SIFT's OpenMIND: Open Model Improvements for Novel Domains

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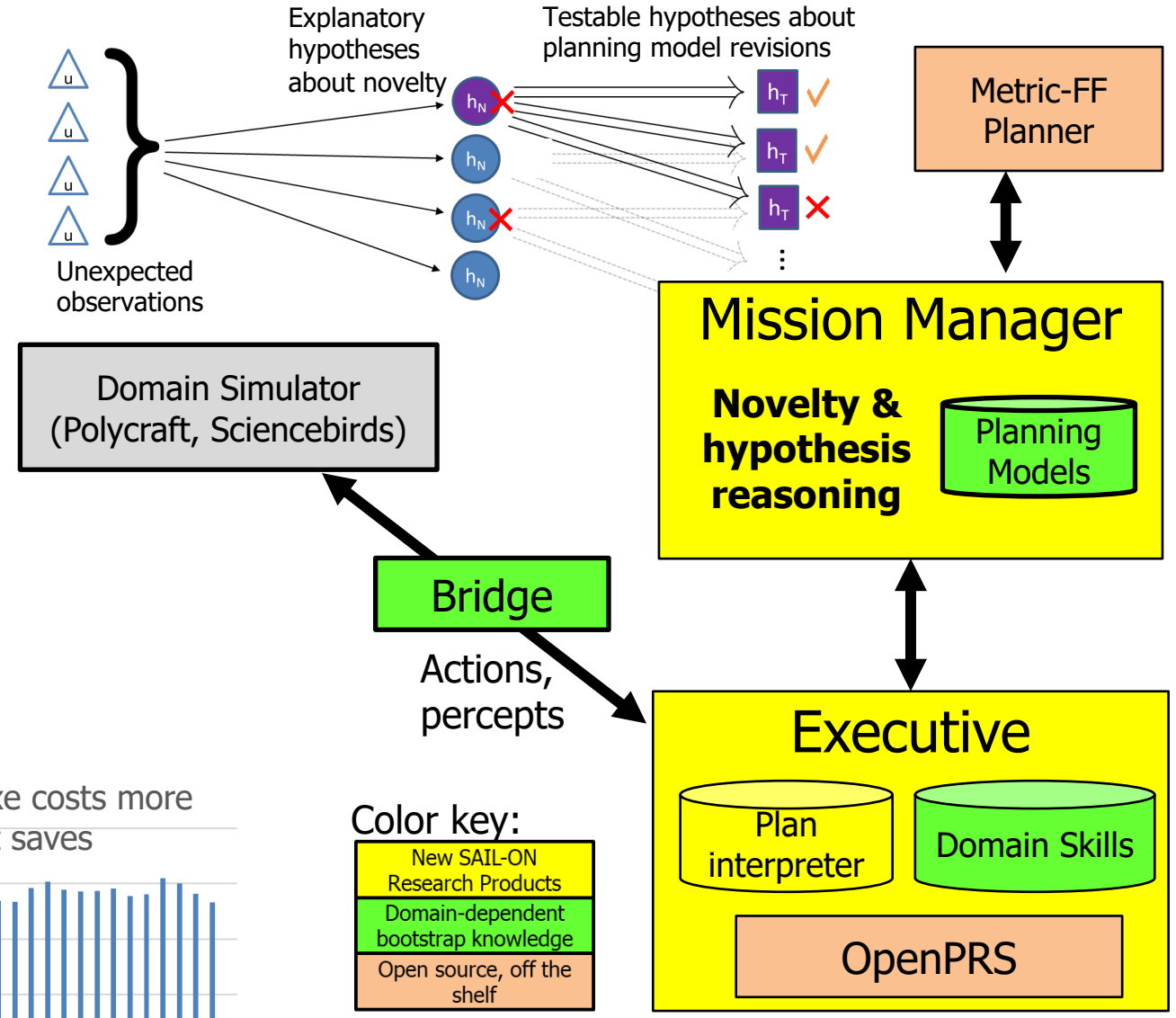
OpenMIND: Open Model Improvements for Novel Domains

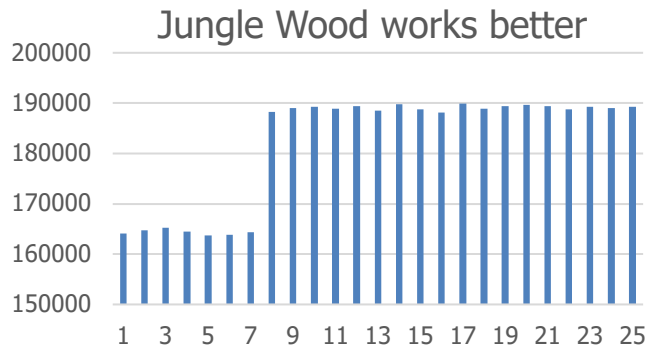
OpenMIND **revises and extends its planning and execution models** in response to novelty.

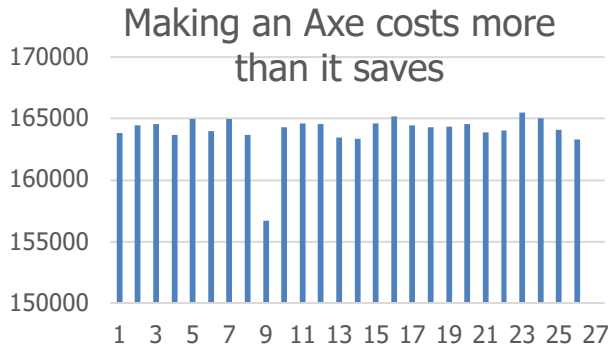
- Plans activities to achieve goals, including expected observations over time.
- Detects unexpected observations during plan creation and execution.
- Creates novelty hypotheses to explain them, linked to other hypotheses about how to test the explanations.
- **Tests its hypotheses by modifying planning models and examining effects. Domain feedback validates or rejects hypotheses.**

Advantages:
- Immediate detection of violated expectations.
- One-shot learning of validated model changes.
- Planner avoids myopic behavior.
- Executive handles novel sensing data and responses.
- Validated hypotheses are explicit, explainable, and combinable – no "mystery learning."



One-shot learning:





The Big Science Idea: Reasoning About Novelty Hypotheses

Unexpected observations

E.g.

- Planner failures.
- Plan execution failures.
  - Action failures.
  - Critical condition check failures.
- Unrecognized item class detected.
- Unrecognized item feature detected.

Novelty hypotheses

- Characterize novelty holistically.
- Assumption can produce new operators in **domain-independent** fashion.

E.g.:

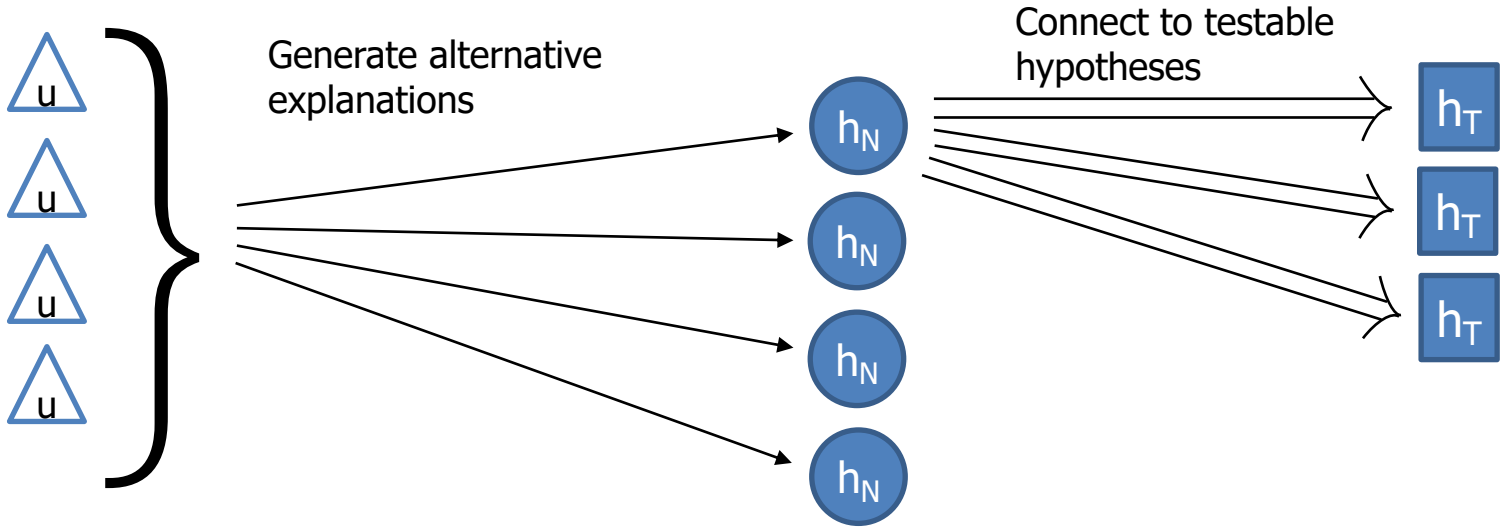
- Novel class C is a beneficial parameter (tool) for action A.
- Perception of features F on items I is transformed by T.

Testable hypotheses

- Can be validated/rejected by experimentation.

E.g.

- An operator can be executed successfully.
- One operator will have lower cost than another.
- An operator will have a particular effect.
- An operator will make it possible to create a plan, when before it was not possible.



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Thank you