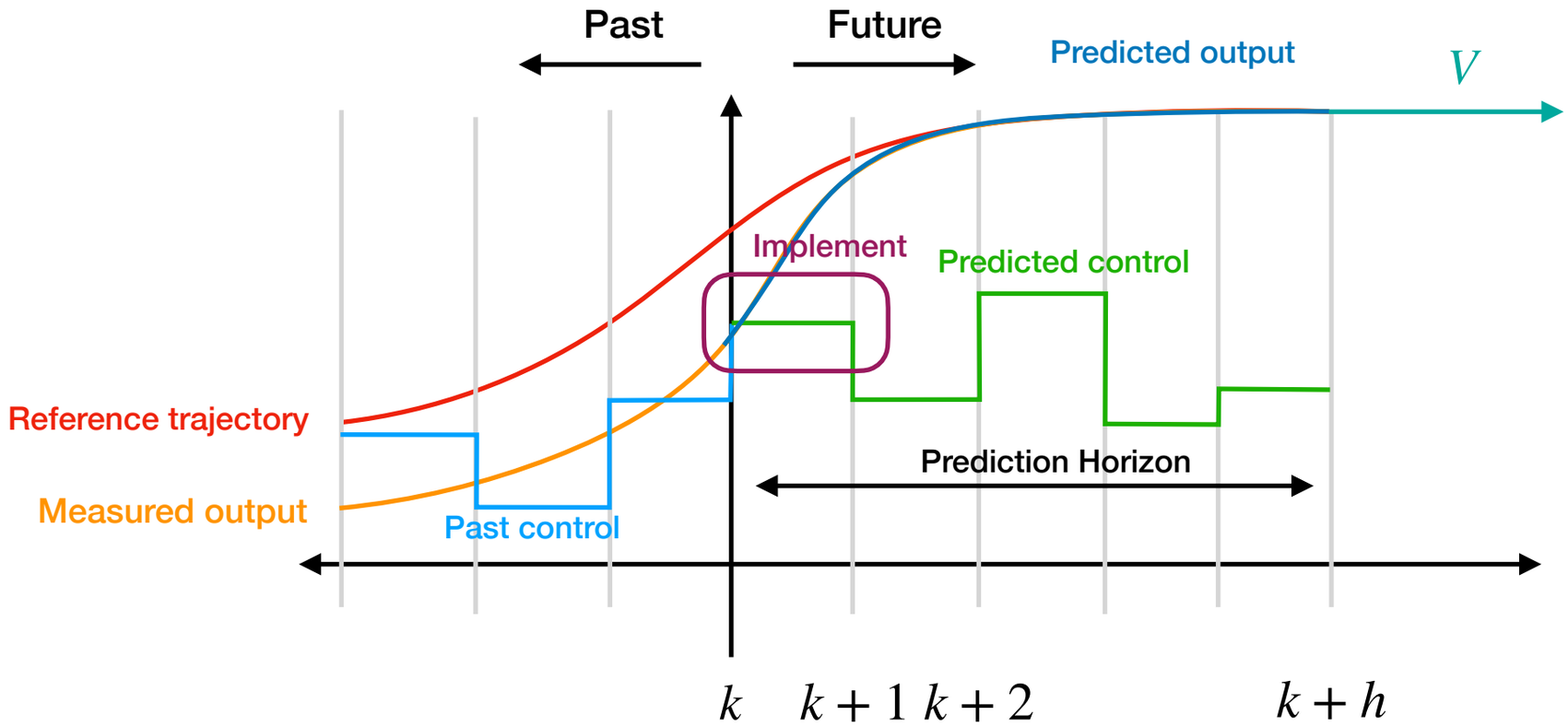
Best of both worlds - model predictive control (MPC)



Adapted from AA 203: Optimal and Learning-Based Control

MPC Idea



Want to solve infinite optimization problem:

$$\text{maximise}_{\pi_t} \lim_{T\to\infty} \mathbb{E}_{W_t}[\frac{1}{T}\sum_{t=0}^{T} R_t(S_t, A_t, W_t)]$$

$$\text{subject to: } S_{t+1} = f_t(S_t, A_t, W_t)$$

$$A_t = \pi(S_t)$$

$$S_0 = s$$

MPC computes an open loop control on finite horizon:

Optimise for finite horizon

$$\text{maximise}_{\{a_t\}} \mathbb{E}_{W_t}[\sum_{t=0}^{H-1} R_t(S_t, A_t, W_t) + V(S_H)]$$

$$\text{subject to: } S_{t+1} = f_t(S_t, A_t, W_t)$$

$$S_0 = s$$

Final cost performance for robustness