

# Towards Dynamic Adaptation within an ESB-based Service Infrastructure Layer

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# Agenda

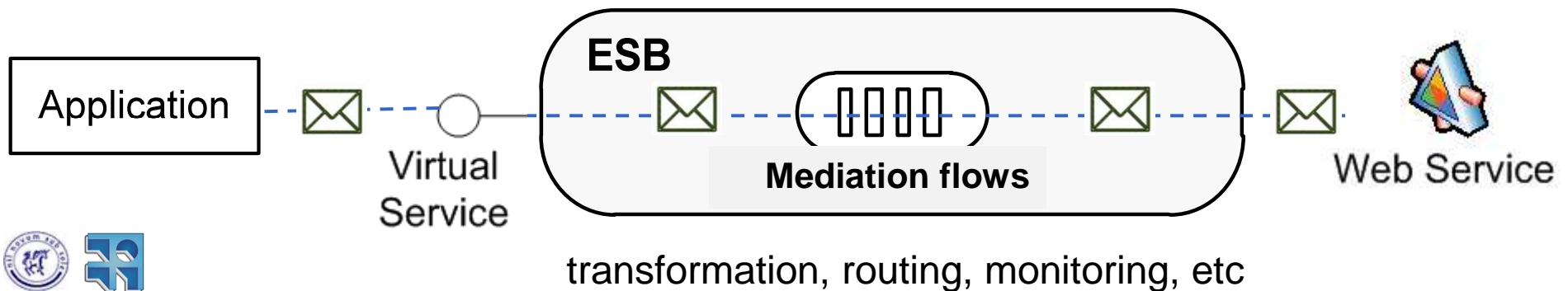
- ❑ Motivation
- ❑ ESB Background
- ❑ Solution Approach
  - Addressing SOA Adaptation
  - Dynamic Adaptation in ESB
- ❑ Conclusions
- ❑ Future Work

# Motivation

- ❑ Self-adaptation in SOA is increasingly required
- ❑ ESB recognized middleware for supporting the SOA infrastructure layer
- ❑ Our main goal:
  - To enable dynamic adaptation in ESB-based service infrastructures to support self-adaptation in SOA

# ESB Essentials

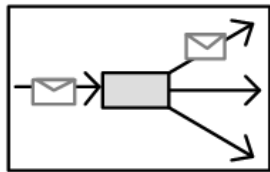
- ❑ An ESB is a standards-based integration platform which combines messaging, web services, data transformation, and intelligent routing... (Chappell 2004)
- ❑ Applications (or services) communicate through the ESB by sending messages



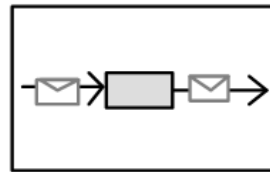
transformation, routing, monitoring, etc

# ESB Mediation Patterns

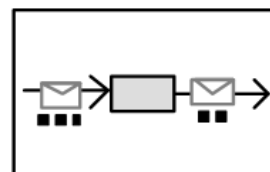
- Intermediate Routing Patterns determine message path based on different factors



router



static router

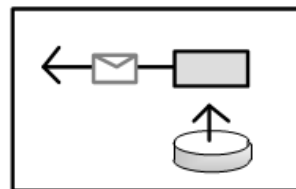


routing slip

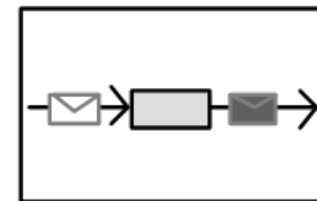
- Transformation Patterns deal with runtime transformation of messages

- Others

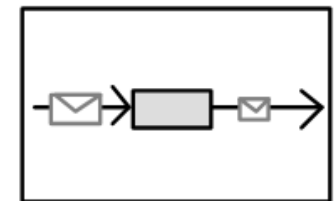
- Cache:



cache



transformation



content filter

# Solution Approach

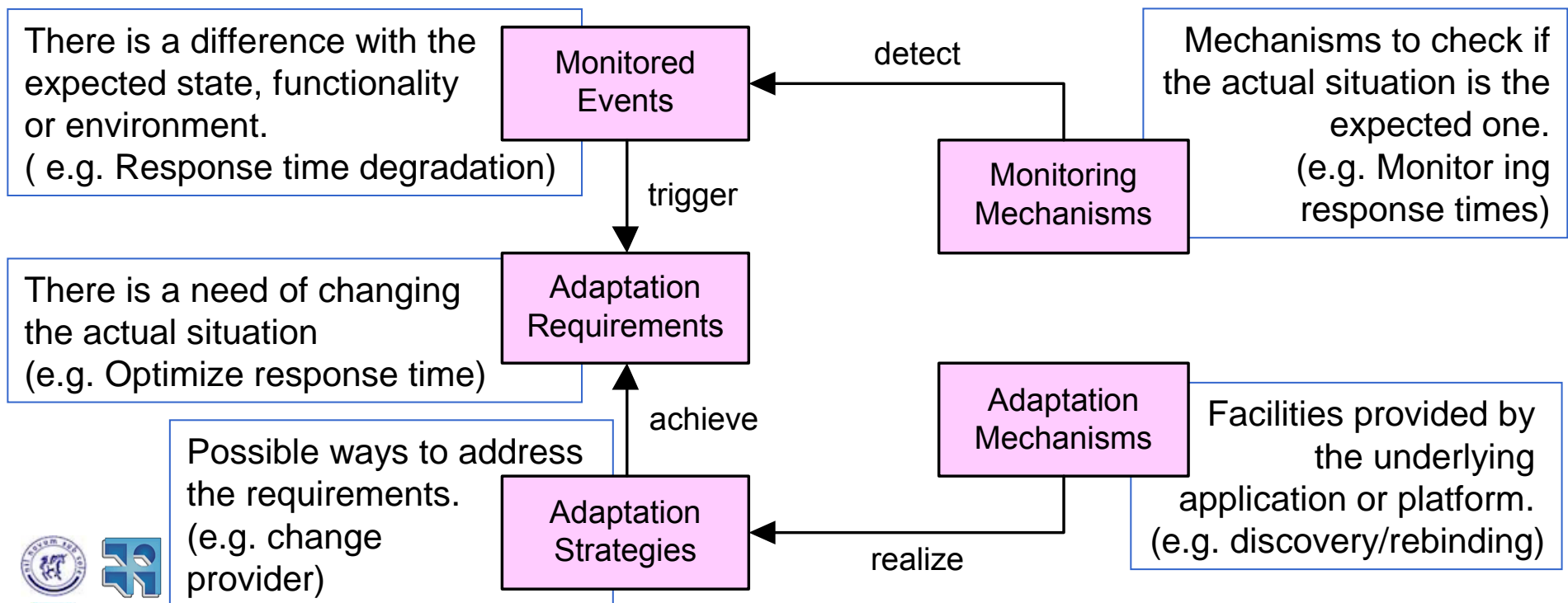
- ❑ ESBs provide various built-in mediation features, however:
  - Their main purpose is to address integration / communication issues
  - They generally require static configuration
  - They are usually configured in a per service basis
- ❑ S-Cube Project
  - Adaptation as a cross-layer issue in SOA
  - Definition of an Adaptation and Monitoring Framework

# Solution Approach

- Our approach consists in:
  - Analyzing and specifying how SOA adaptation requirements can be addressed with ESB capabilities
  - Enabling the dynamic execution of the identified adaptations
  - Providing adaptations which can be re-used by different services
  - Considering S-Cube definitions regarding SOA adaptation

# Addressing SOA Adaptation

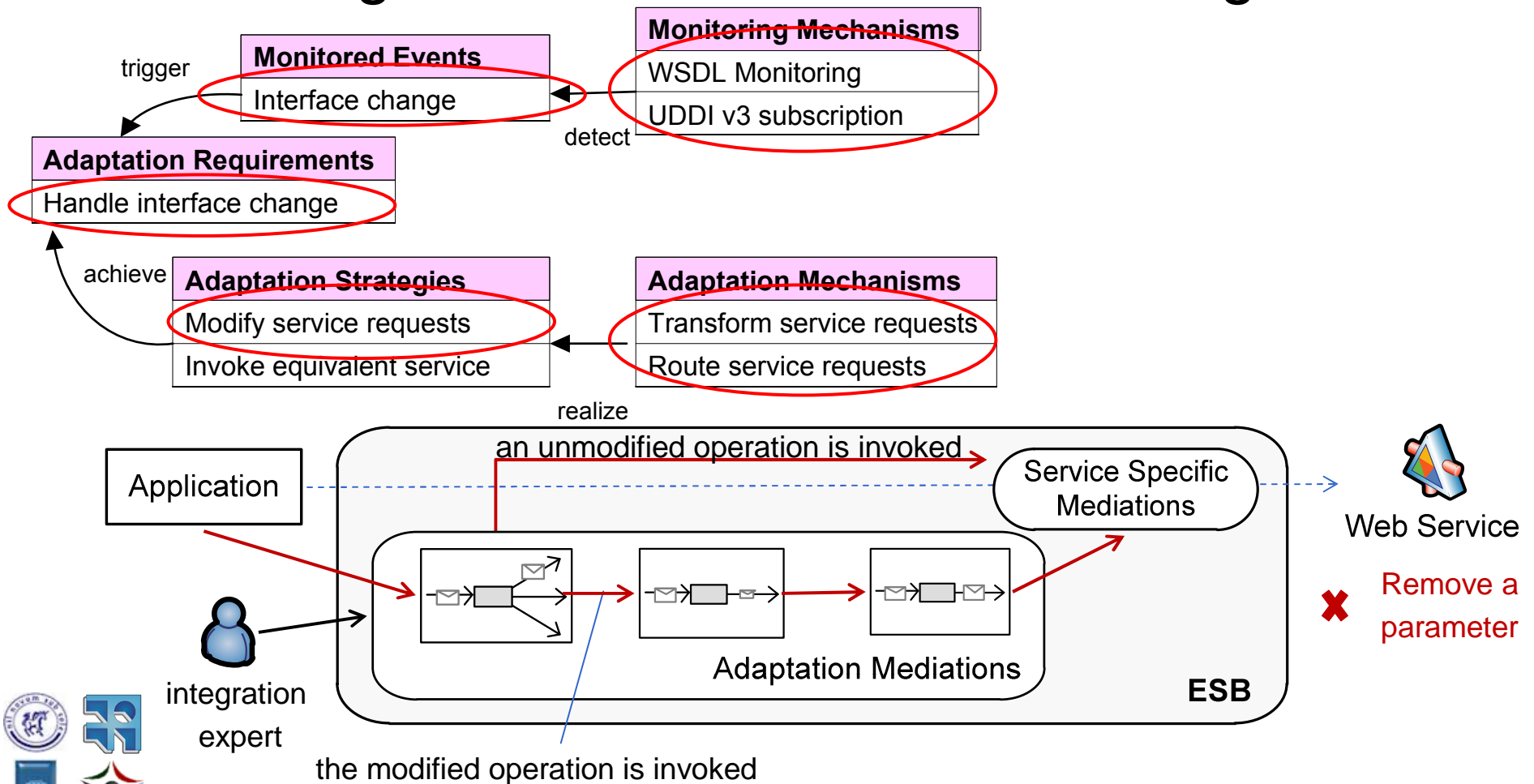
- To analyze how adaptation requirements can be addressed in an ESB, we use concepts defined within the S-Cube A&M Framework





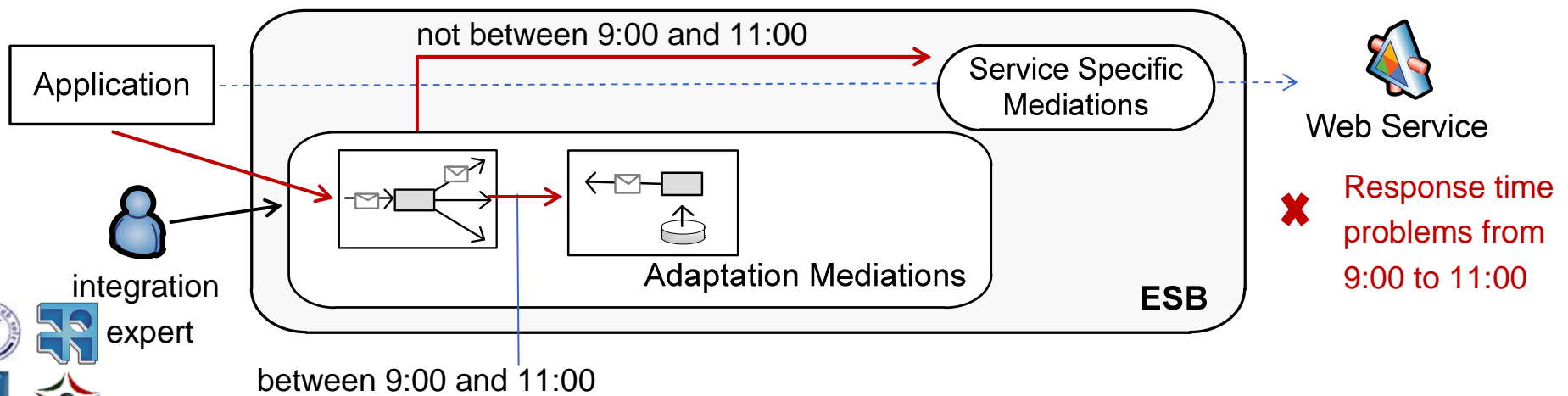
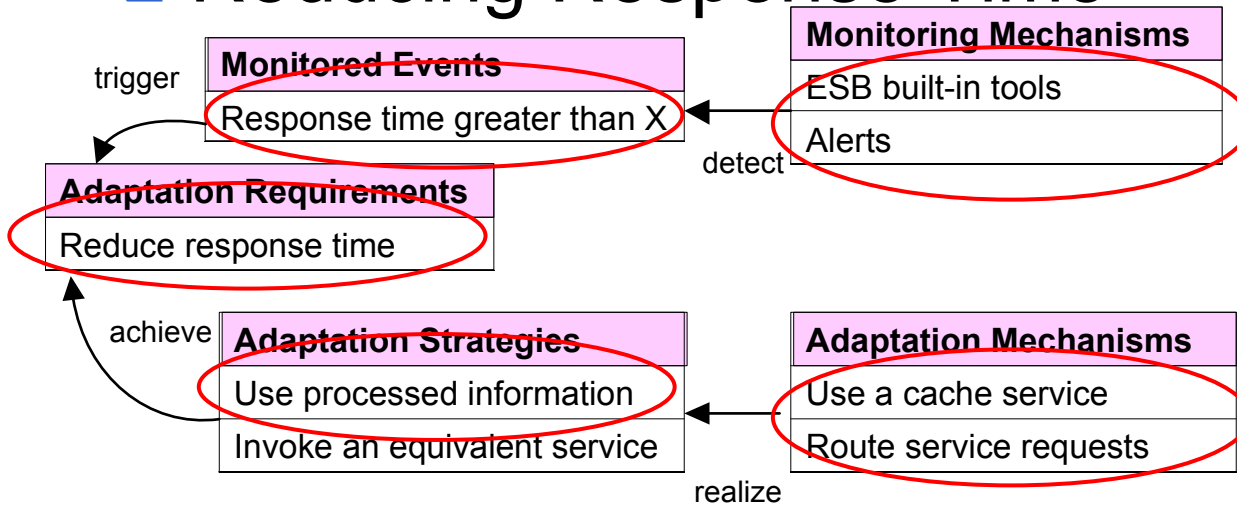
# Addressing SOA Adaptation

## □ Handling Web Service Interface Changes



# Addressing SOA Adaptation

## Reducing Response Time

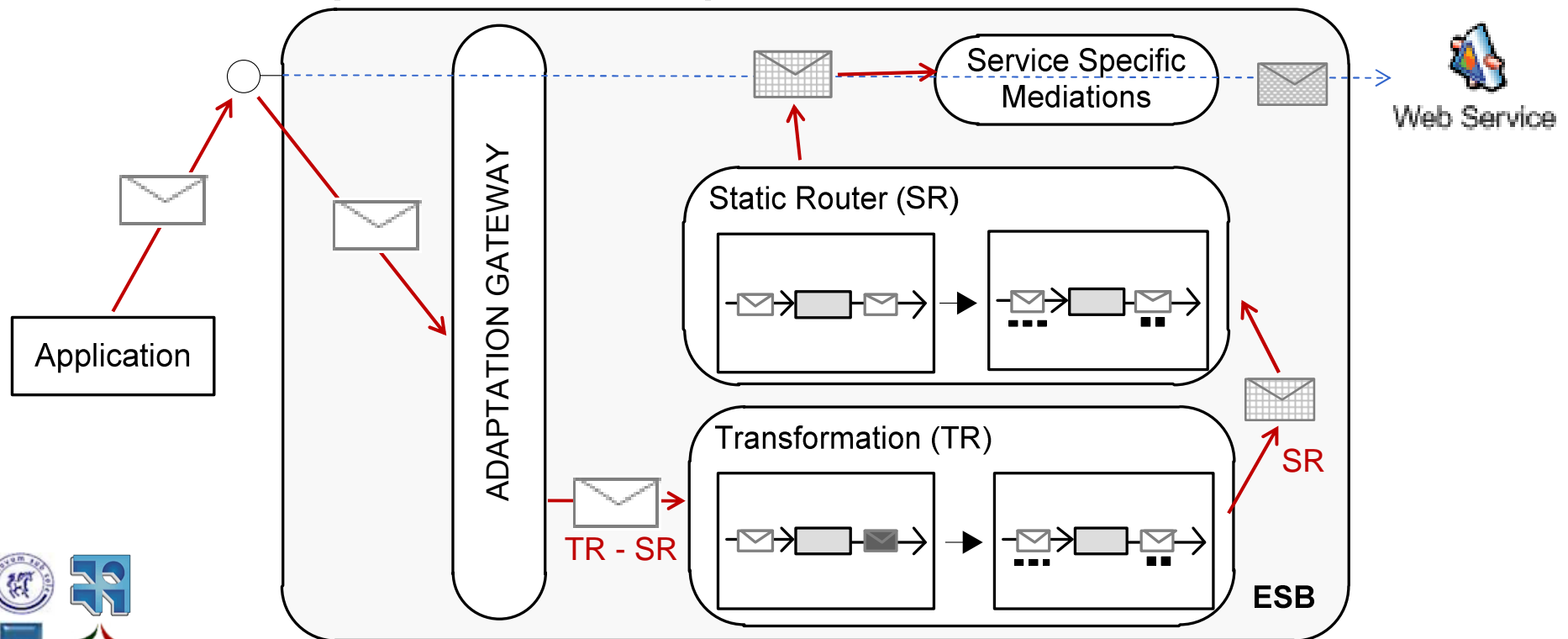


# Addressing SOA Adaptation

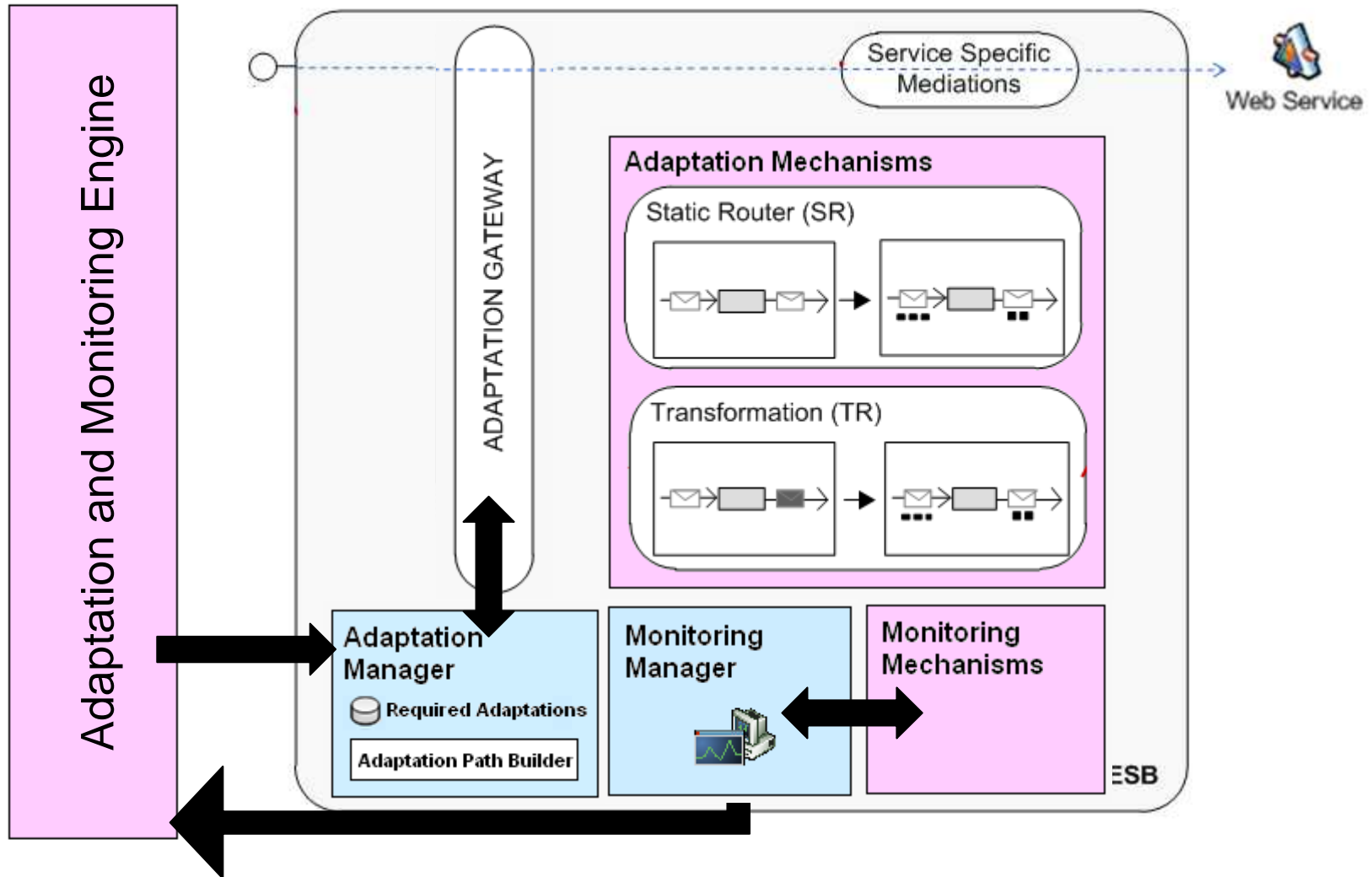
- Other Adaptation Requirements
  - Handling service contract changes
    - Operations, policies, data model
  - Optimizing quality of service values
    - Availability, performance, service saturation
  - Handling Faults
  - Handling invalid input / output

# Dynamic Adaptation in ESB

- The general idea is to intercept all messages and attach them an “adaptation path” when an adaptation is required



# Dynamic Adaptation in ESB



# Conclusions

- ❑ We presented how an ESB can be leveraged to address common SOA adaptation requirements
- ❑ We also proposed an approach to execute these adaptations dynamically
- ❑ The solution approach is based on:
  - commonly supported ESB patterns (likely to be applied in different ESB products)
  - S-Cube definitions on SOA adaptation

# Future Work

- ❑ Analyze how other SOA adaptation requirements can be addressed by ESBs
- ❑ Incorporate other ESB mechanisms to perform adaptations
- ❑ Decision mechanisms
- ❑ Consider other SOA layers
- ❑ Implementation and evaluation of the proposed approach
  - Currently being implemented with JBossESB

# Questions?





# Contact Information



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