

Autonomous Capability Assessment of Sequential Decision-Making Systems in Stochastic Settings

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We learn Capability Descriptions of SDM Systems

What is a capability?

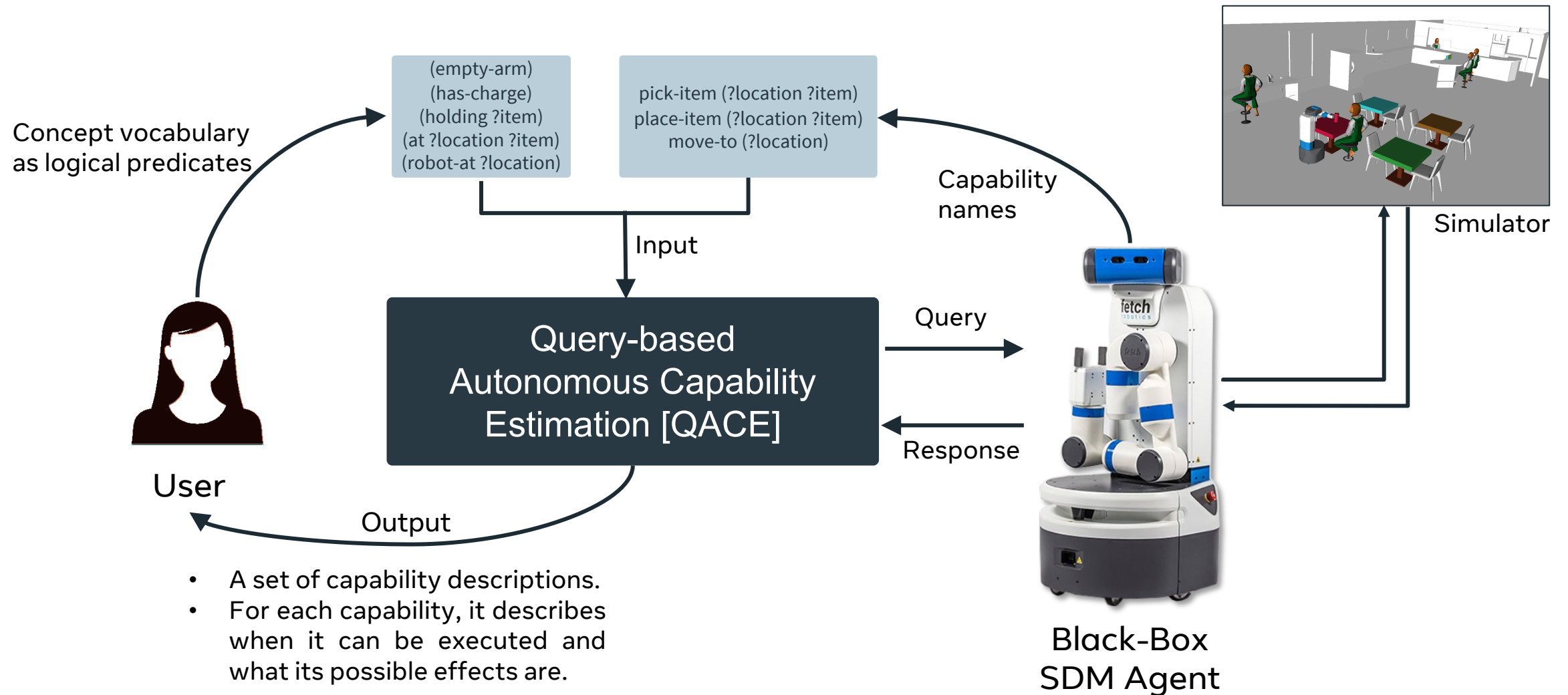
- A high-level task that an SDM system can perform.
- Combination of multiple low-level functionalities of the SDM system.

Why learn Capability Descriptions?

- Easier to reason about in terms of capabilities than low-level functionalities.¹



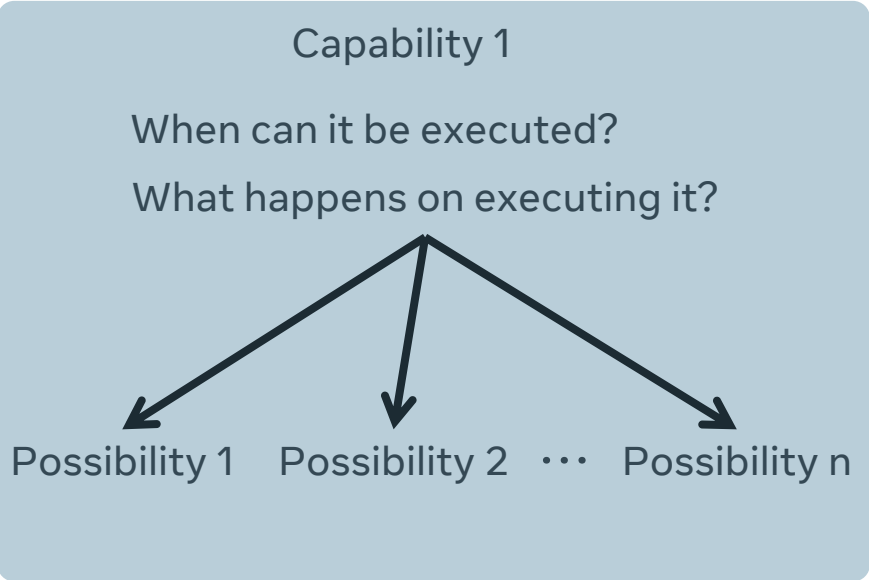
[†]Verma P., Marpally S.R., Srivastava S. Discovering User-Interpretable Capabilities of Black-Box Planning Agents. In Proc. KR 2022.



QACE works in 2 phases

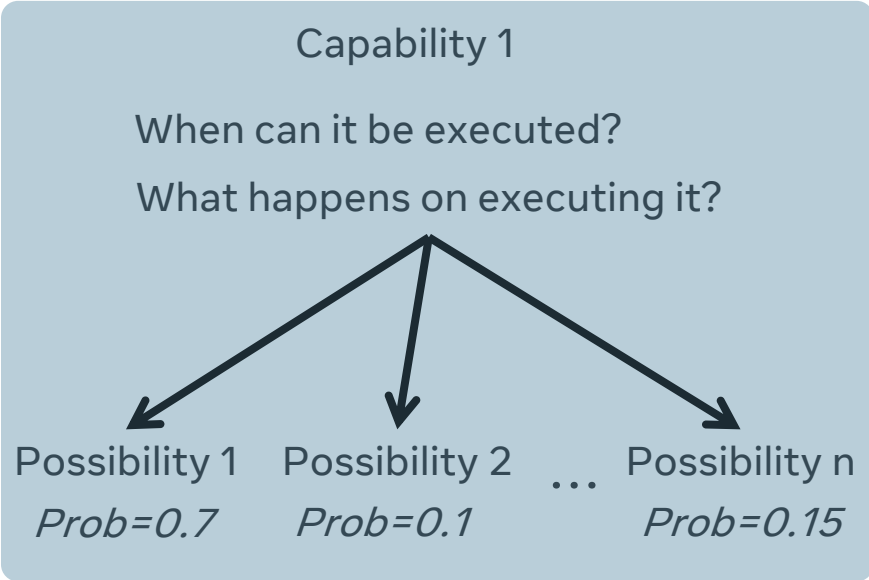
Phase 1:

Learn a Non-Deterministic Model



Phase 2:

Convert Non-Deterministic Model to Probabilistic Model

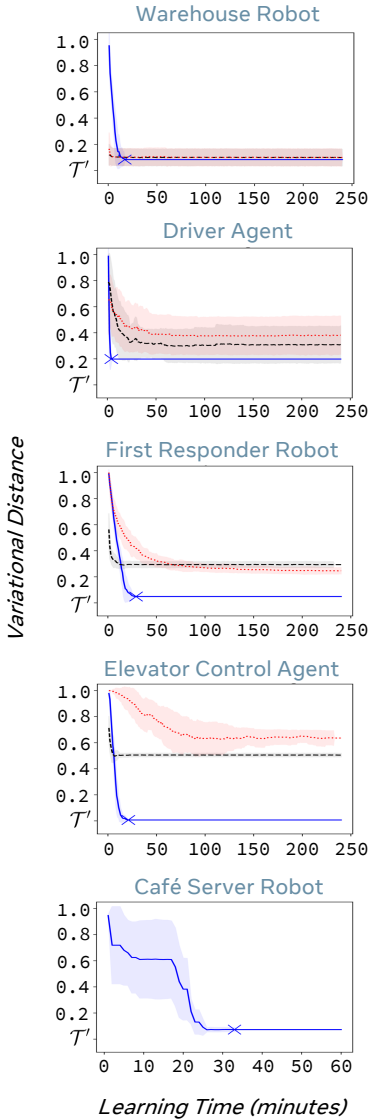


We do this by generating queries and using their responses. We developed an automated process for doing this.

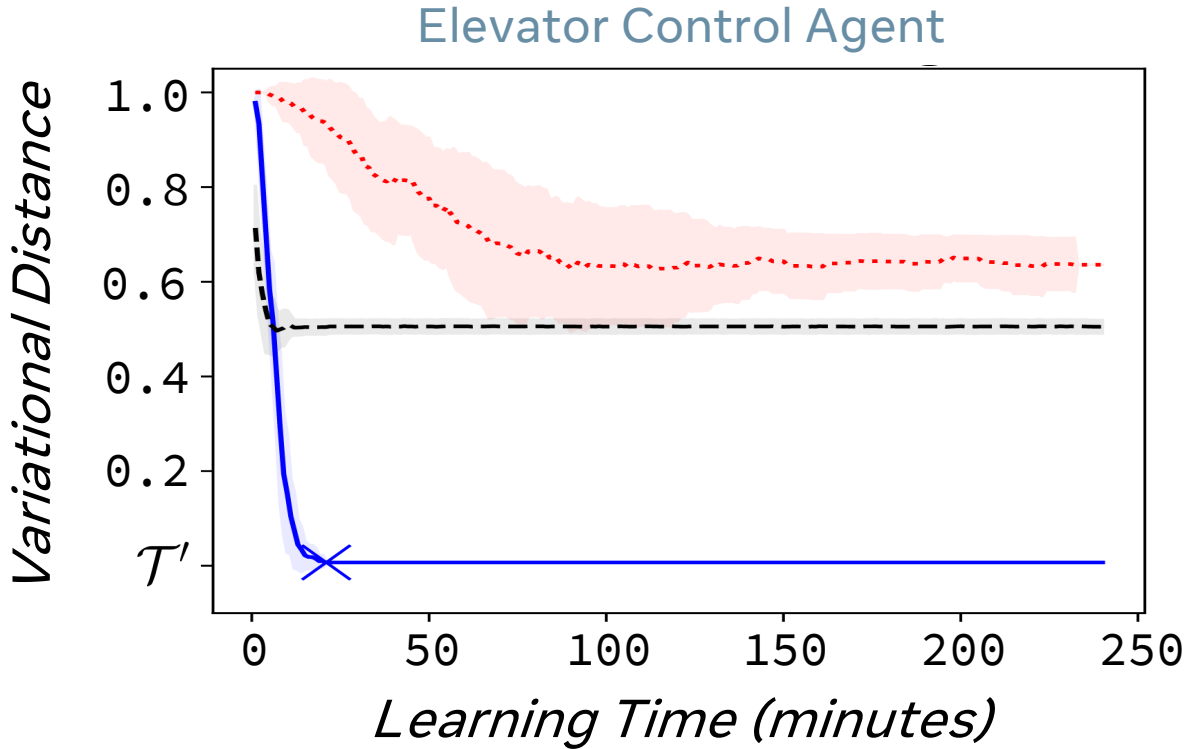
Empirical Evaluation

- 5 SDMAs: Café Server Robot (using OpenRave), Warehouse Robot, Driver Agent, First Responder Robot, Elevator Control Robot.
- Model accuracy in terms of variational distance.
- Compared with GLIB (Chitnis et al., AAI 2021).

QACE learns faster and more accurate models

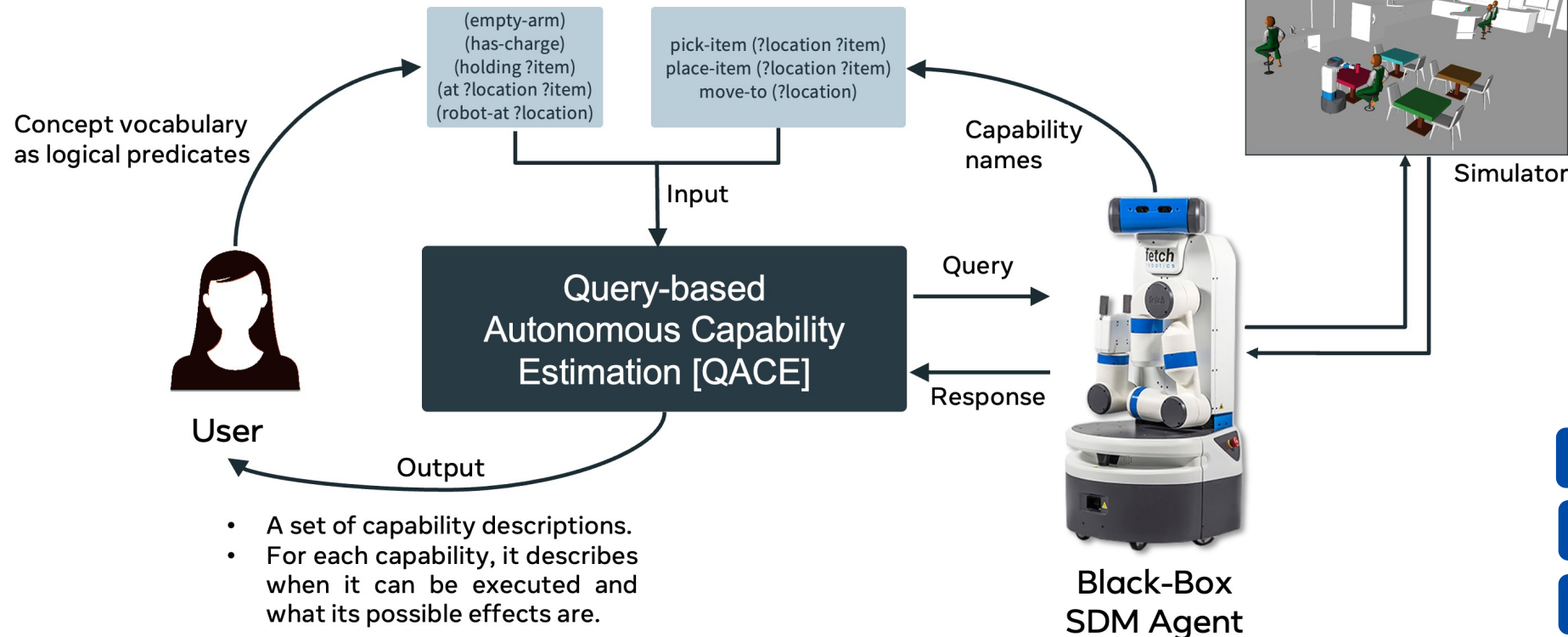
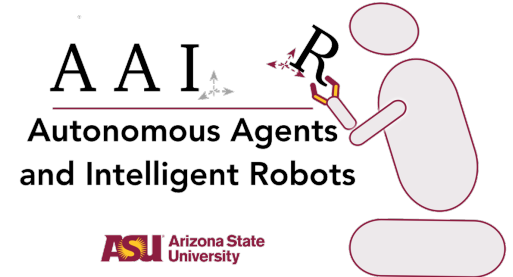


—x— QACE (ours) - - - - GLIB-G ····· GLIB-L



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