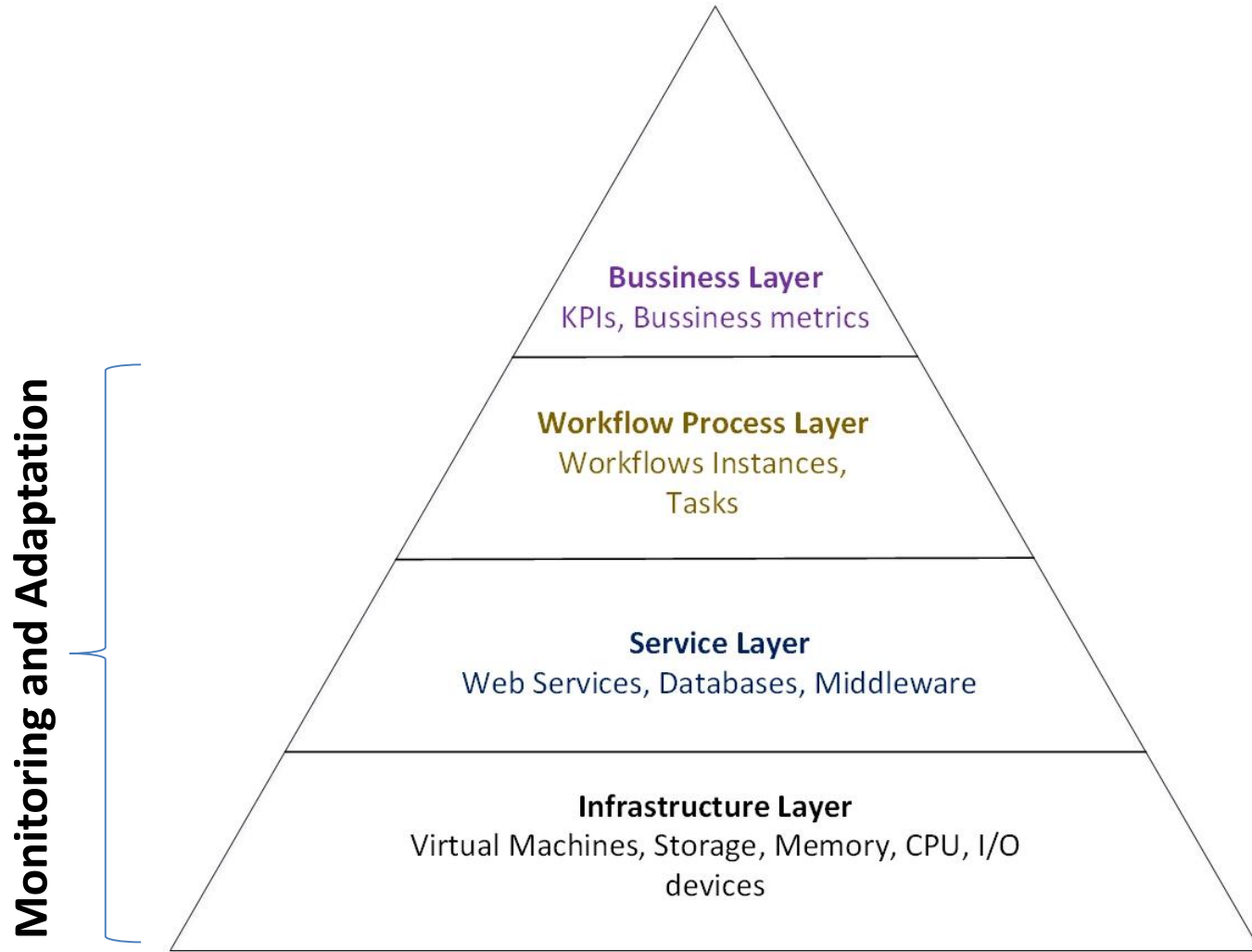


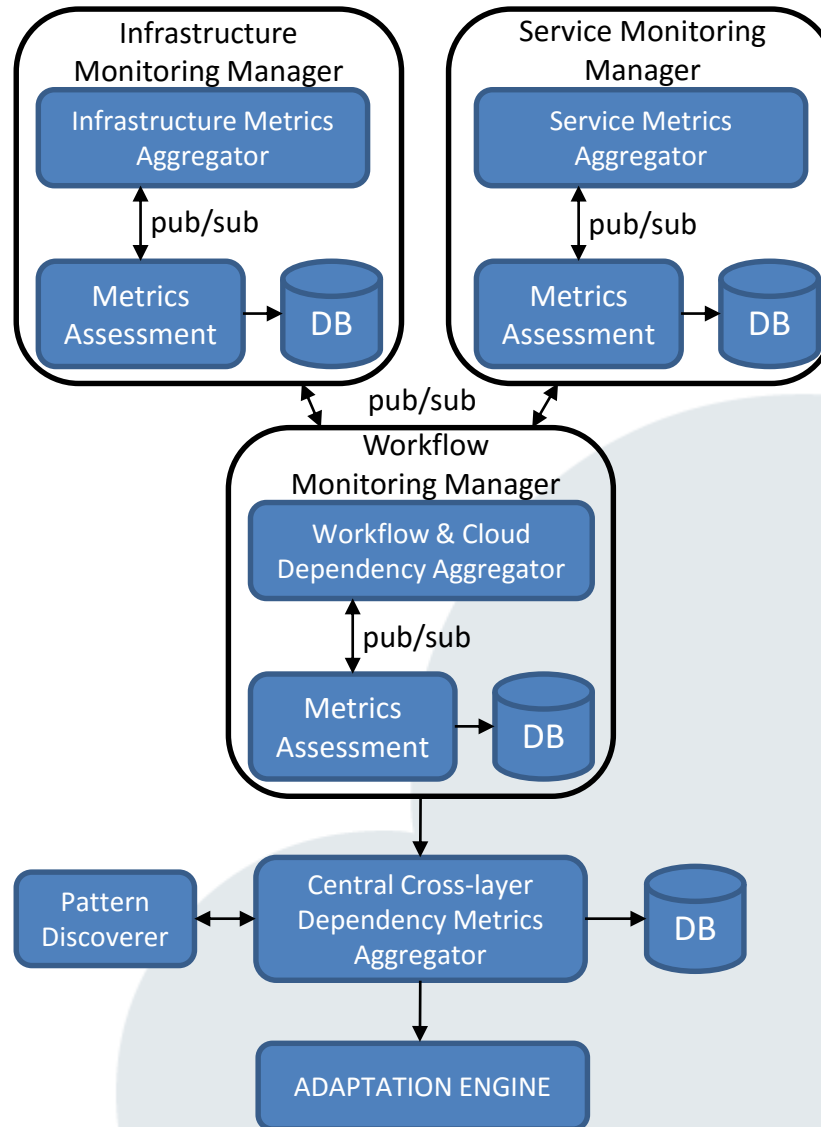
Cross-layer monitoring and adaptation

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ICS-FORTH

Functional Layers Pyramid



Monitoring Framework Architecture



Cross-Layer BPaaS Monitoring

- Cross-layer metric model to cover the measurement gap in same or across connected layers
- Layer-specific monitoring mechanisms
- Publish-subscribe for propagation of measurements from lower to higher-levels
- SLO condition evaluation via CEP or UULM approach (everything is a metric)

Cross-Layer BPaaS Monitoring

- Quality models for Workflow, Service and Infrastructure layers

- Workflow Quality Model**

- Time
- Cost
- Reliability
- Security

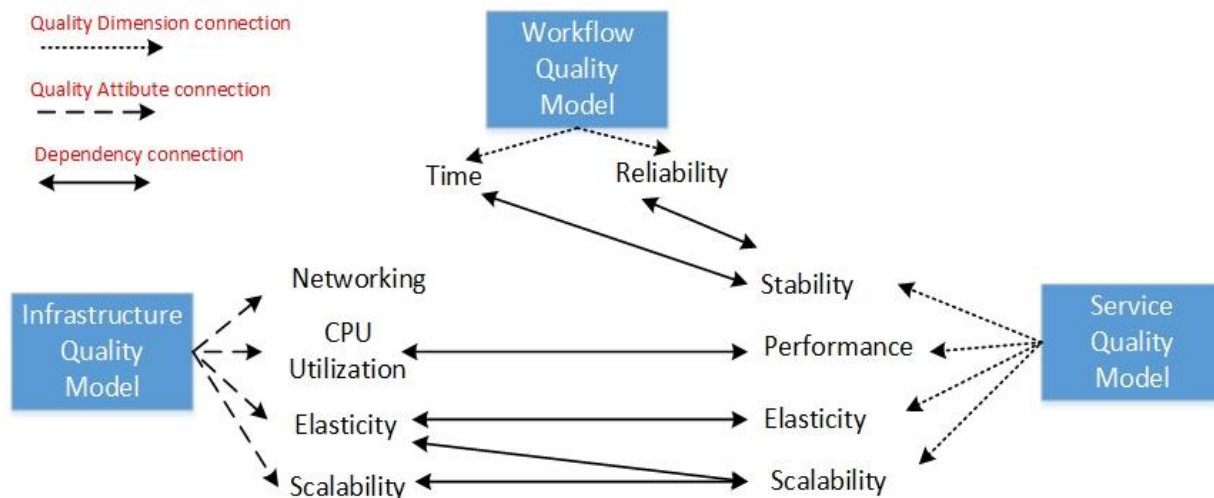
- Service Quality Model**

- Performance
- Stability
- Scalability/ Elasticity
- Security

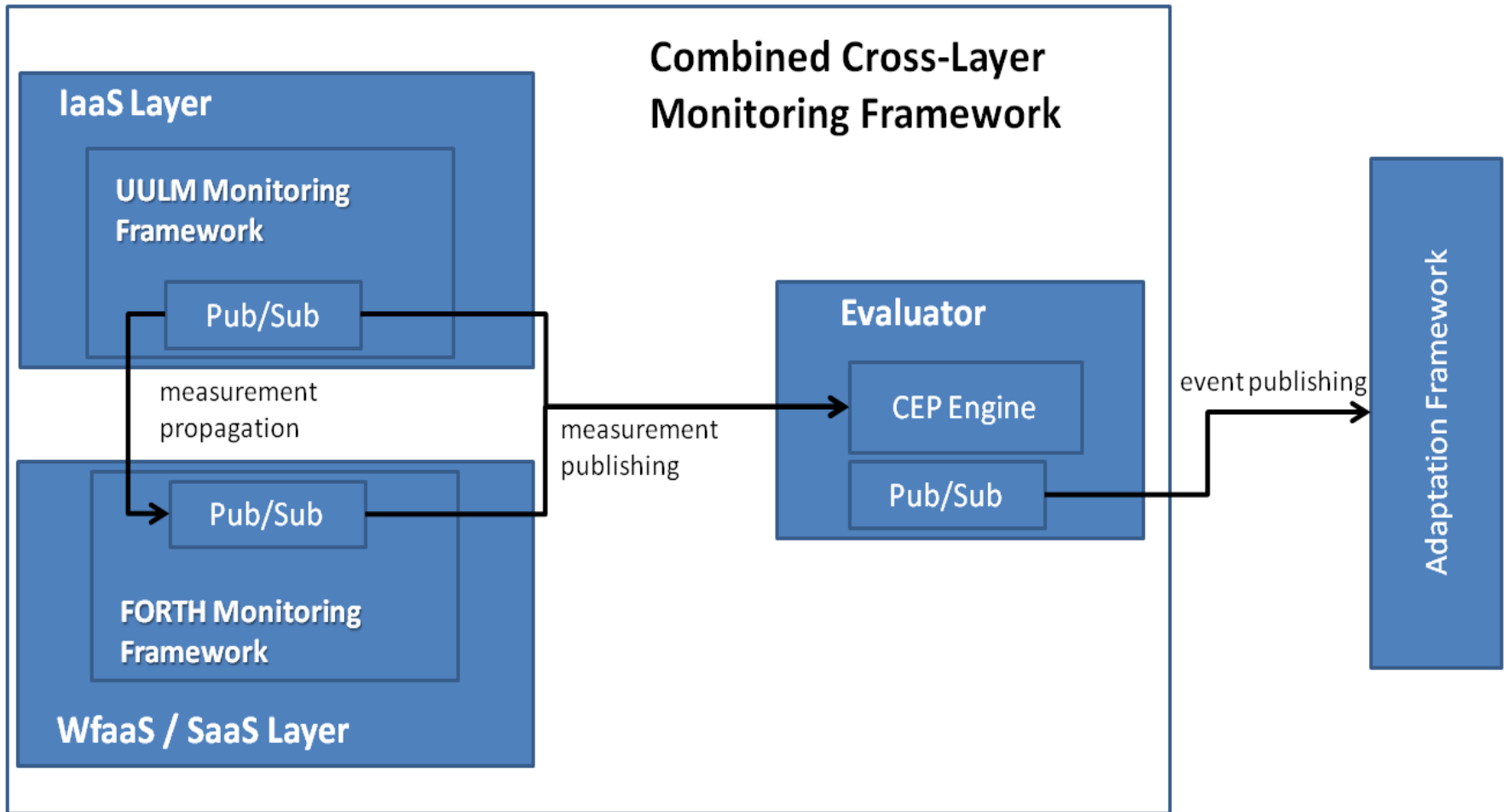
- Infrastructure Quality Model**

- Performance
- Scalability/Elasticity
- Security

Cross-layer metric dependencies



Cross-Layer BPaaS Monitoring



Cross-Layer BPaaS Adaptation

- Adaptation actions as methods of services in each layer (e.g., scale-out as method of Cloud Provider Engine)
- Rule Engine follows current situation and triggers adaptation rules
- Rule triggering leads to adaptation workflow execution via a Workflow Engine
 - Dynamic selection of adaptation actions based on current situation and broker requirements
- Semi-automatic enhancement of adaptation rule knowledge via BPaaS Evaluation Environment

Cross-Layer BPaaS Adaptation

