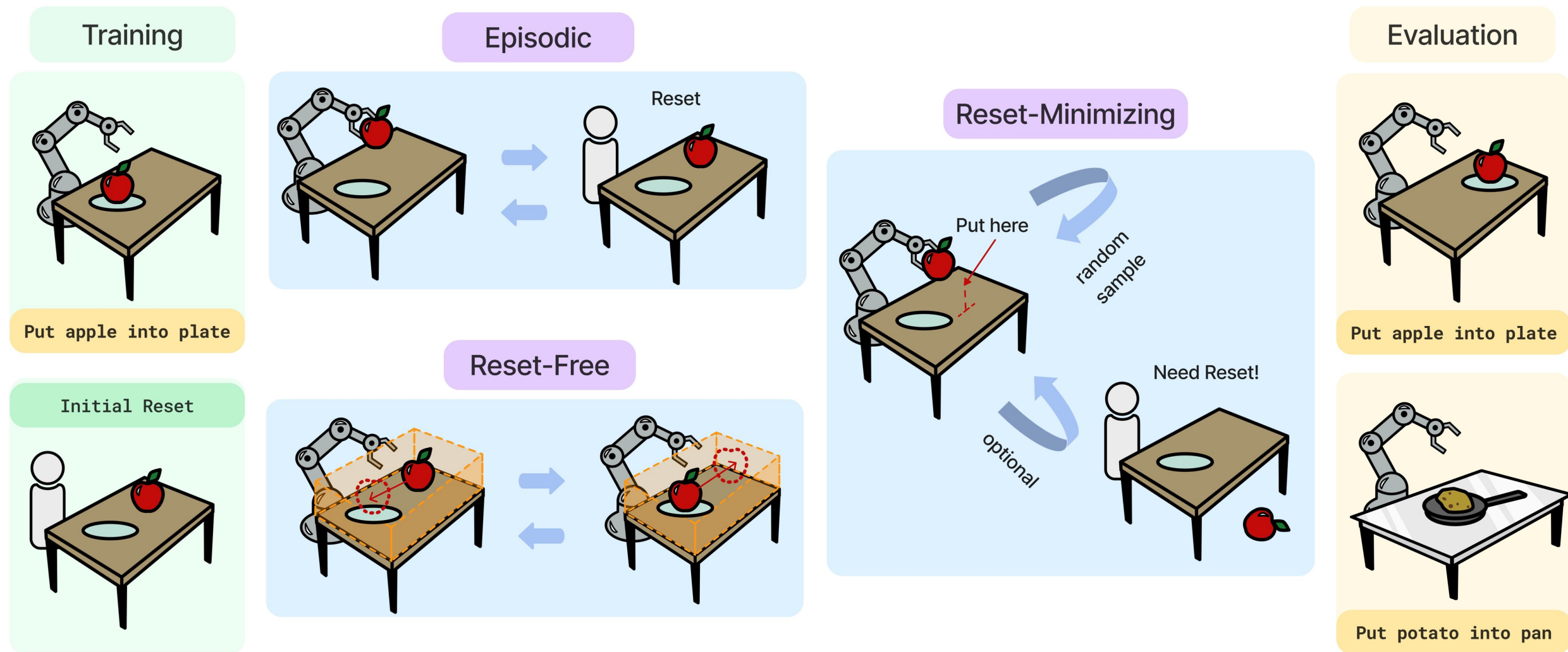


When Learning Is Out of Reach, Reset: Generalization in Autonomous Visuomotor Reinforcement Learning

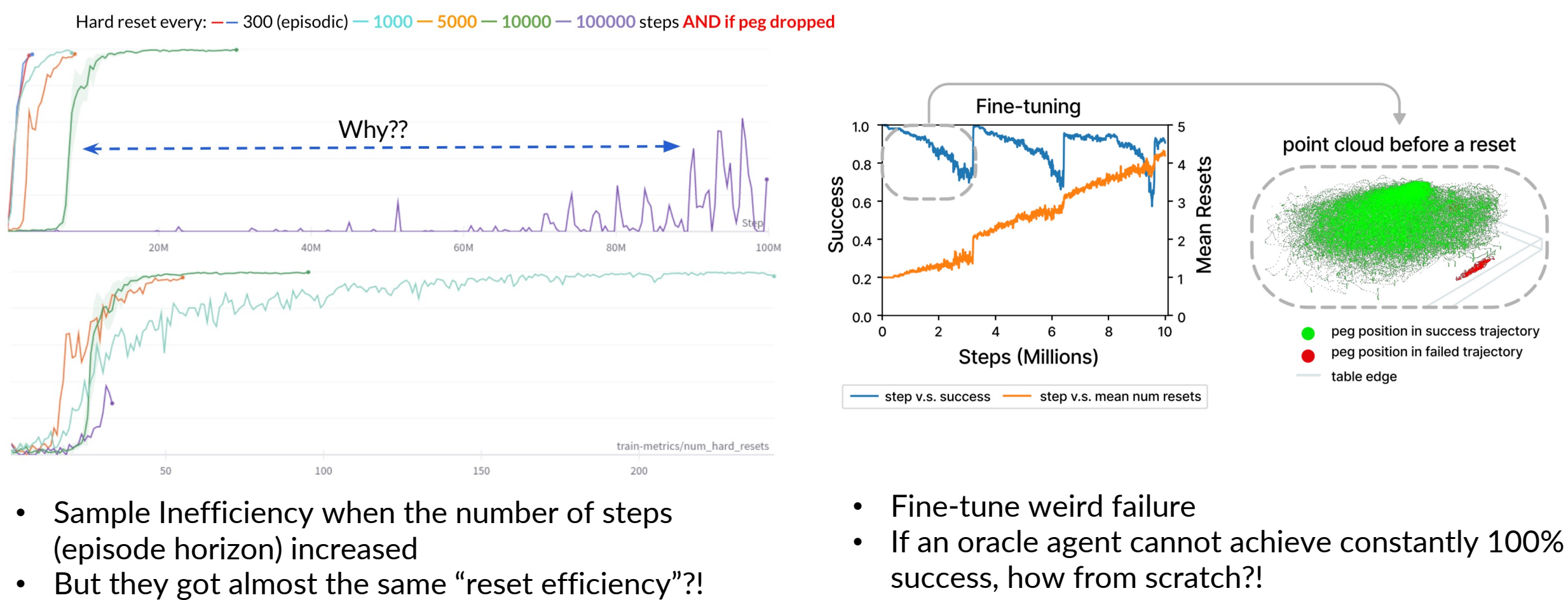
Zichen “Charles” Zhang, Luca Weihs

1. Autonomous RL

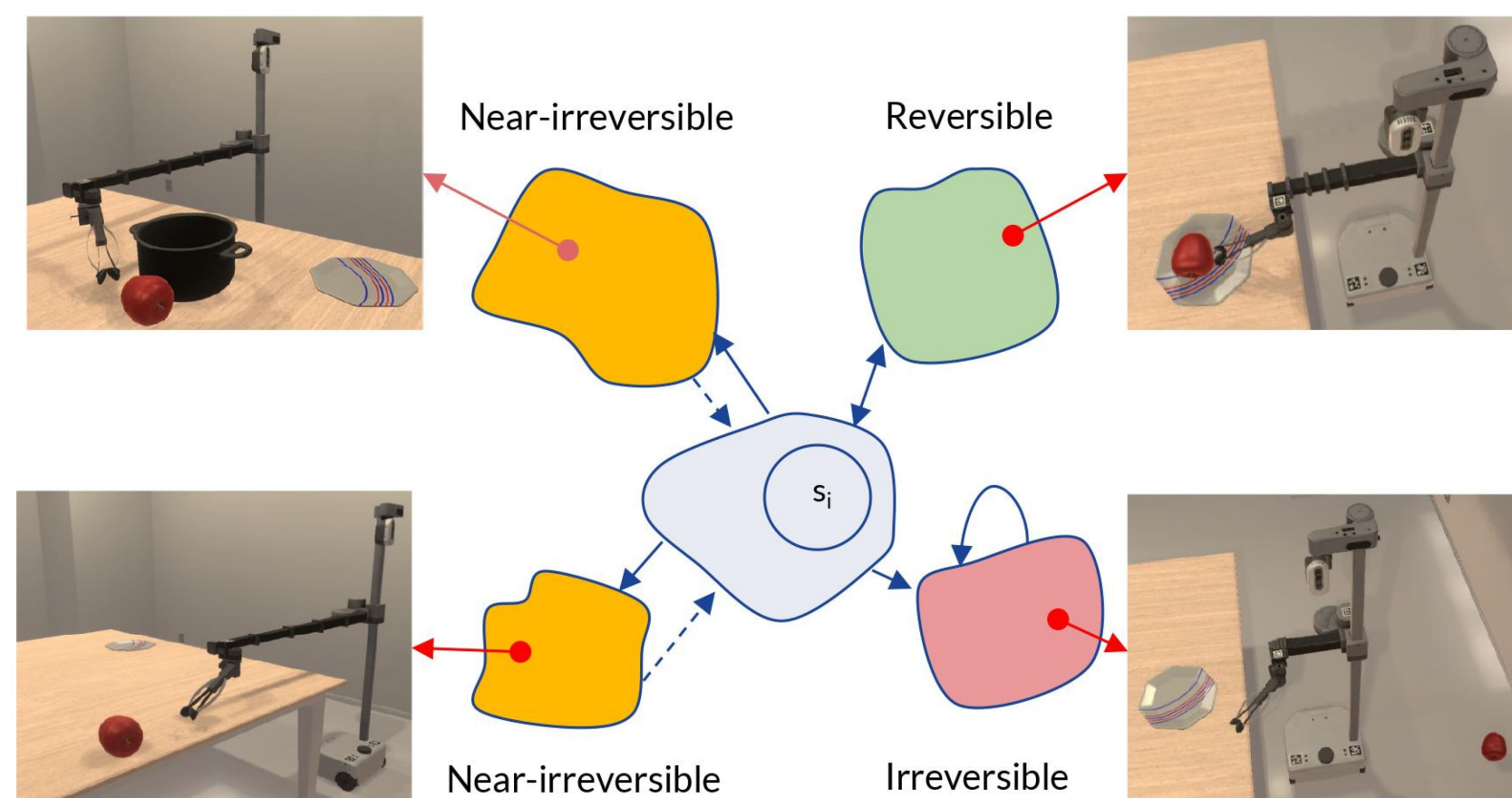


- **Episodic RL:**
 - Resets are expensive even impossible in real-world. Even in simulation, resets in large-scale embodied training are also costly.
- **Reset-Free RL (RF-RL)**
 - Requires tedious setup for irreversible states
 - Low state diversity => cannot generalize
- **Reset-Minimizing RL (RM-RL)**
 - Goal space \approx entire state space
 - Allow minimized “smart” resets for better efficiency
 - A single policy that requires generalizations

2. Previous Challenges

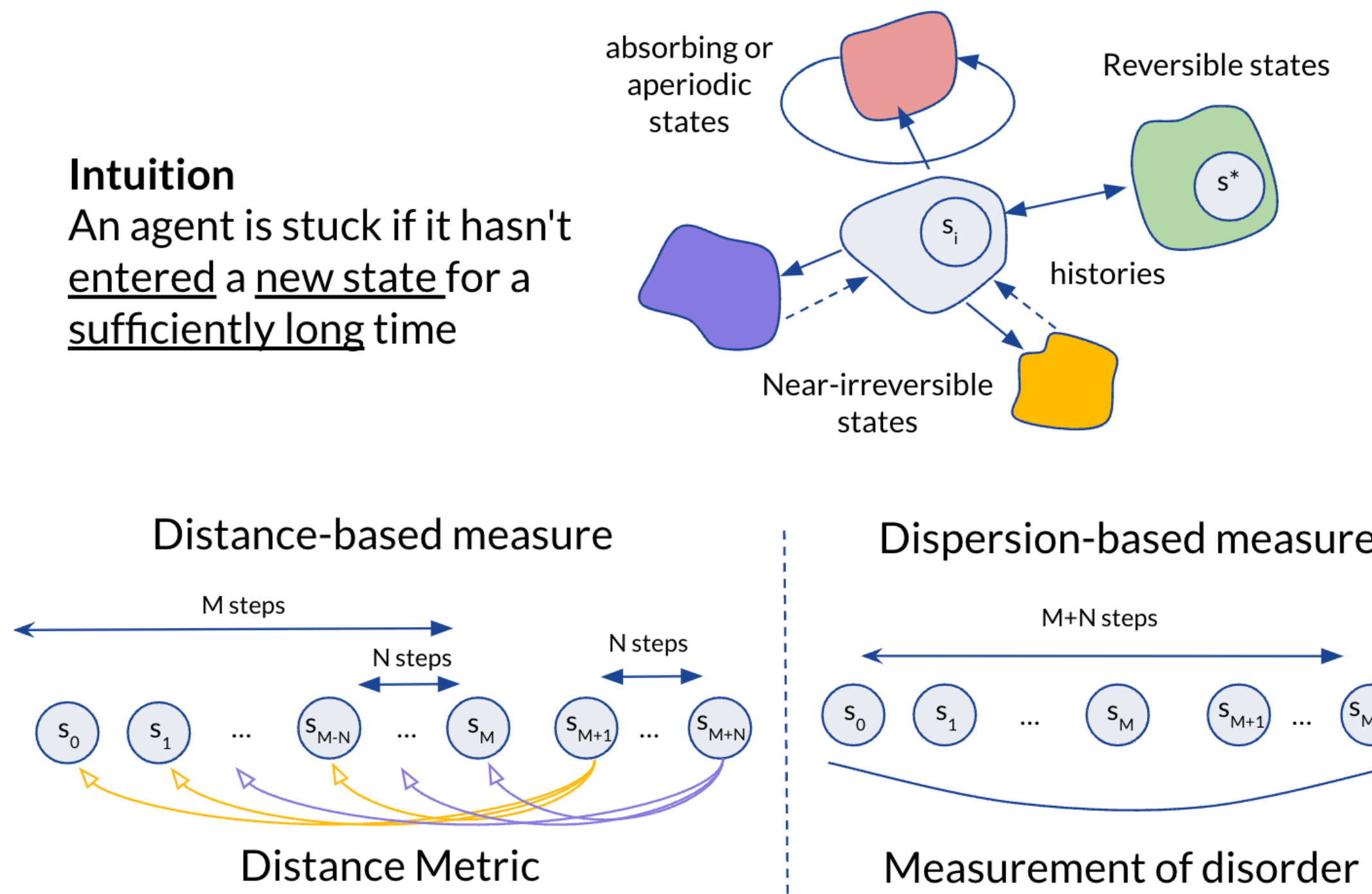


- Sample Inefficiency when the number of steps (episode horizon) increased
- But they got almost the same “reset efficiency”!
- Fine-tune weird failure
- If an oracle agent cannot achieve constantly 100% success, how from scratch?!

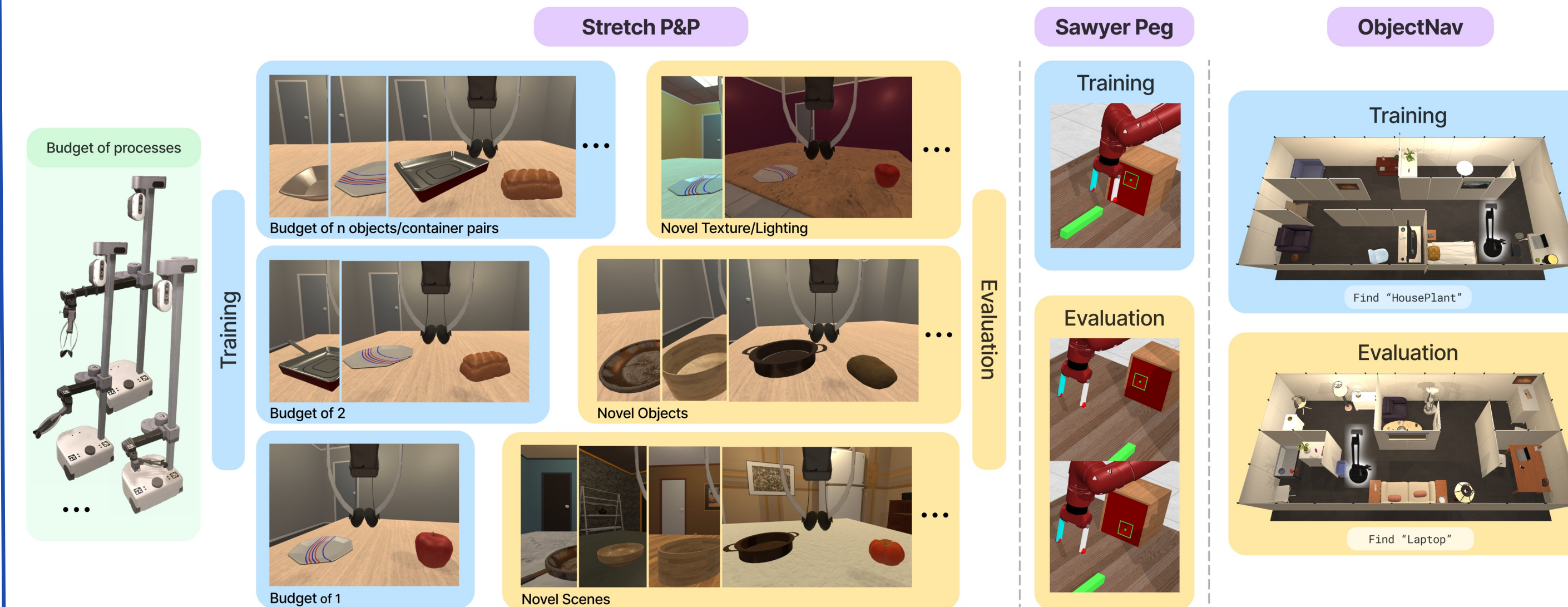


**Reason:
Near-Irreversible
States!**

3. Method



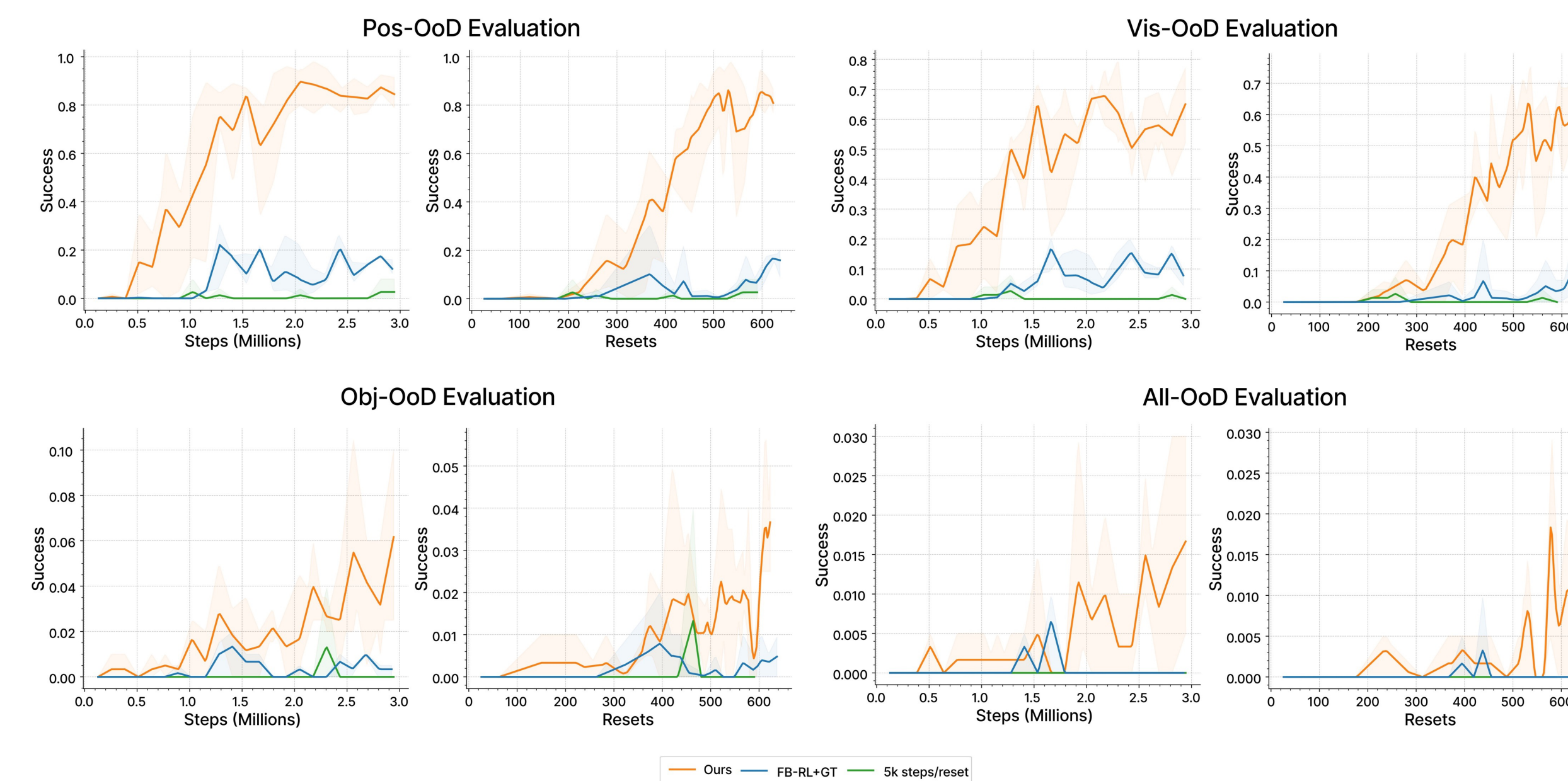
4. Benchmarks



- **Pos-OOD:** novel initial states of objects
- **Vis-OOD:** novel visual textures
- **Obj-OOD:** novel object instances
- **All-OOD:** All of above and totally novel environments/rooms

5. Experiments

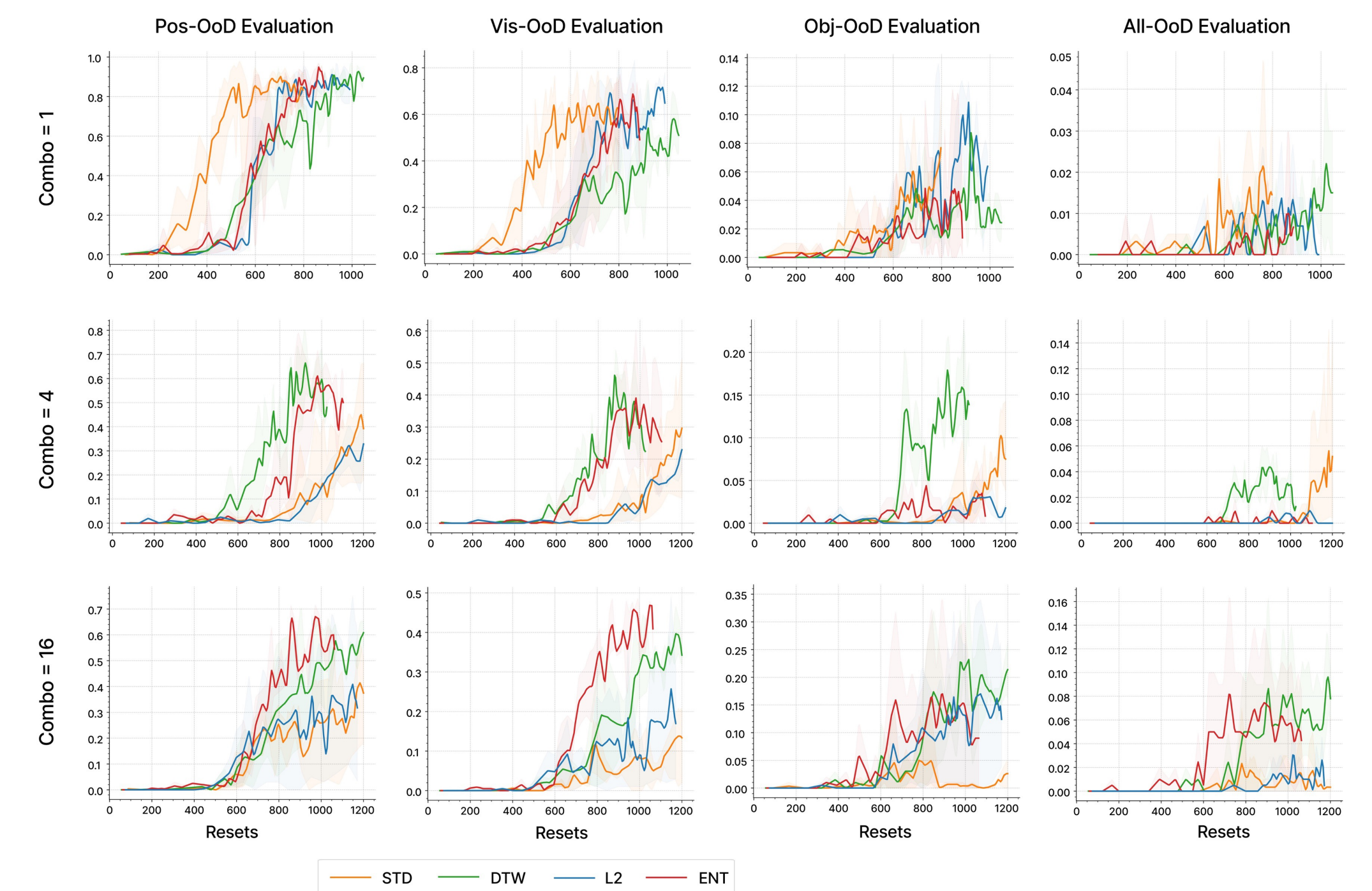
STRETCH-P&P



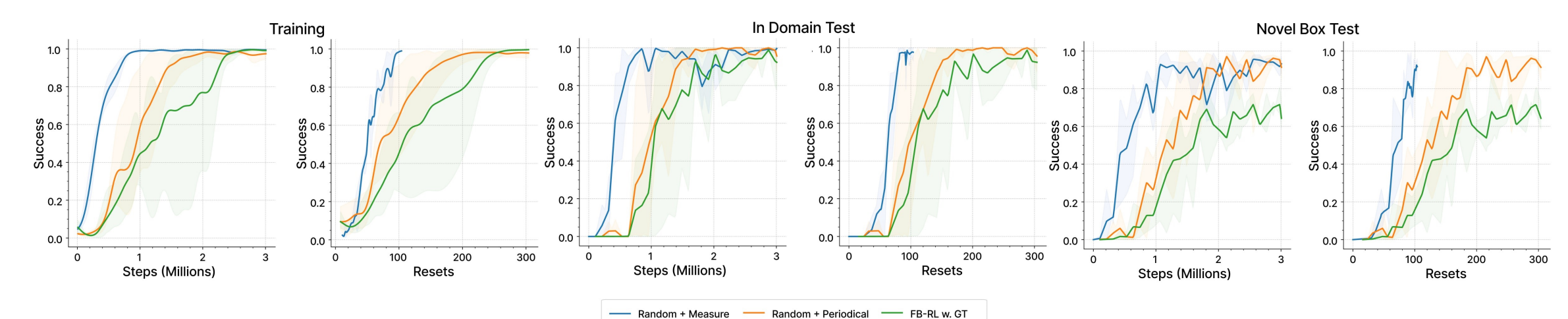
Object Navigation (RoboTHOR)

	Success (50M)	SPL (50M)	Resets (50M)	Success (100M)	SPL (100M)	Resets (100M)
Ours	0.216	0.131	592	0.551	0.275	635
H=300	0.334	0.166	24k	0.355	0.167	1M
H=10k	0.246	0.134	5k	0.418	0.218	10k
H= ∞	0.206	0.141	60	0.339	0.178	60
EmbCLIP	0.431	0.204	1M	0.504	0.234	2M

Ablations



Sawyer Peg



Check More!

<https://zcczhang.github.io/rmrl>

