QuanTM Architecture

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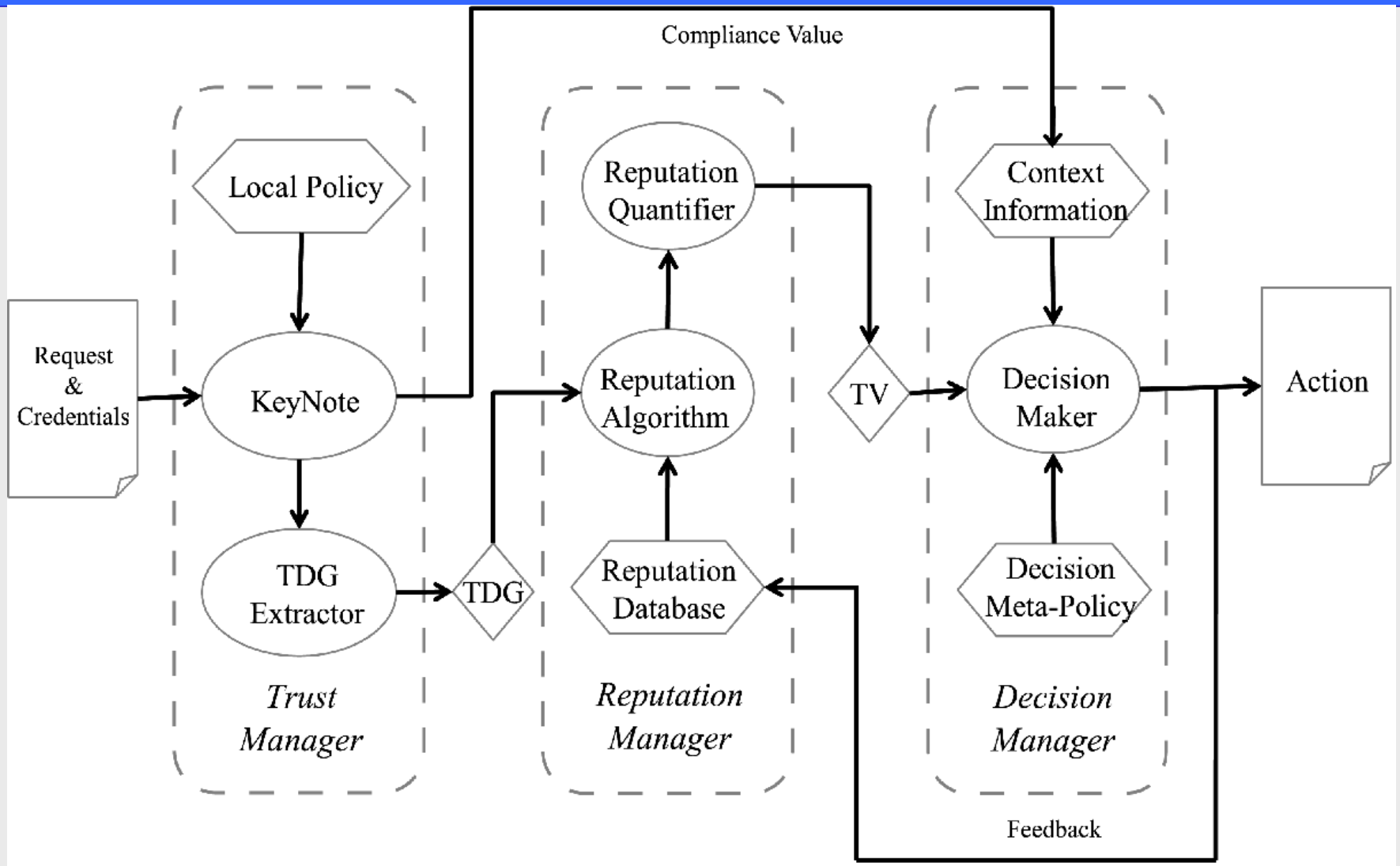
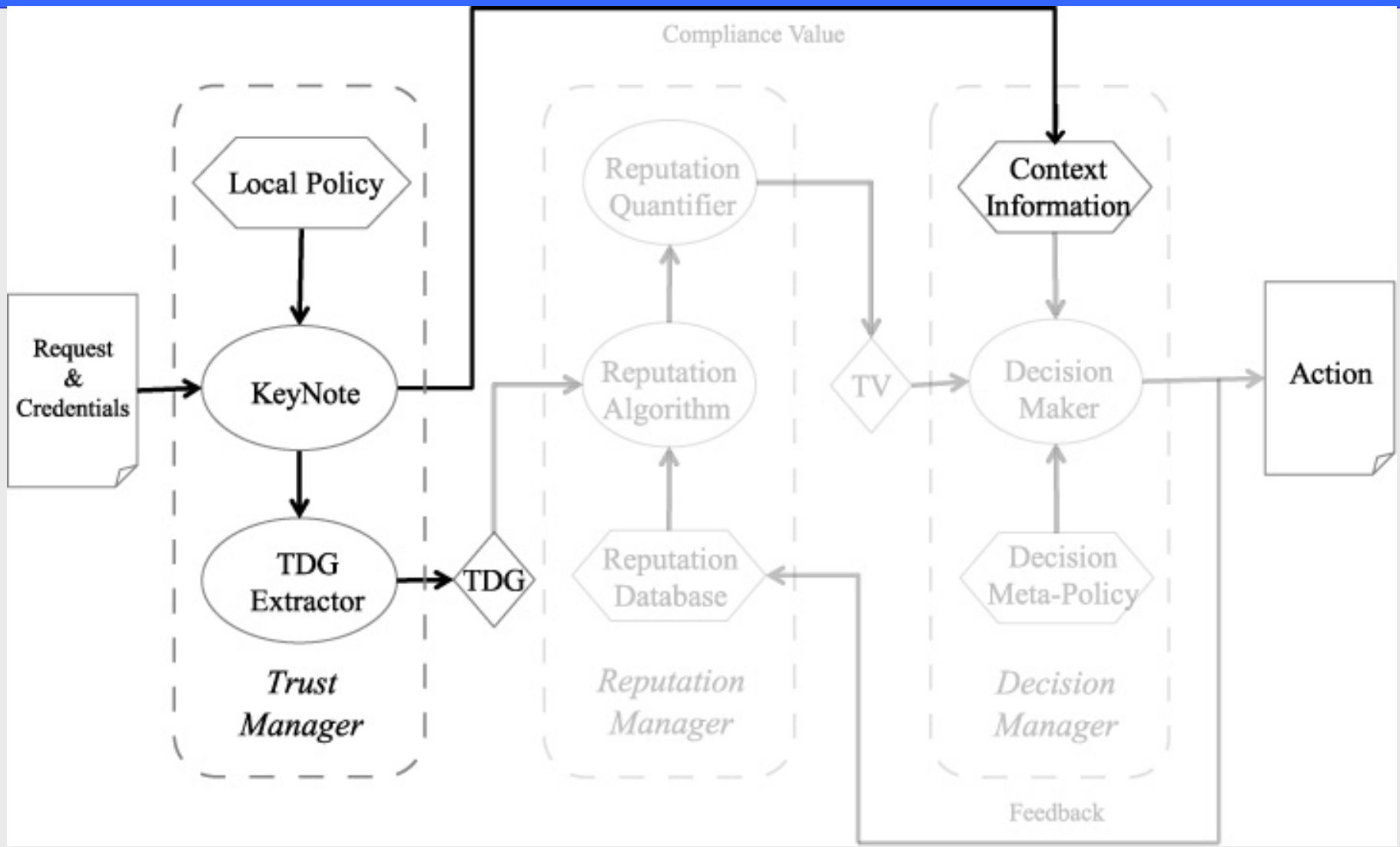
Architecture overview



Trust manager



Trust manager

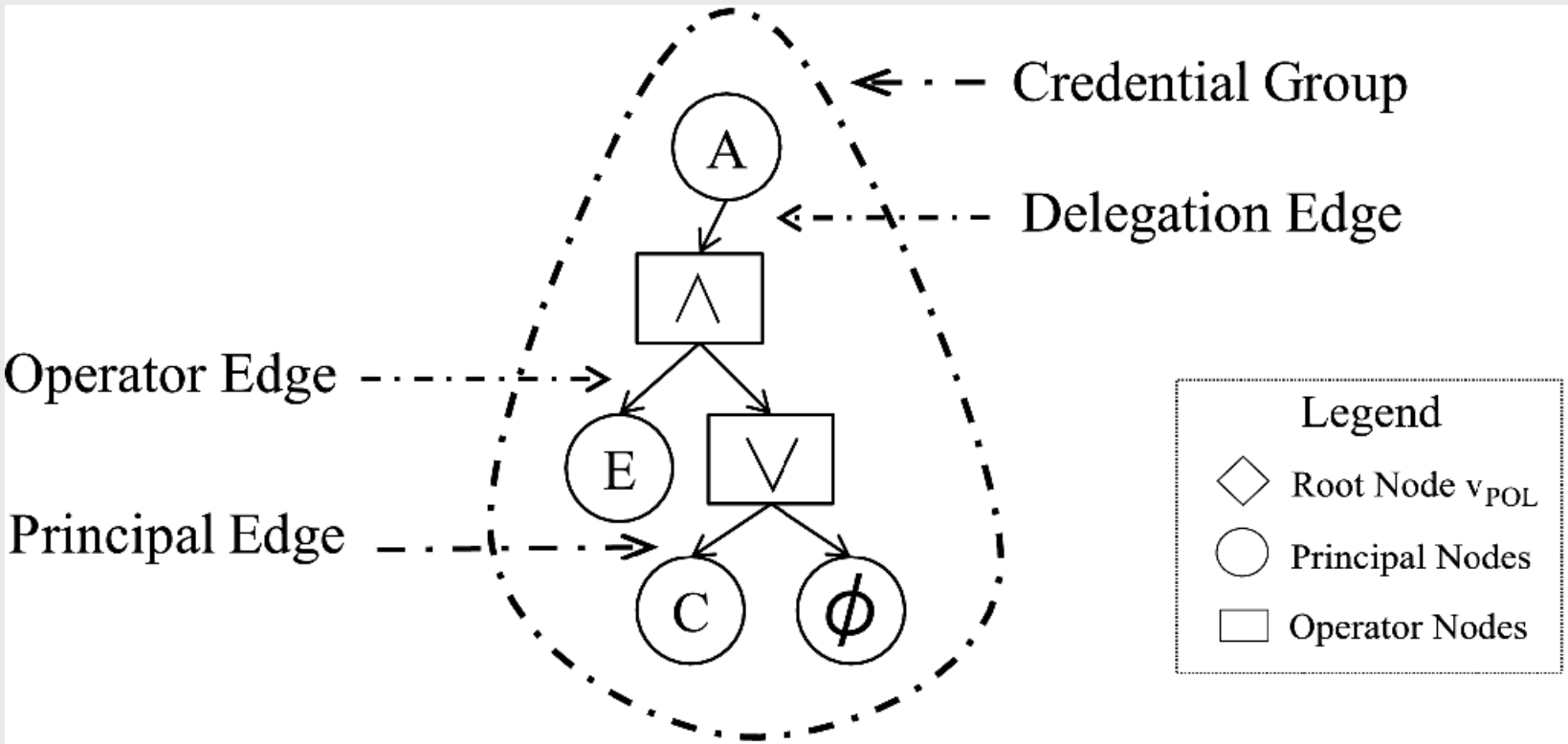
- Check credentials, compute compliance value
  - Qualitative value representing compliance with the policy
- Construct trust dependency graph (TDG)
- Current implementation based on KeyNote
  - Other access control logics can be used

Trust Dependency Graph (TDG)

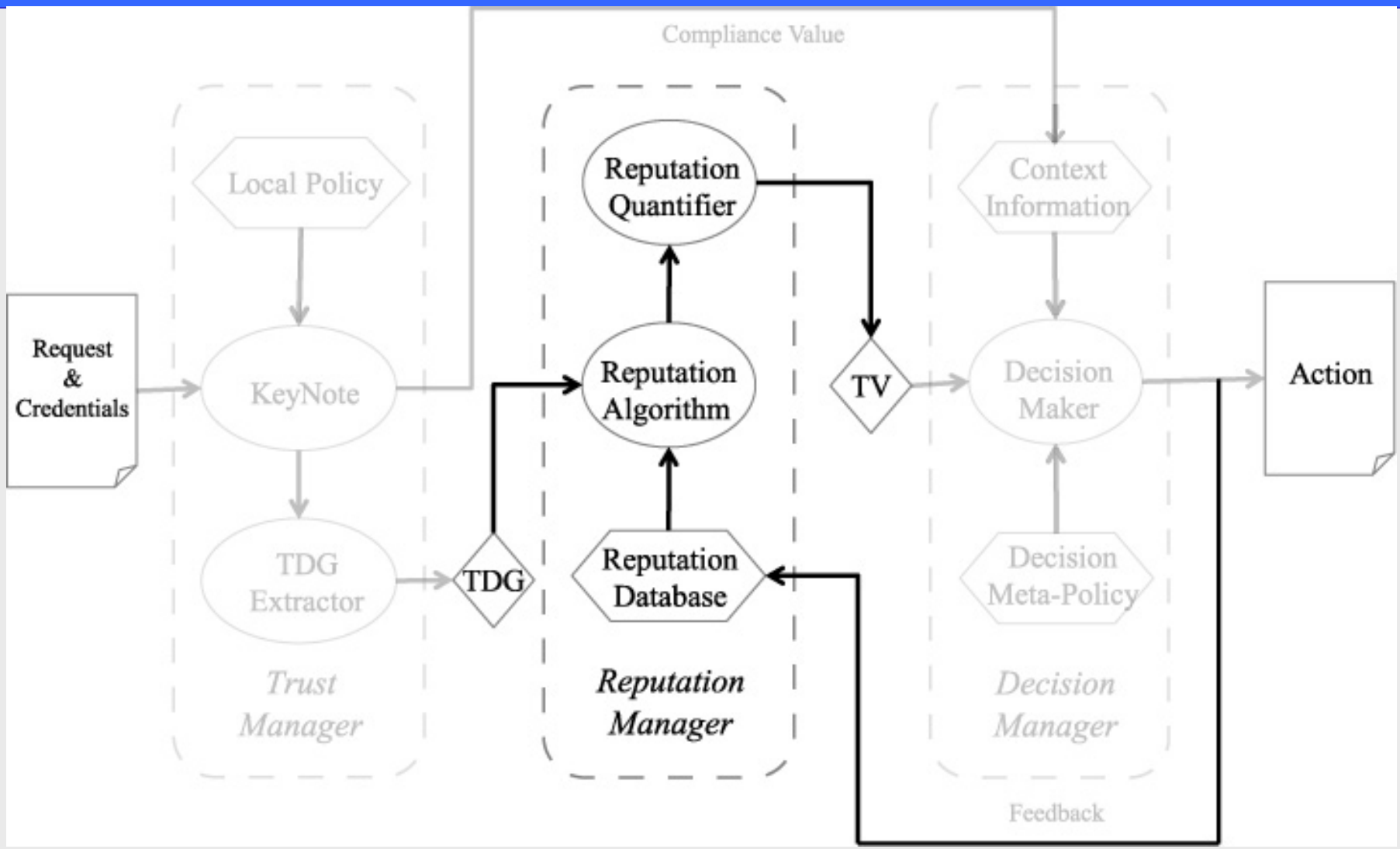
- An encoding of a request and its dependencies:
  - Action requesters
  - Delegation chains
  - Credentials
- Edges represent trust dependencies
  - Place-holders for reputation (shown later)
- Can be easily derived from PTM (KeyNote) local policy and credentials

TDG example

- Reputations are assigned to TDG elements
- Reflect trust in principals, delegations, credentials



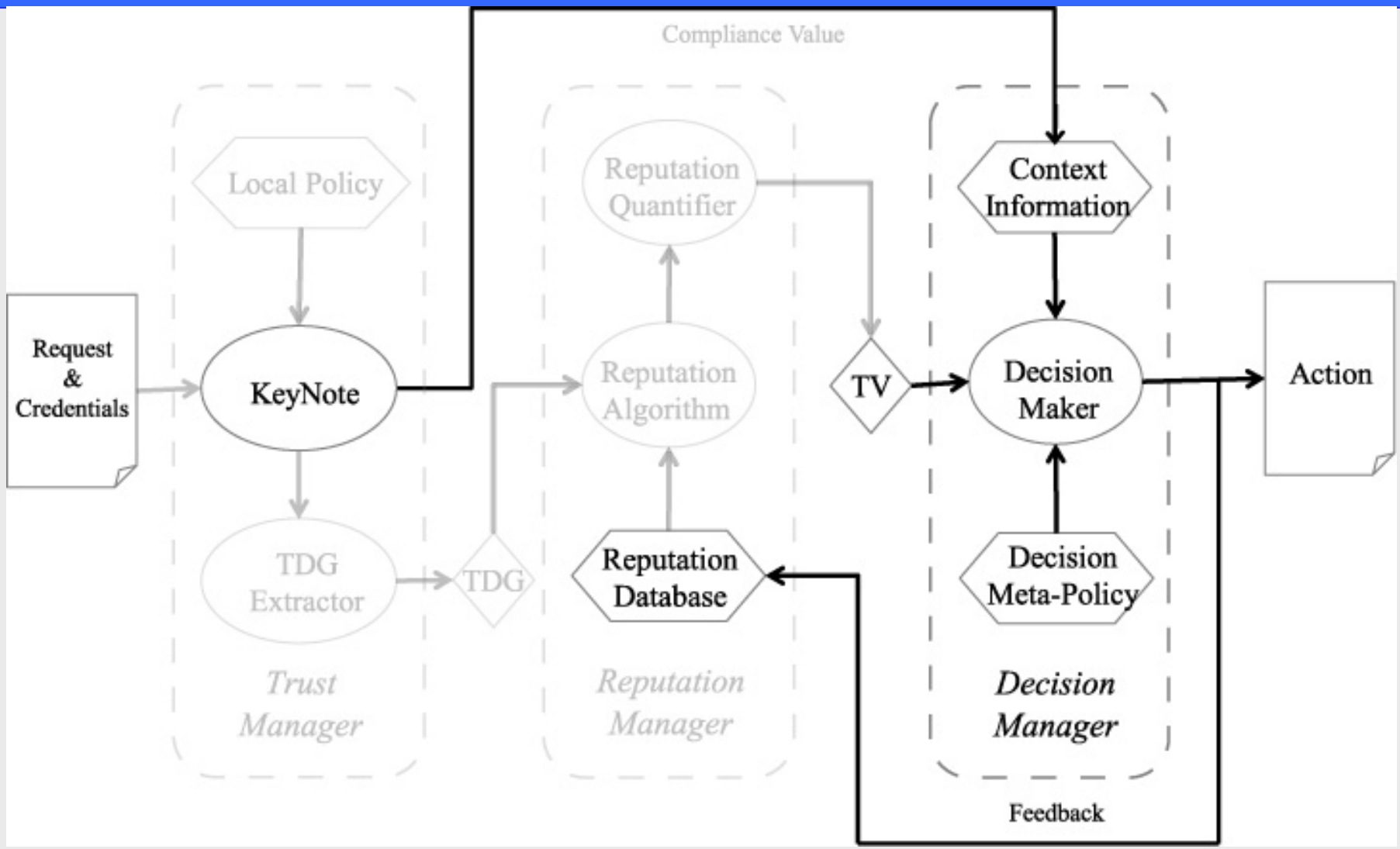
Reputation manager



Reputation manager

- Calculate trust value
  - Assign reputations to TDG edges using the reputation database
  - “push” reputation values up the graph
- Reputations is updated based on feedback
  - Outcomes from previous requests
- Current implementation based on TNA-SL
  - Trust network analysis – Subjective logic
  - Consensus and discount operators

Decision manager



Decision manager

- Uses an application-specific meta-policy
  - Context monitors
  - Cost-benefit analysis
  - Game-theoretic formalization
- Simple example: Threshold policy
  - If CV='maybe' and TV>0.5 -> Fulfill request
  - If CV='true' always fulfill request
  - In general, thresholds can be adaptive

Summary

- QuanTM architecture is a prototype implementation of QTM
- Outcomes of admitted requests produce measurable effect
  - Used as feedback to reputation database
- Design for modularity
  - Different PTM and RTM systems can be plugged in