

# ADAAS

ASSURING DEPENDABILITY  
IN ARCHITECTURE-BASED  
ADAPTIVE SYSTEMS

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# Consortium

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# Motivation and Aim

## ■ Large-scale software systems

- it is important to improve their dependability and optimize their performance
- while reducing their development and operational costs

## ■ ADAAS project

- focus on provision of **self-adaptability** to enhance system dependability and reduce overall operational costs
- improve support for the practical application of self-adaptation
  - to express the adaptation strategies in a flexible way
  - to provide evidence that system function and quality are satisfied during system's operation

# Approach

## ■ Architecture-based

- use of **architectural models** at run-time

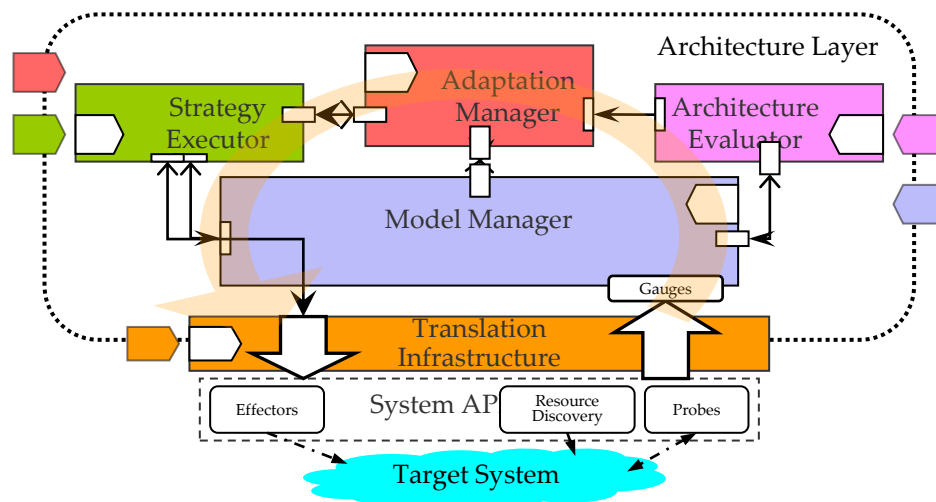
## ■ Use complementary techniques

- **anticipated changes** – at **design-time** practical notations for expressing adaptation strategies and techniques that support analysis for obtaining confidence that system goals are fulfilled during system's operation
- **unanticipated changes** – at **run-time** adaptation strategies are generated for ensuring system dependability

# Technical Objectives

## ■ Strategy language and platform

- Language amenable to analysis for expressing adaptation strategies, and able to address key quality attributes, including dependability
  - to be based on *Stitch*, a language to express self-adaptation strategies
- Integrated into *Rainbow*, a platform in which architectural models can be used to adapt systems



# Technical Objectives

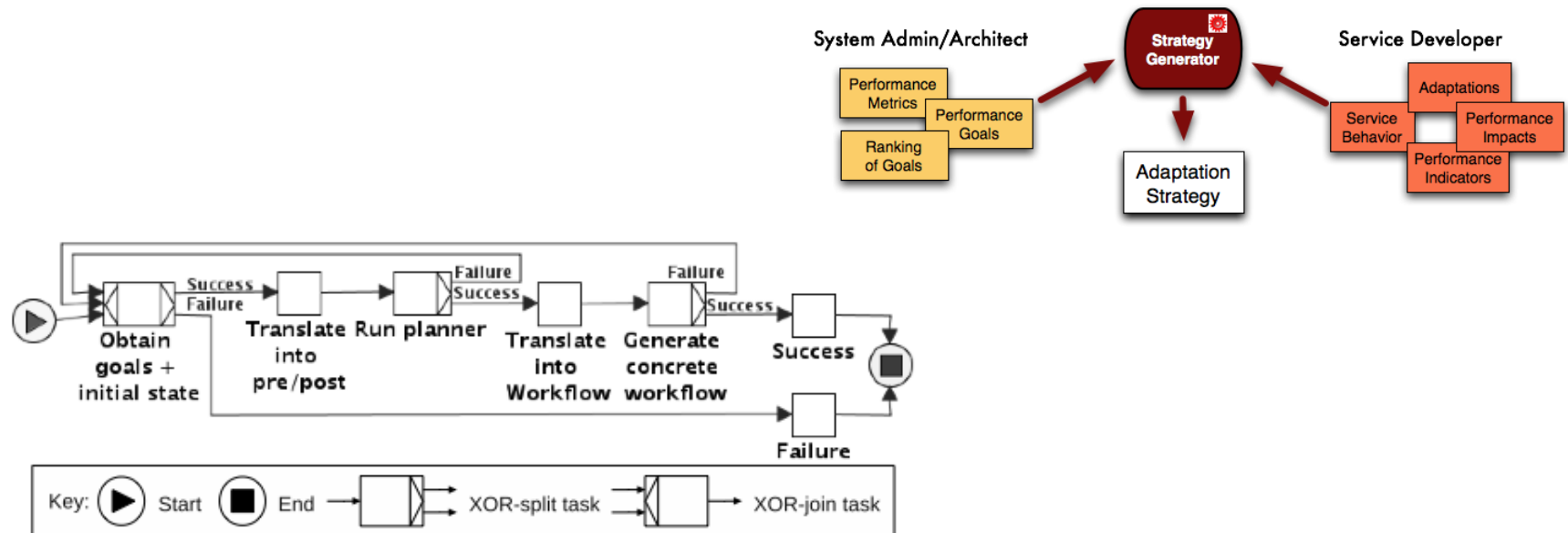
## ■ Support for analysis

- Techniques and tools that support both qualitative and quantitative analysis of adaptation strategies with respect to system goals
- Address uncertainty using probabilistic models and integrating different techniques
  - Formal architectural reasoning employing Alloy and Spin for generating possible system configurations and checking those for satisfaction of properties
  - Combination of probabilistic model checking and test cases for the provision of levels of confidence in adaptation strategies
  - Benchmarking the resilience of self-adaptive software system
  - Run-time diagnosis to identify likely sources of detected faults
    - Can assist adaptation mechanism in performing more efficient reconfiguration by focusing attention on likely causes

# Technical Objectives

## ■ Dynamic generation of adaptation strategies

- According to system goals and depending on the available resources generate adaptation strategies during run-time
- Automated generation of processes for integration testing of self-adaptive software



# Technical Objectives

## ■ Case study and evaluation

- Real world scenario to experiment and assess the effectiveness of the approach
- Critical Software device manager service for data acquisition and device control

## ■ Dissemination of results

- Website to distribute publications and tools  
<http://adaas.dei.uc.pt/adaas>
- A dedicated session and panel on **Assurances** at the 6th International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2011)



# *Collaboration to-date*

- Kickoff meeting of all PIs (Lisbon, Nov. 19<sup>th</sup>, 2010)
- Weekly telecom and video conferences
- Project Wiki
  - Public website (Dissemination)
  - Private area (Collaboration)
- Meeting with industrial partner to select case study
- Planned spring PIs meeting in Portugal (date to be determined)