The key to creating **general and reusable** robotics software architectures lies in fulfilling **quality requirements** and considering their **influencing factors**.

Towards Meeting Quality Requirements with Self-adaptive Robot Behavior

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Research Question

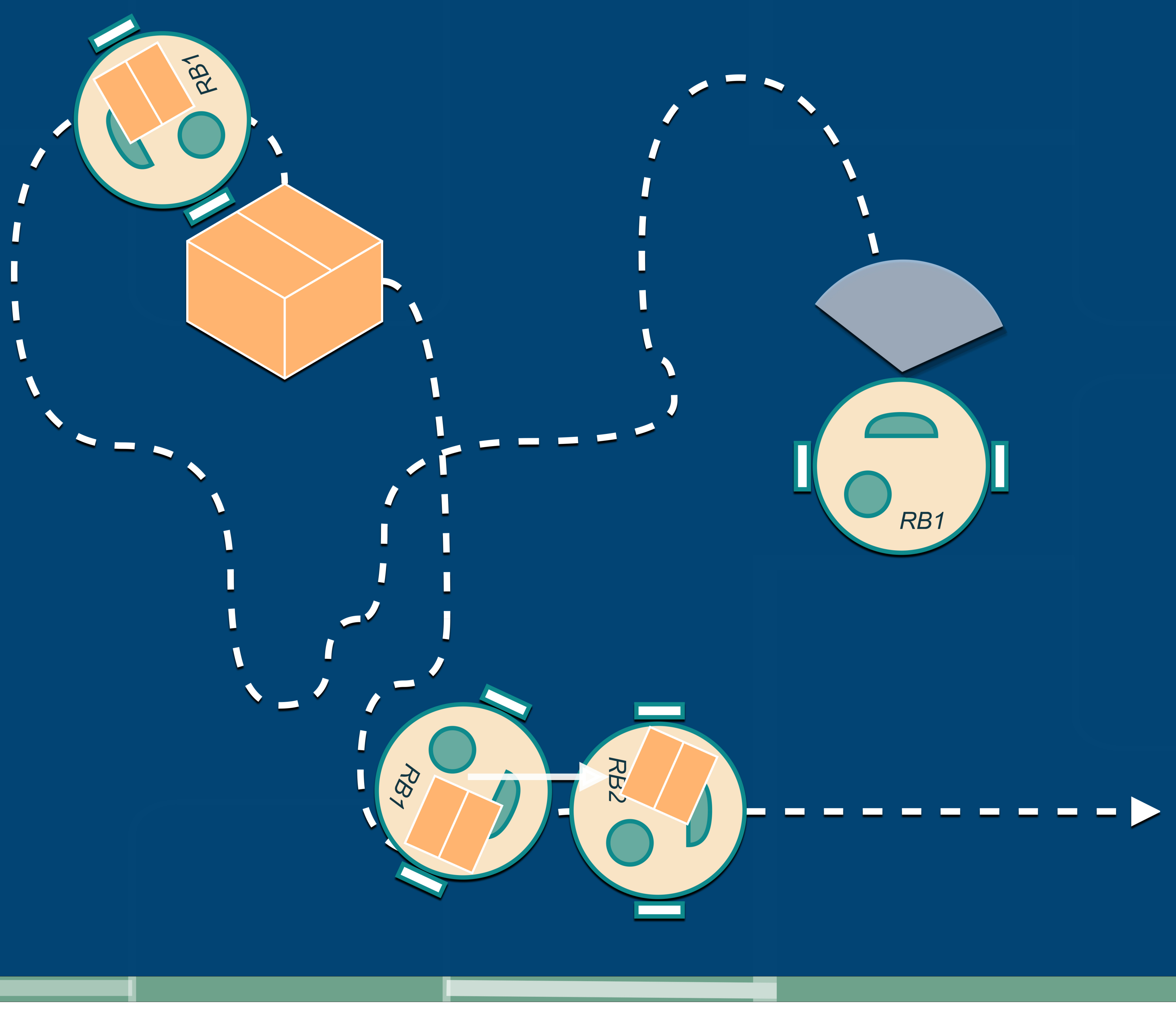
How can we build robotics software which meet QRs at runtime despite the uncertainty present in complex operating environments?

Motivation

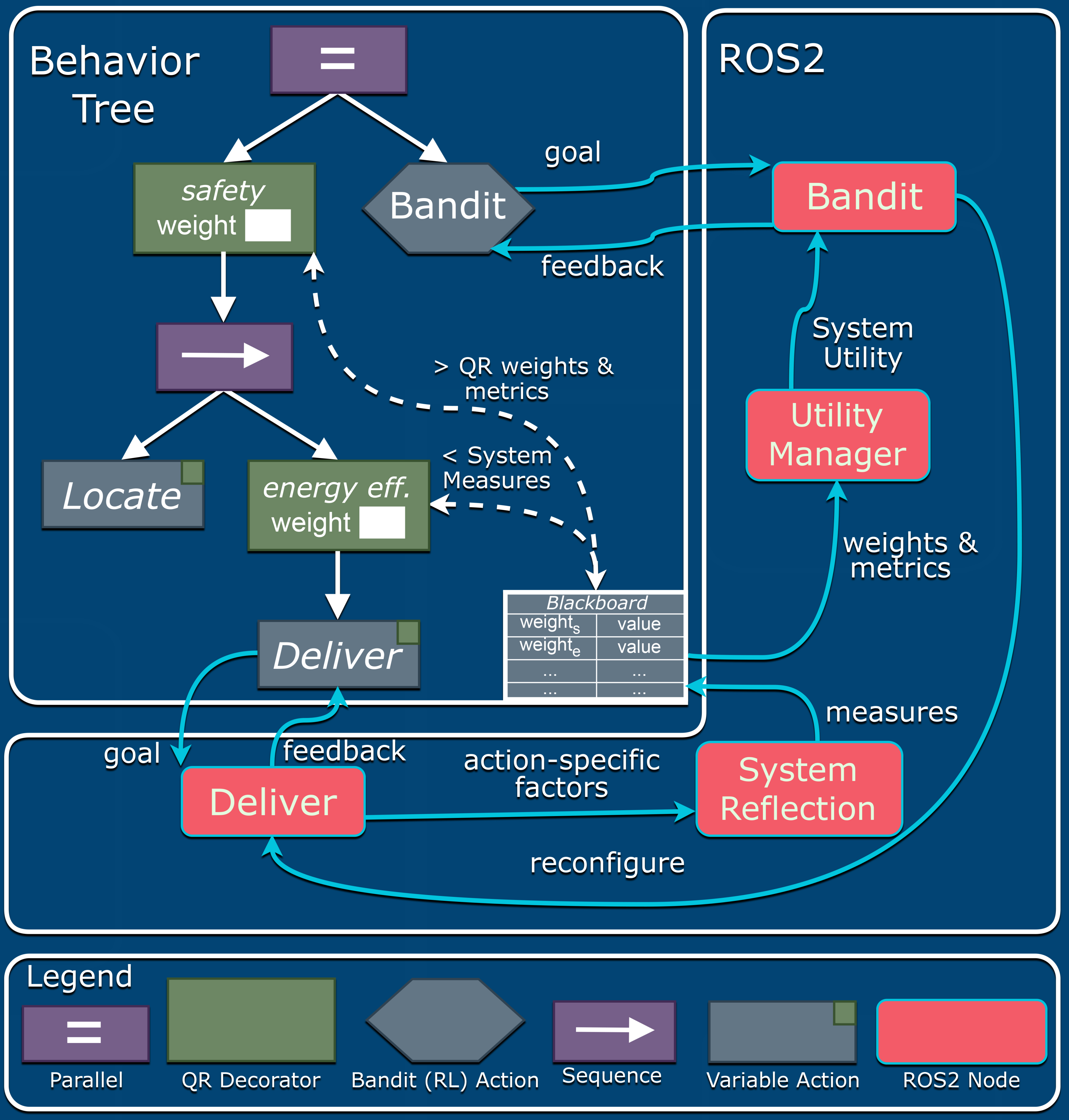
- Robotics software tends to be developed in an **ad-hoc** fashion. When the same system is redeployed under differing conditions **performance may suffer.**
- At design time both '**failure of imagination**' and the '**reality gap**' may lead to the emergence of **new uncertainties** during operation **violating prior associations between behavior and performance.**

Scenario: Find and Deliver

Two robots must cooperate to successfully deliver an important parcel while also meeting quality requirements such as being *safe* to avoid collisions and *economical* to sustain operation. However, the way to fulfill these requirements **changes** due to different **contexts**. These context changes can stem from the **environment**, the robot's **task**, or even the robot **itself**.



Approach



Our approach continously fulfills QRs **at runtime** by integrating RL into behavior trees. A *Bandit action node* reconfigures the system to meet QRs specified in *decorators* while considering **contextual factors**. Thus, the system is made **resilient** to uncertainties.

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