The MAPE-K Loop Considered Harmful

SEAMS 2015 Panel

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MAPE-K
Rainbow Framework

Architecture Layer

- Strategy Executor
- Adaptation Manager
- Architecture Evaluator

Model Manager

Translation Infrastructure

- System API
- Resource Discovery
- Probes
- Effectors

System Layer

Target System
So What’s the Problem?

- In practice there are many reasons to
  - Cross MAPE-K abstraction boundaries
  - Combine stages
  - Involve outside agents (humans, other adaptive systems)

- Is it time to rethink the decomposition?
  - Might allow more flexible ways of adaptation
  - Might lead to new synergies
  - Might produce more realistic systems
Examples

- \( P \Leftrightarrow M \) (Plan and Monitor)
  - Applications: Adaptive monitoring
- \( P \Leftrightarrow A \) (Plan and Analyze)
  - Deciding what is broken takes time
  - Analyzing future predictions may depend on what you want to do
- \( A \Leftrightarrow E \) (Analyze and Execute)
  - Actuators may be broken
  - New forms of actuation may be acquired dynamically
- \( H \Leftrightarrow P \) (Humans and Planning)
  - Involving humans in the loop to achieve goals
  - Reasoning about adversaries
Humans and MAPE-K

Actions/Decisions

Make changes

Insight

Information