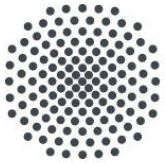
Outlook to the Afternoon Sessions



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Institute of Architecture of Application Systems

PlanQK

SeQuenC

EniQmA

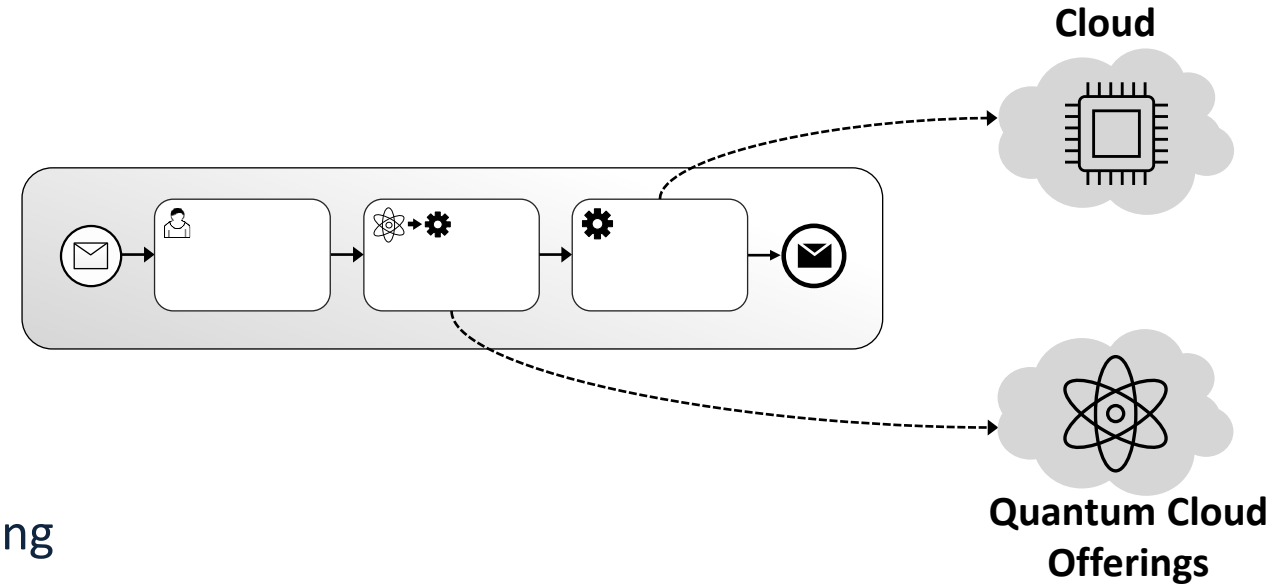
Tutorial Structure

- Session 1 (09:00 - 10:30): An Introduction to Quantum Computing
- Session 2 (11:00 - 12:30): Quantum Software Engineering
- **Session 3 (14:00 - 15:30): Quantum Workflows**
  - Quantum Workflows
  - Service-oriented Quantum Applications
  - Introduction to Hands-On Session
  - Hands-On Session Part 1
- Session 4 (16:00 - 17:30): Operation of Hybrid Quantum Applications

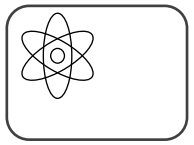
Workflows for Quantum Computing

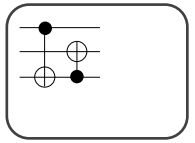
- Workflows enable orchestration and integration of heterogeneous applications
  - Definition of activities, control flow, and data flow

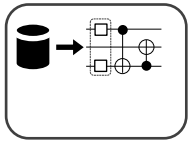
- Advantages:
  - Scalability
  - Robustness
  - Monitoring
  - Advanced Exception Handling
  - Portability via standardized languages (BPMN, BPEL)

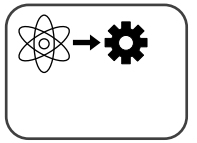


Quantum Modeling Extension (QuantME)


quantum computation task

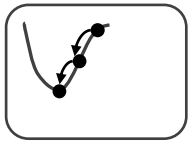

quantum circuit loading task

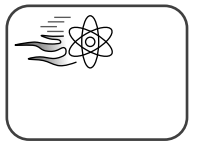

data preparation task

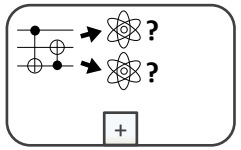

quantum circuit execution task

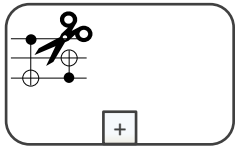

readout error mitigation task

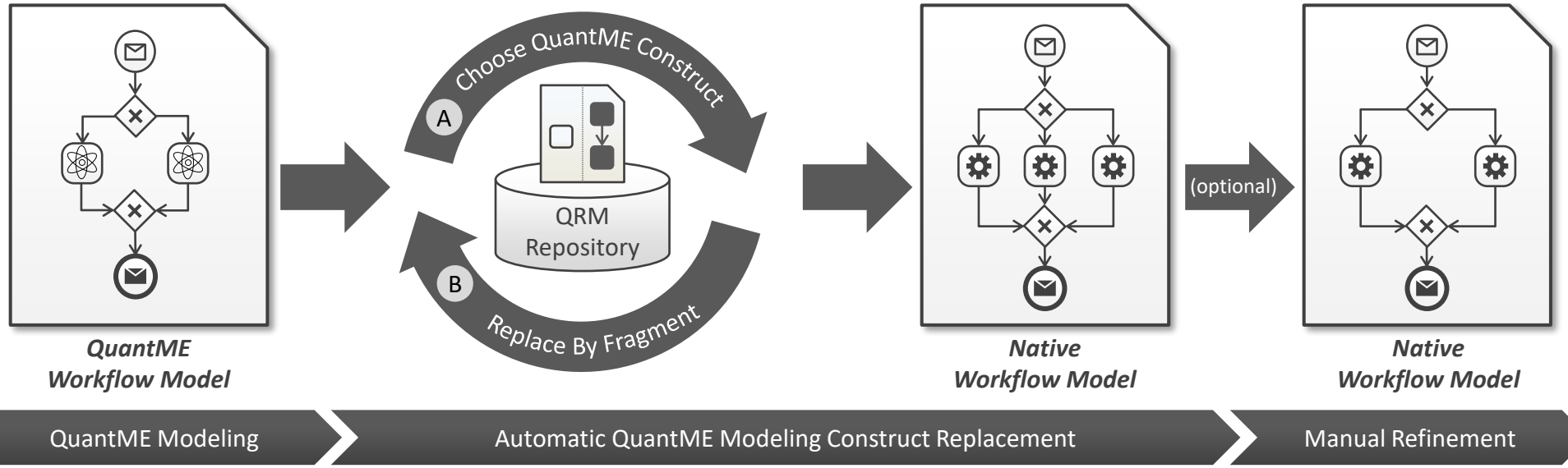

result evaluation task


optimization task

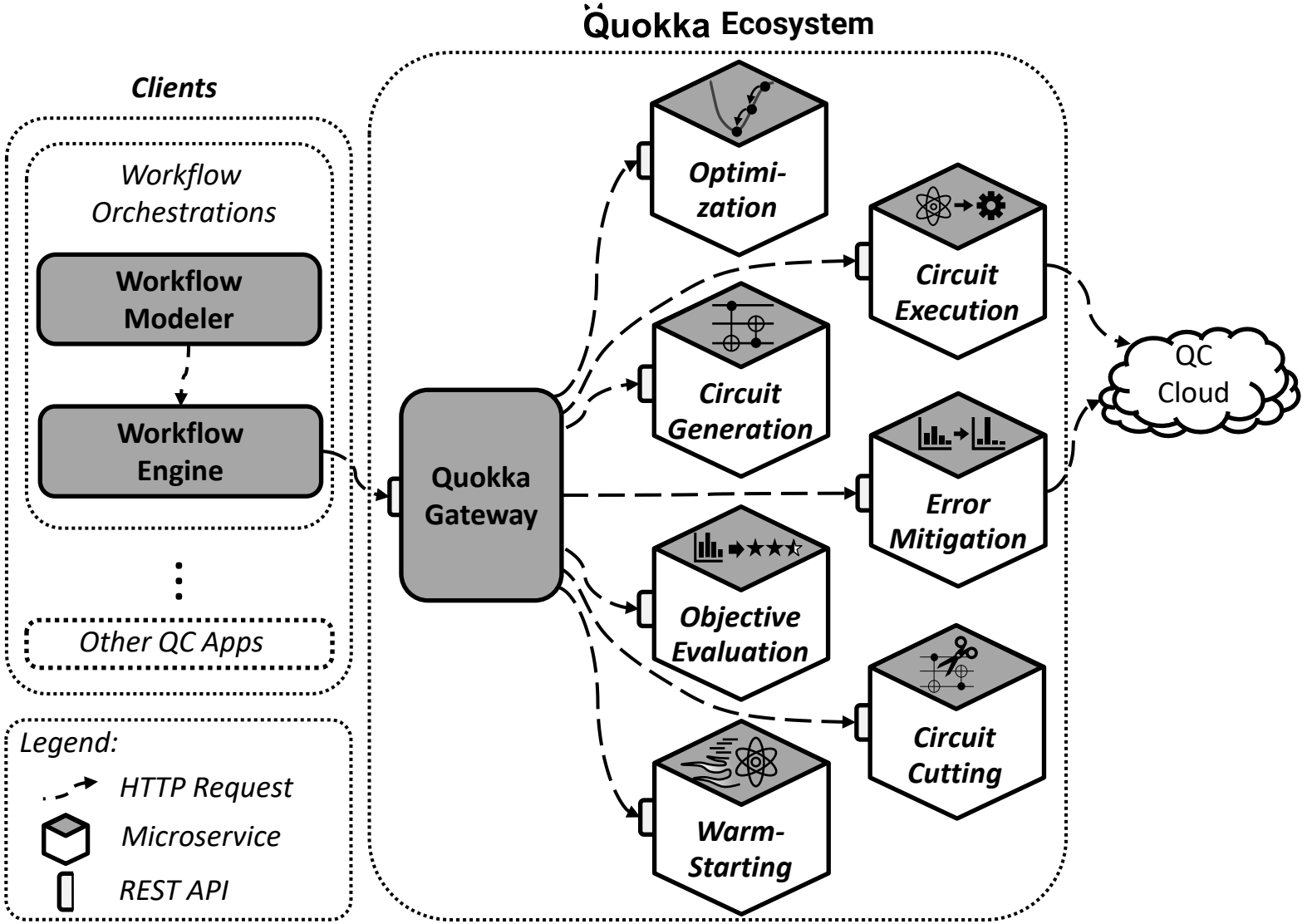

warm-starting task


quantum hardware selection sub-process


circuit cutting sub-process



Quantum Service Ecosystem



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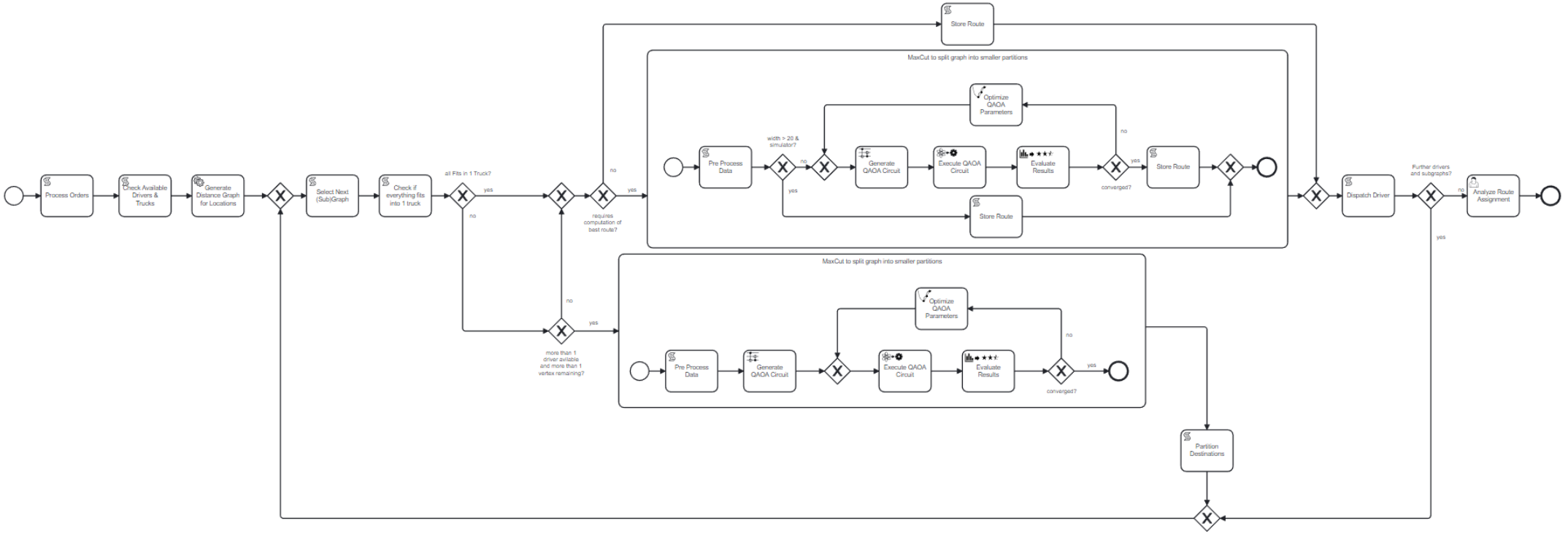
  - Hands-On Session Part 2
  - Wrap-Up

Hands-On Session: Route Planning for Package Delivery Drivers

- Hybrid Quantum Application:
  - MaxCut and TSP solved using variational quantum algorithms
  - Additional classical pre- and post-processing steps



Hands-On Session: Route Planning for Package Delivery Drivers

- Resulting routes for 3 drivers and 10 destinations: