An Overview of Access Control in ST

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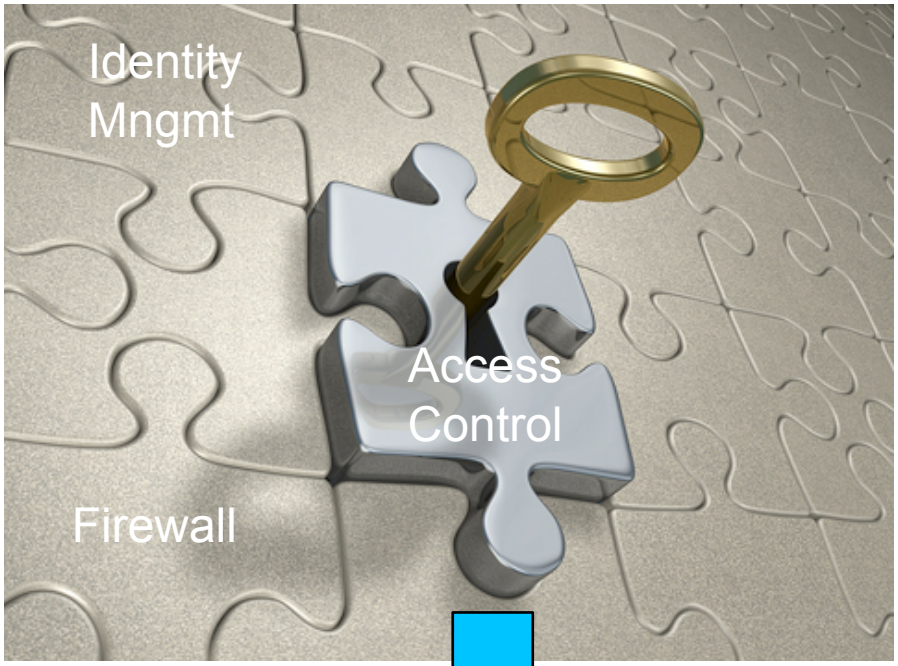
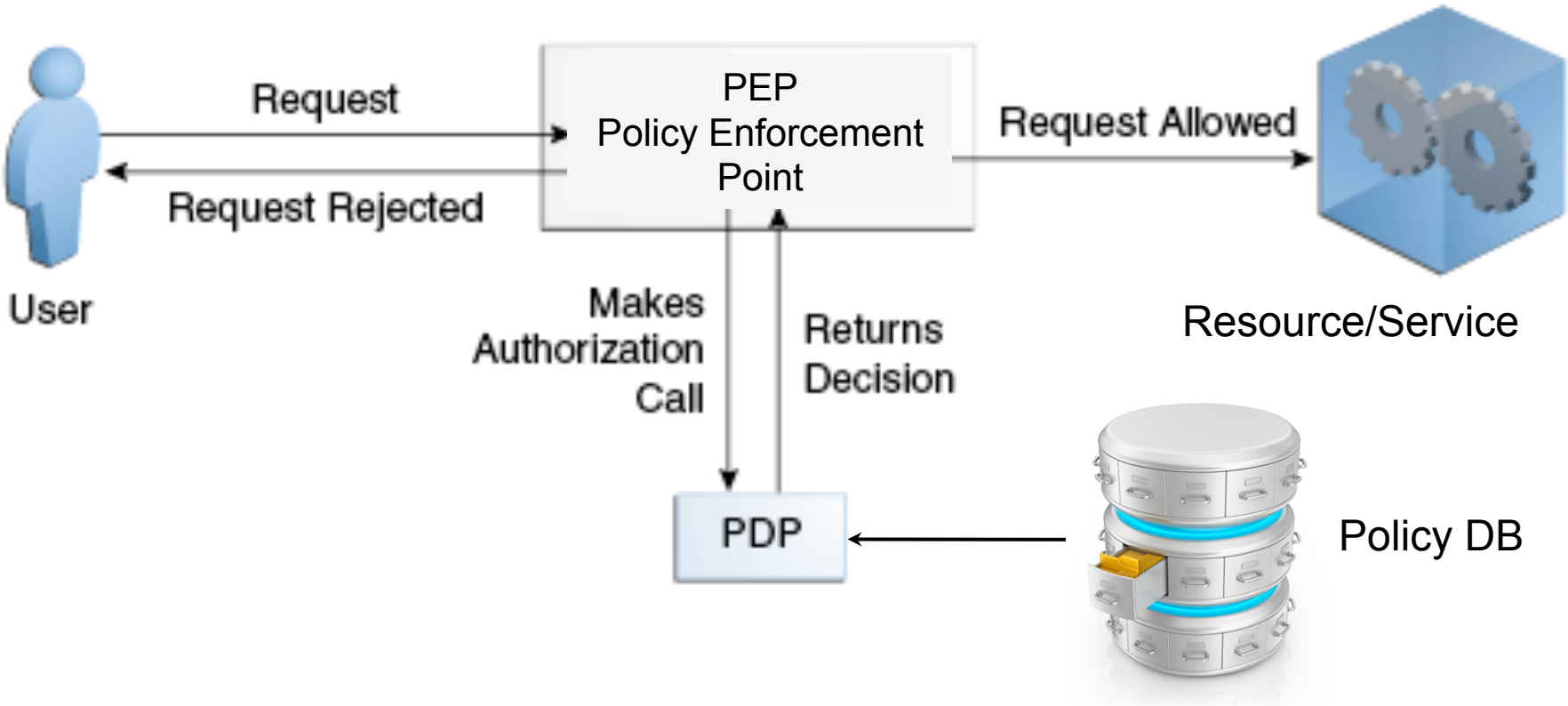
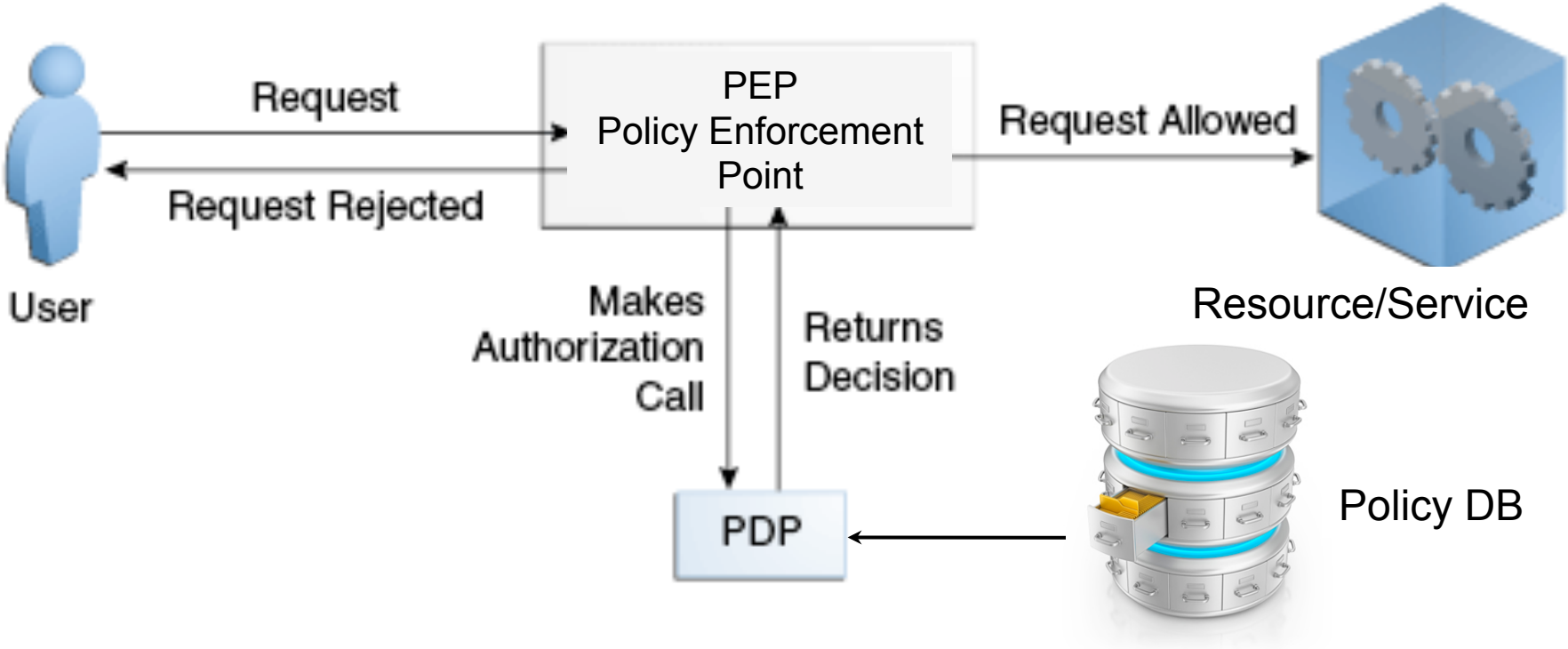
Access Control in the Security Puzzle



Access Control Mechanism



Access Control Mechanism



Security of Cloud-based and Service-oriented Applications and Infrastructures

Problems/Limitations/Difficulties

Access Control: problems

- Difficult to write policies that match designer intentions
- Required more than a simple grant/deny to maximize sharing of information while reducing risk of unintended disclosure

- Administration is complex and may give rise to safety problems

ASASPXL

ASASPTIME

- Enforcement may become very complex in presence of computation-dependent authZ constraints

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- Lack of a uniform framework encompassing policy design and enforcement

ALPS

smart campus
OpenServices
Smart Community

Access Control: problems

- Difficult to write policies that match designer intentions
- Required more than a simple grant/deny to maximize sharing of information while reducing risk of unintended disclosure

Passive Missile Defence (PMD) Scenario

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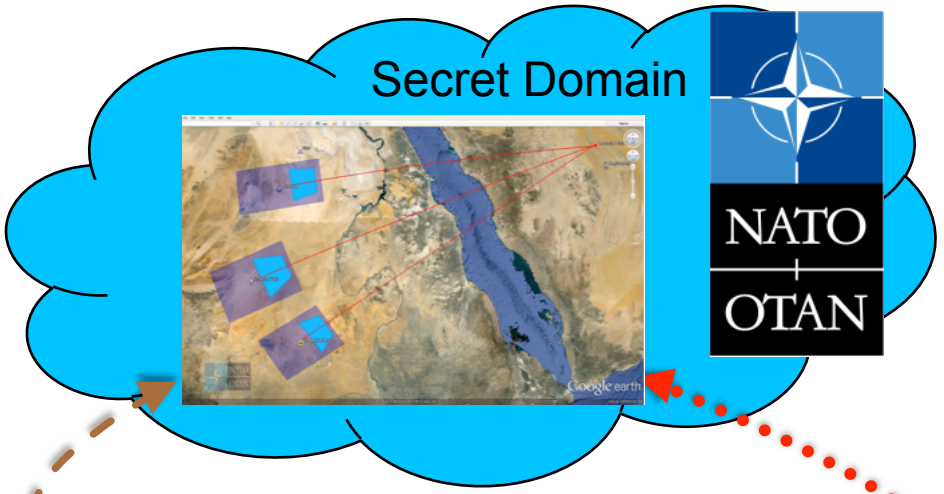
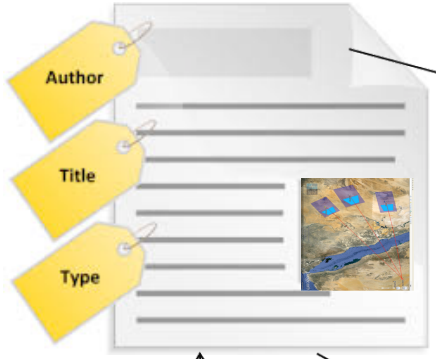
Maps with simulation on rescue mission



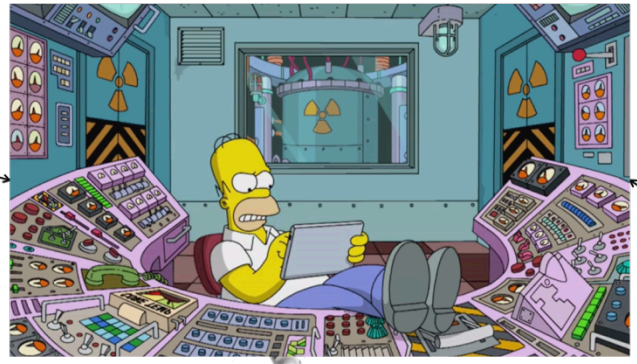
Soldier of NATO member country

Doctor of Red-Cross

Content-based Protection and Release



3. extract content metadata



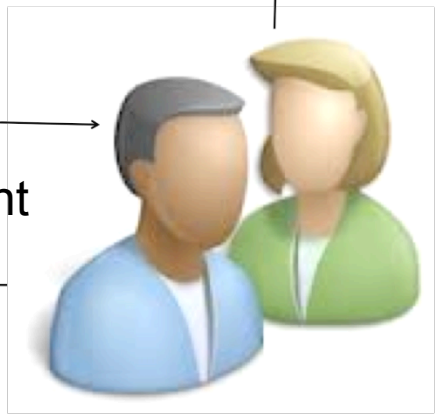
3. credentials

2. pick document

4. picked document

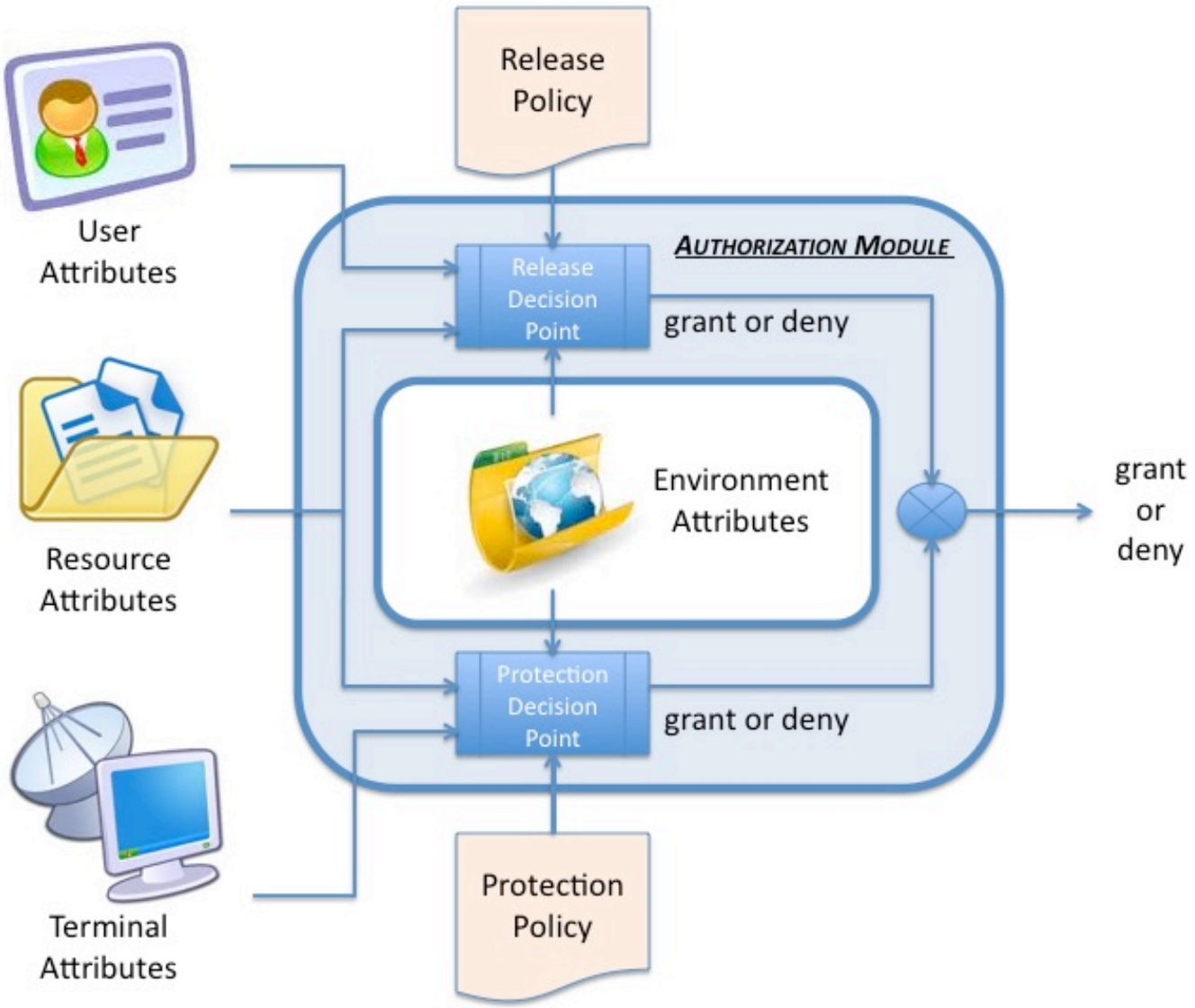
2. provide user profile

5. ***view*** of picked document

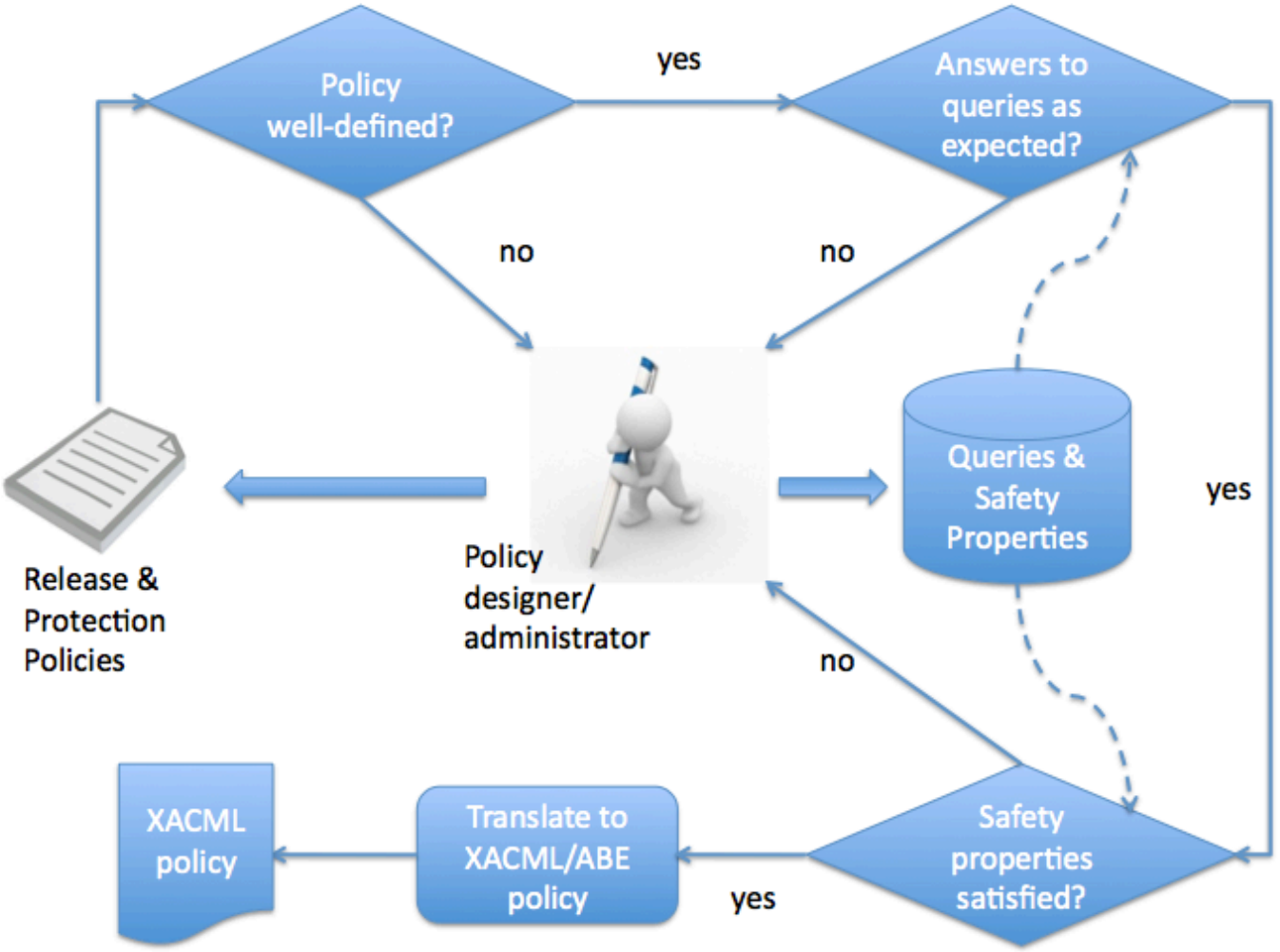


1. ask for a document

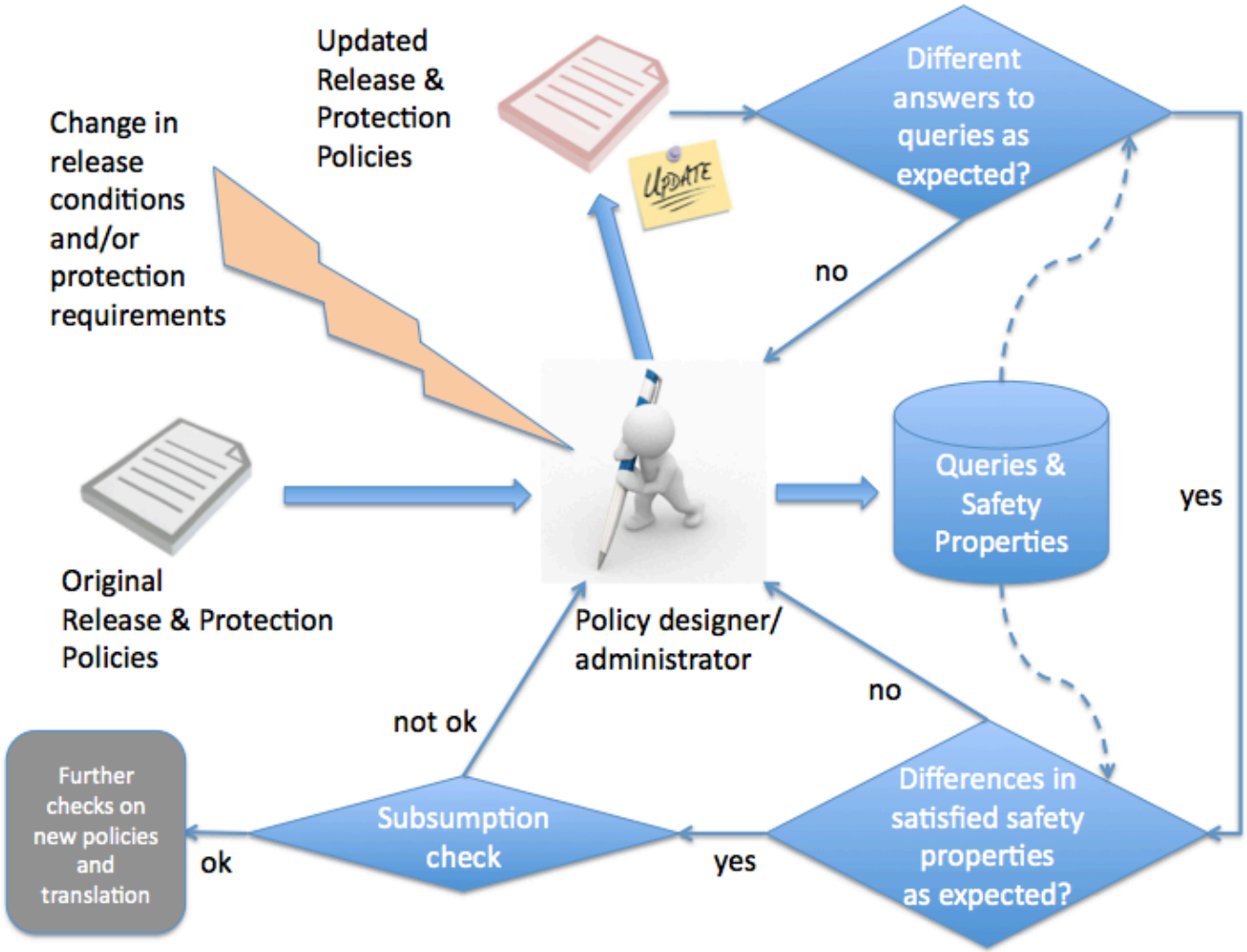
Content-based Protection and Release



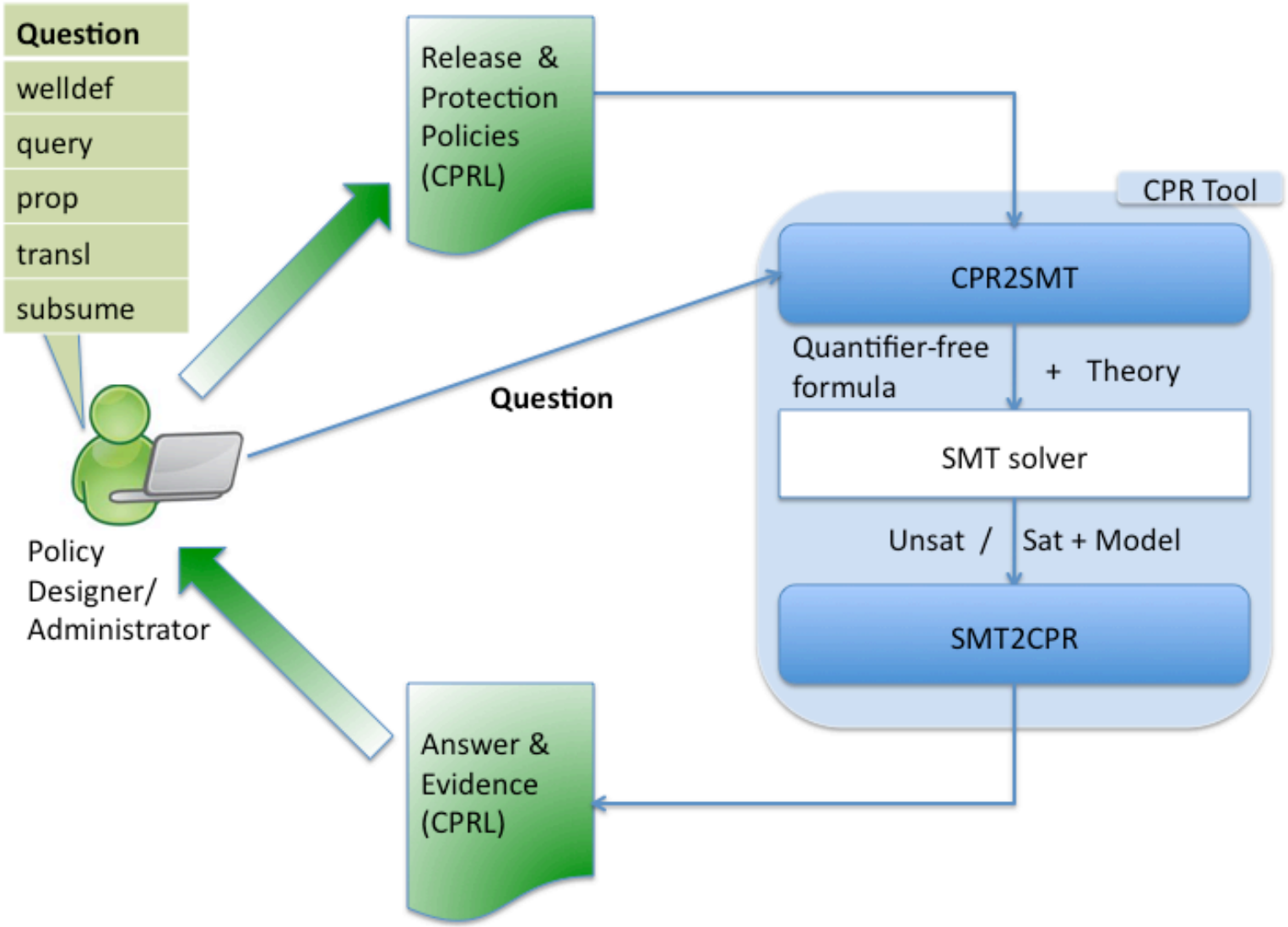
Policy Management Life Cycle (1)



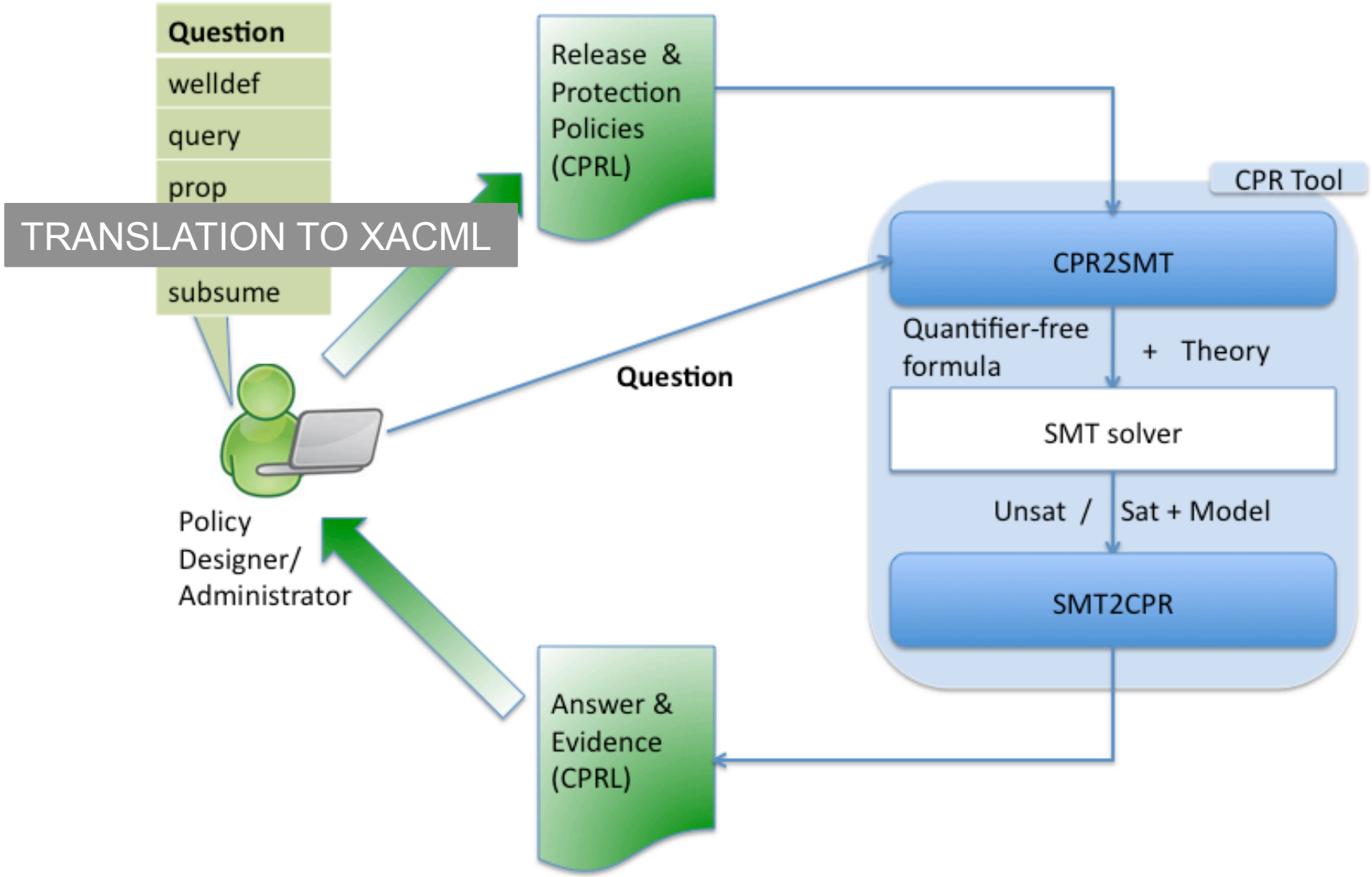
Policy Management Life Cycle (2)



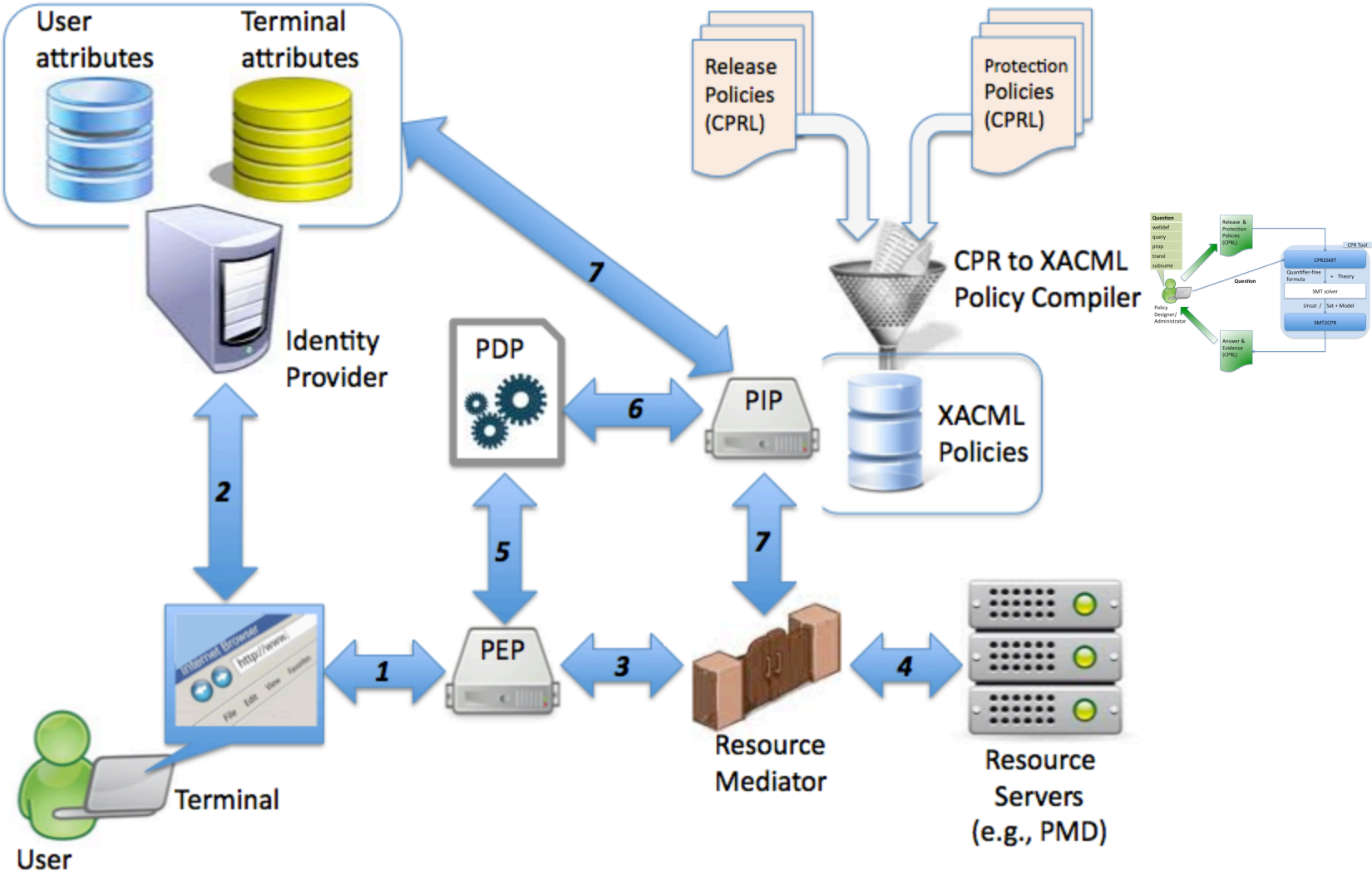
The CPR Tool: architecture



The CPR Tool: architecture



Architecture of the NATO enforcement tool



Automated analysis of NATO policies

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- SMT-based verification
  - Encoding of verification problems as logic problems
  - Theoretical: decidability of verification by decidability of logical problems
  - Practical: integration of state-of-the-art SMT solvers for scalability
- SMT-based enforcement
  - Enforcement of policies by translation to XACML

Access Control: problems

Administration is complex and may give rise to safety problems

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ASASPTIME

Automated analysis of Administrative Policies

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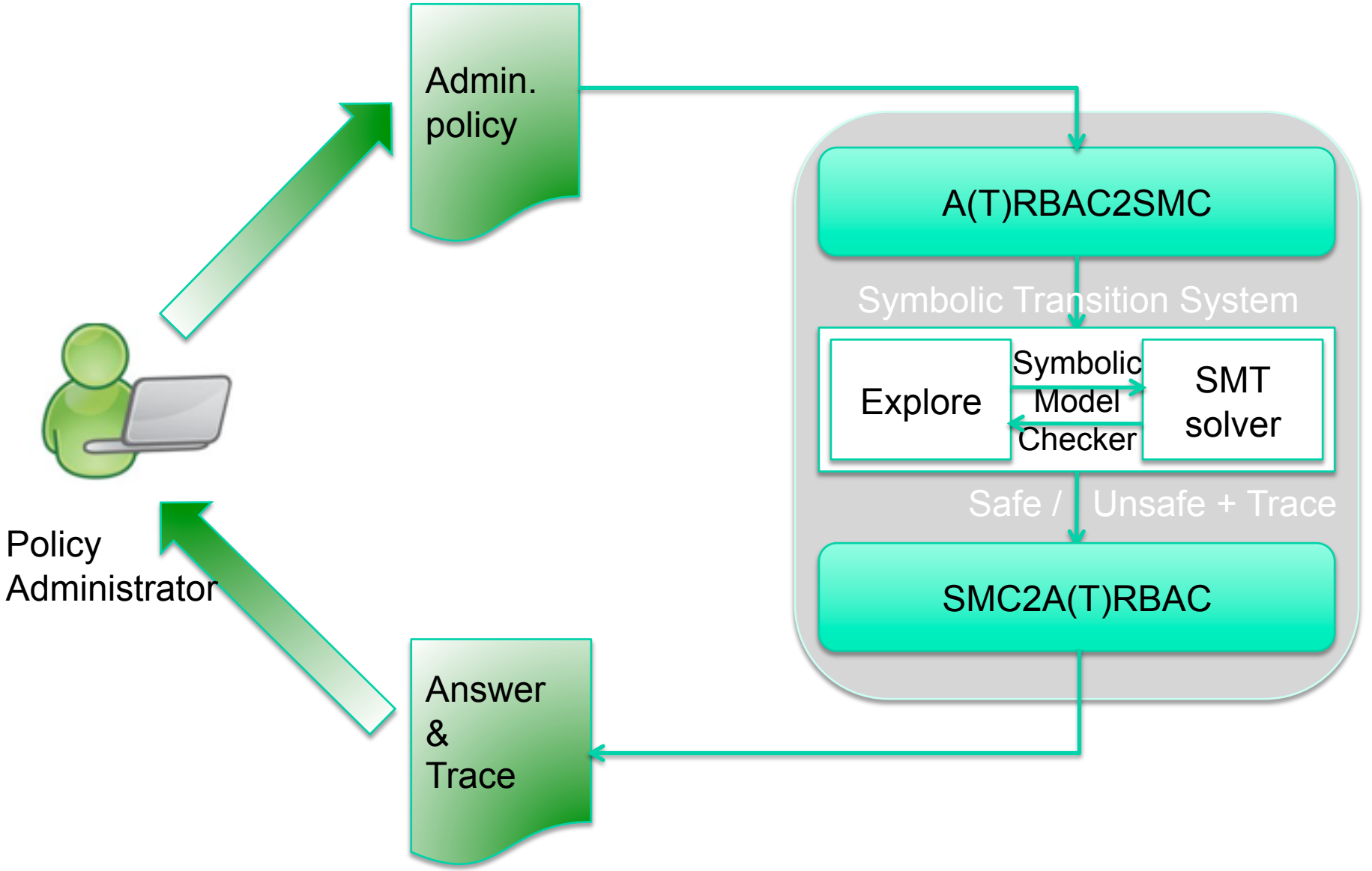
- Administration of policies in (extensions of) RBAC model by SMT-based model checking ASASPXL
  - Theoretical: decidability of safety wrt a ***FIXED BUT UNKNOWN NUMBER OF USERS***
  - Practical: development of a scalable tool, ***COMPETITIVE WITH*** other state-of-the-art tools such as Mohawk, VAC, PMS
- Extensions to temporal RBAC model
  - First decidability result ASASPTIME
  - Scalable tool ***BETTER THAN COMPETITOR***
  - SACMAT paper shortlisted for best paper award

ASASPXL/ASASPTIME: architecture



Access Control: problems

- Enforcement may become very complex in presence of computation-dependent authZ constraints

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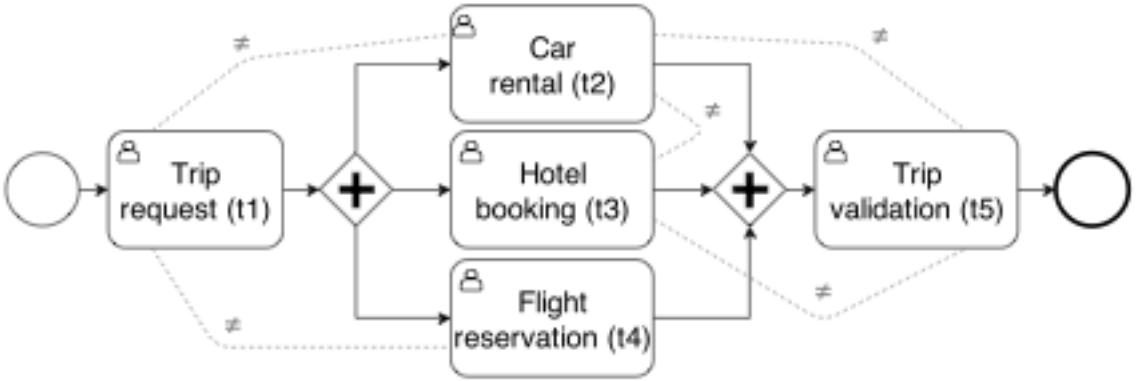
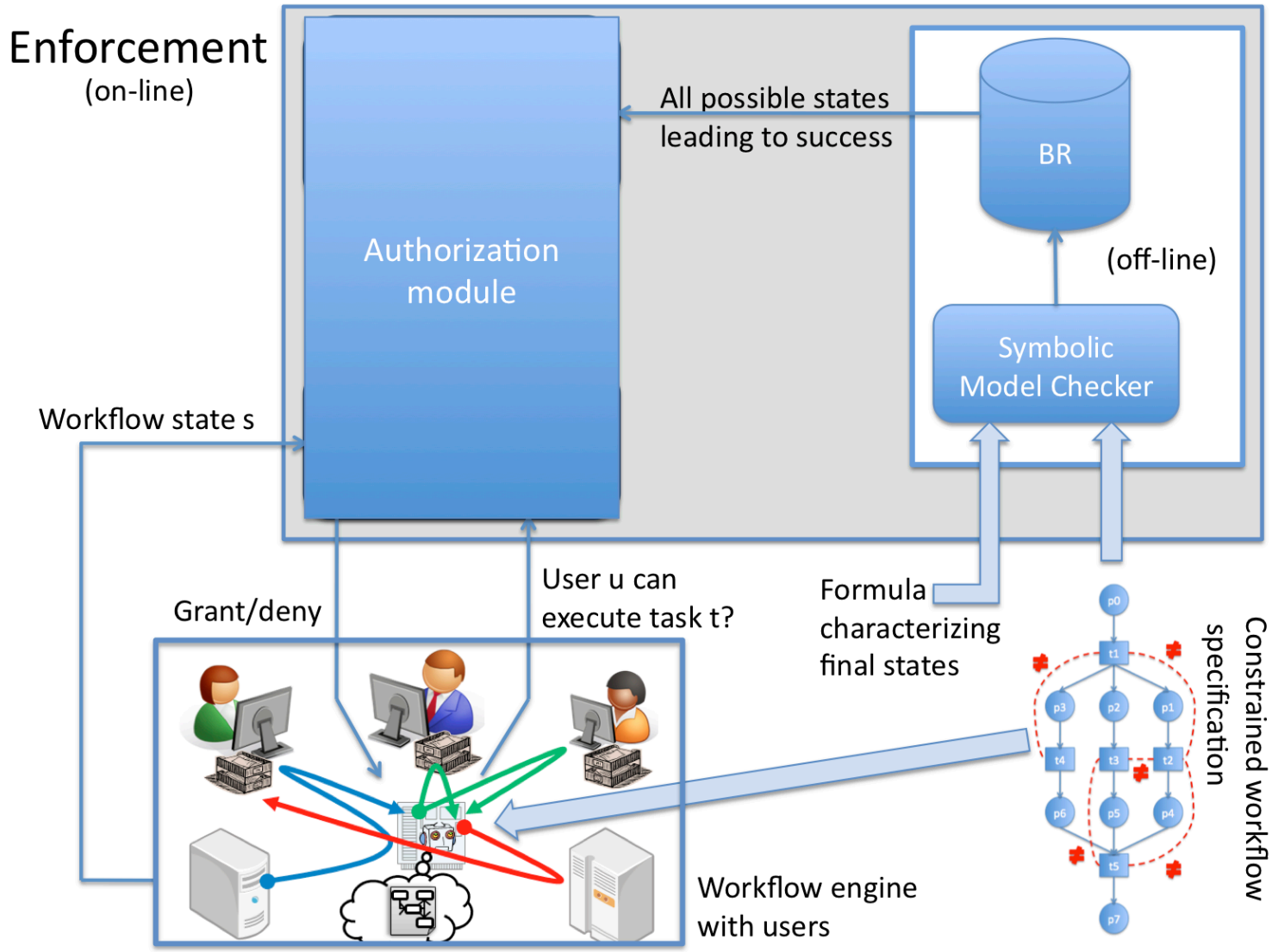
Synthesis of run-time monitors: problem



- Two types of authZ constraints
  - Local: user can execute a task under a policy
  - Global: Separation/Bound of Duties
- Workflow Satisfiability Problem: ensure termination while satisfying both control and authZ constraints

Synthesis of run-time monitors: solution



Access Control: problems

- Lack of a uniform framework encompassing policy design, enforcement, and extensions such as purpose for privacy

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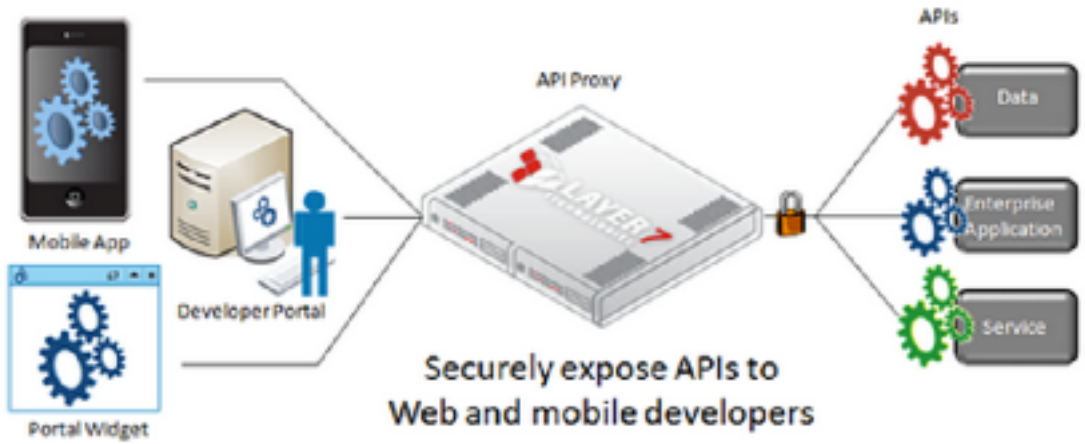
Smart Community

ALPS: a uniform framework for reasoning and enforcing access control policies

- Intermediate language
  - Precise semantics
  - Expressive for encoding variety of policies
- Reuse of theoretical results (e.g., from planning) and available verification tools (e.g., model checkers)

ALPS will be used in SmartCommunity: OpenServices platform



- API-based service access
- Variety of authZ requirements
- Users becoming more and more important
    - Besides authZ also privacy constraints