

# Informatics 2D: Reasoning and Agents

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Lecture 19a: Planning and acting in the real world:  
Execution monitoring and replanning

# Where are we?

Last time ...

- Fully and partially observable environments
- Actions with non-deterministic outcomes
- Sensorless planning and contingent planning

Today ...

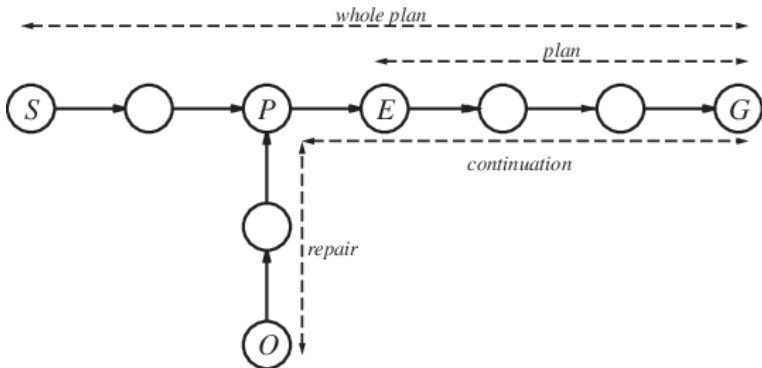
- **Monitoring and replanning**

# Execution monitoring and replanning

- **Execution monitoring** = checking whether things are going according to plan (necessitated by unbounded indeterminacy in realistic environments)
  - Action monitoring = checking whether next action is feasible
  - Plan monitoring = checking whether remainder of plan is feasible
- **Replanning** = ability to find new plan when things go wrong (usually repairing the old plan)
- Taken together these methods yield powerful planning abilities

# Action monitoring and replanning

- While attempting to get from  $S$  to  $G$ , a problem is encountered in  $E$ , agent discovers actual state is  $O$  and plans to get to  $P$  and execute the rest of the original plan



# Plan monitoring

- Action monitoring often results in suboptimal behaviour, executes everything until actual failure
- **Plan monitoring** checks preconditions for entire remaining plan
- Can also take advantage of **serendipity** (unexpected circumstances might make remaining plan easier)
- In partially observable environments things are more complex (sensing actions have to be planned for, they can fail in turn, etc.)

# Summary

- Unbounded non-determinacy requires:
  - Execution monitoring: checking success of execution
  - Replanning: repairing plans in case of failure
- Next time: **Hierarchical Planning**