Can Access Control be Extended to Deal with Data Handling in Privacy Scenarios?

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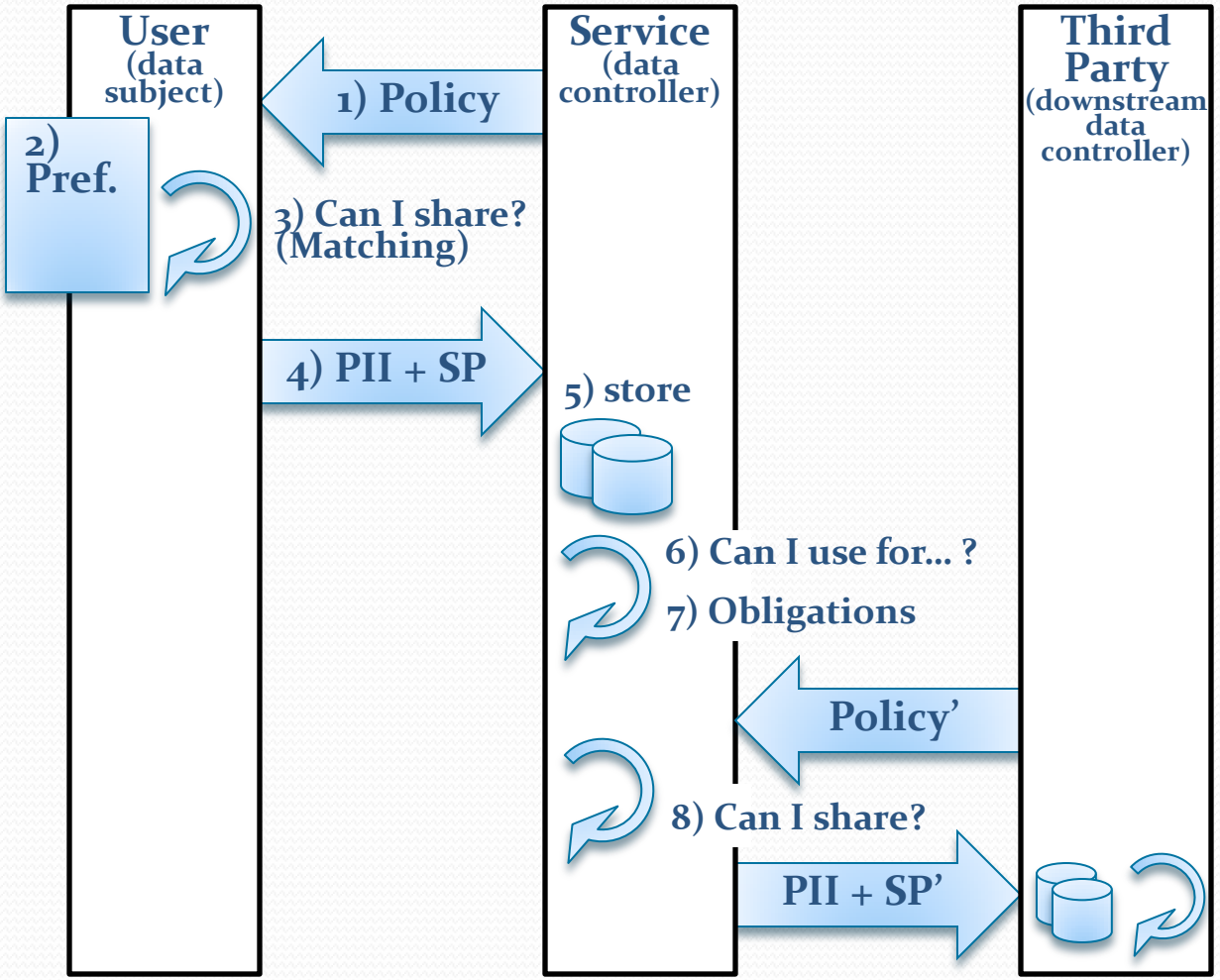
Outlines

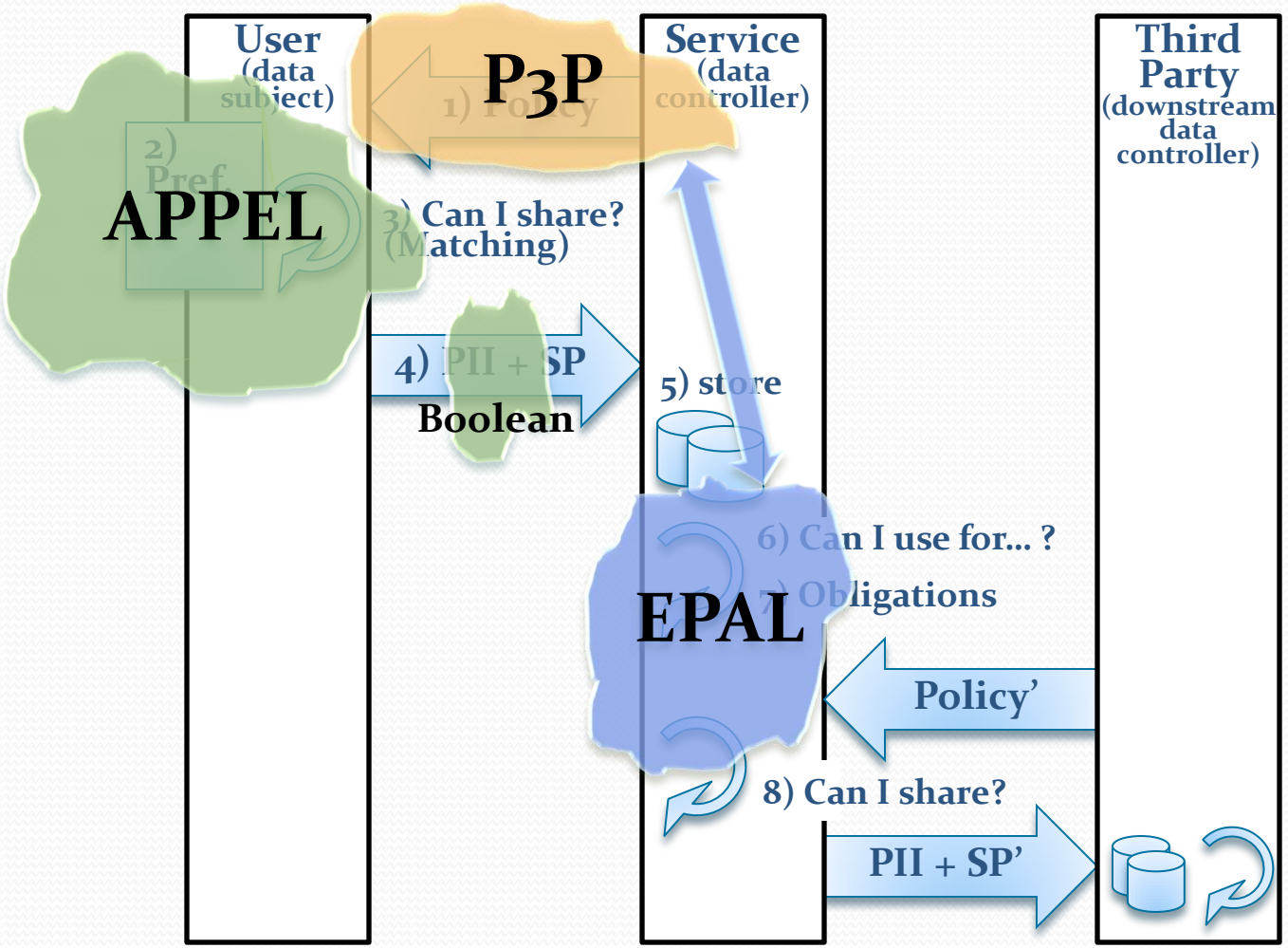
- Scenario: Privacy Policies and Preferences
- Links with Access Control
- Our work: from access control to data handling
  - SecPAL
  - SecPAL for Privacy
- Relevance for XACML

- Questions and Discussion

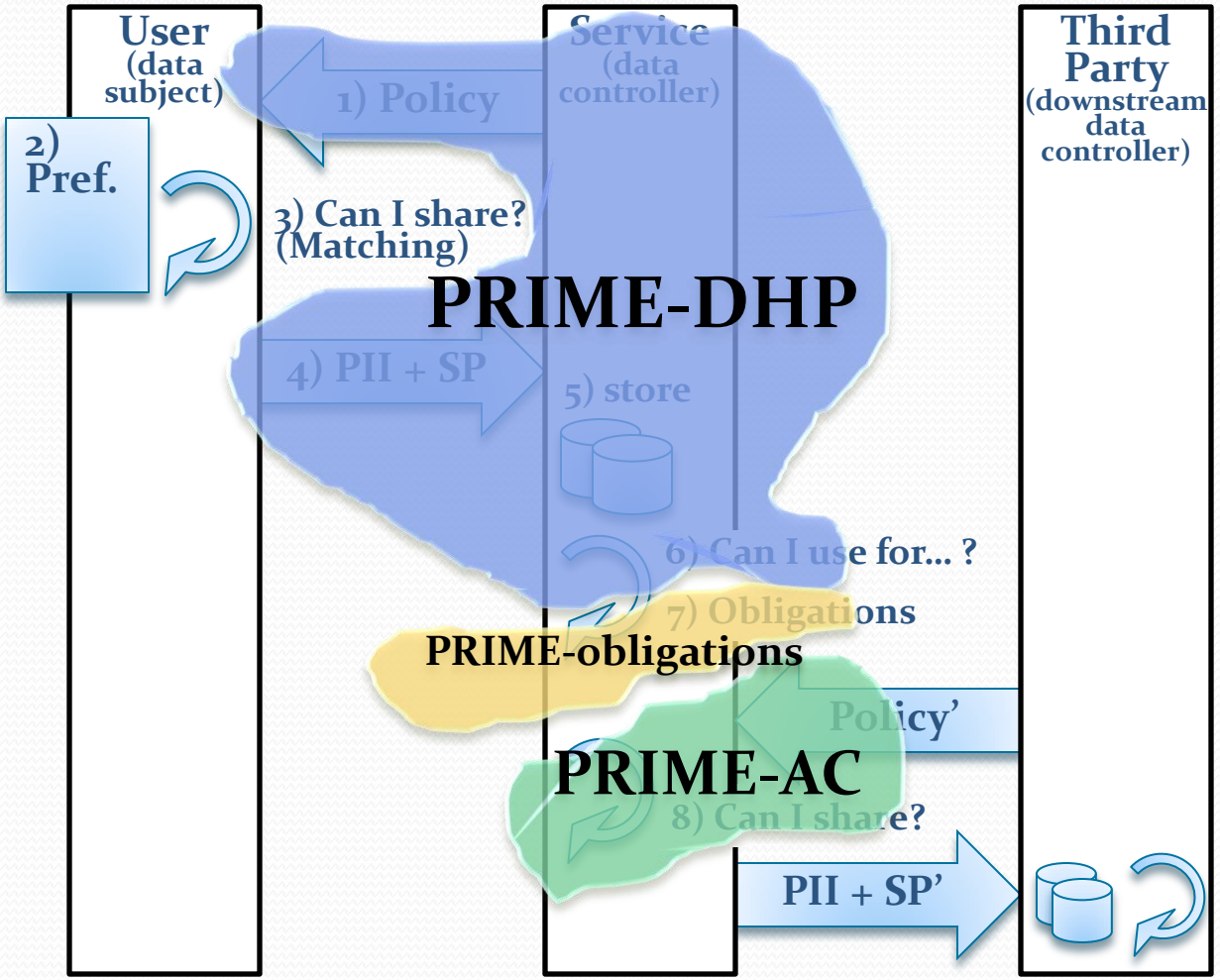
General Scenario



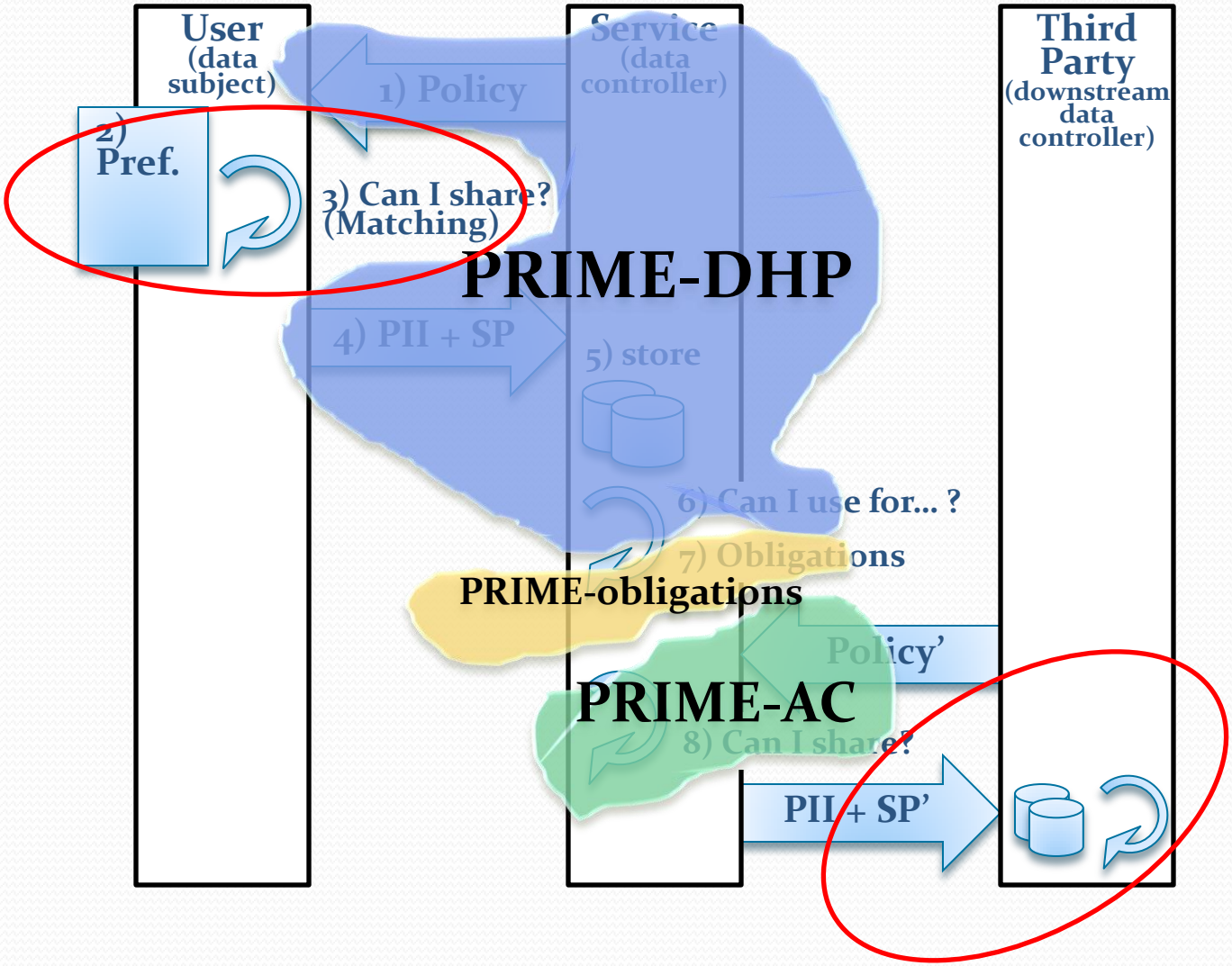
State of the art: APPEL, P3P, EPAL



state of the art: PRIME

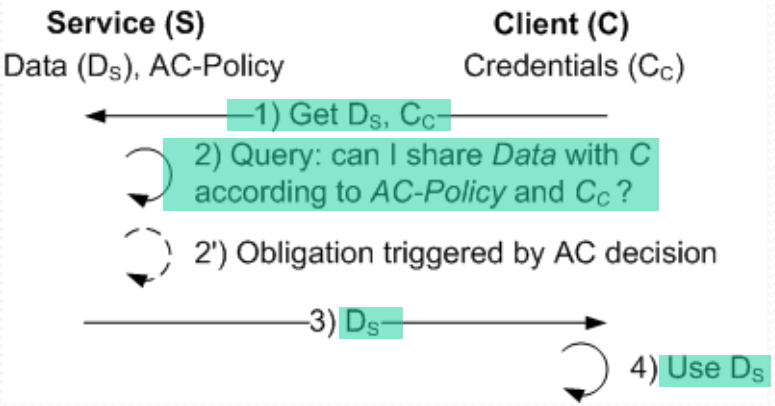


Shortcoming of state of the art

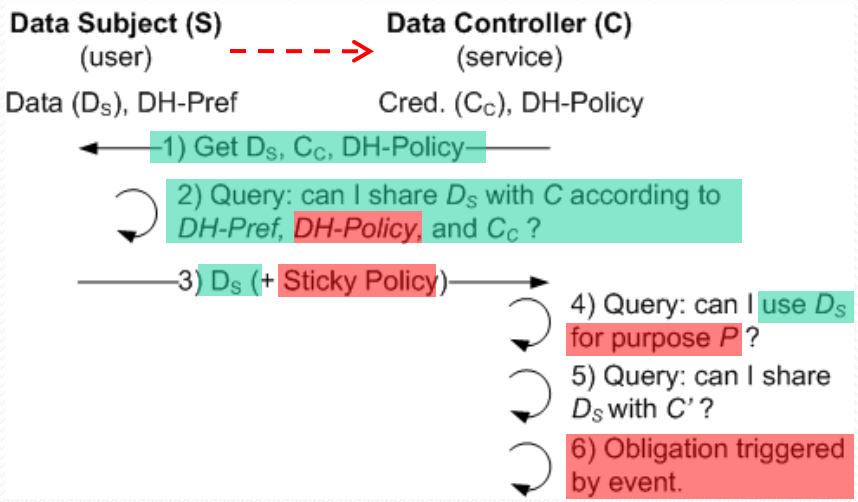


Access Control vs. Data Handling

Access Control (AC)



Data Handling (DH)



- Main differences:
  - In DH, "AC" query (2) takes two "policies" into account.
  - In DH, two parties specify (Sticky) Policy of C (including obligations)
  - In DH, C has to evaluate "AC" queries.
  - In DH, obligations are not only triggered by AC decisions

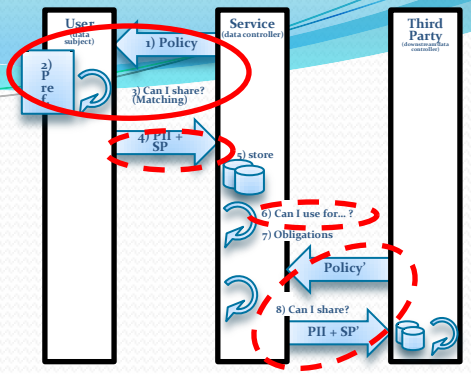
SecPAL (in one slide)

- AC Policy (assertions)
  - Service **says** CA **can say**$_0$ *x* **is a** researcher (A1)
  - Service **says** *y* **can read** /project/data **if** *y* **is a** researcher (A2)
- Credentials (assertions)
  - CA **says** Bob **is a** researcher (A3)
- AuthZ Query:
  - Service **says** Bob **can read** /project/data/file$_1$? (Q1)

  Q1 succeeds because A1 + A3 → Service **says** Bob **is a** researcher
  and because A2 + (A1 + A3) → Service **says** Bob **can read** /project/data

- Key features:
  - Balance between simplicity and expressiveness
  - Syntax close to natural language
  - Semantics consists of just three deduction rules
  - Logic-based: translation to "Datalog with Constraints"

SecPAL for Privacy



- User's Preference
  - Rights
    <Usr> **says** <Svc> **may use** Email **for** *p* **where** (MA1)
    $p \in$ {Confirm; Marketing; Stats}
  - Obligations
    $\exists t$ (<Svc> **says** <Svc> **will delete** Email **within** $t \wedge t \leq 2$ yr) ? (WQ1)
- Service's Policy
  - Rights
    <Usr> **says** <Svc> **may use** Email **for** Marketing ? (MQ1)
  - Obligations
    <Svc> **says** <Svc> **will delete** Email **within** 1 yr (WA1)
- Data is shared if WQ1 and MQ1 succeed.
- This is not a complete example
  - Oversimplified policy and preference
  - Only shows matching (other queries at service)
  - Multi-hops data sharing and delegation are not presented here

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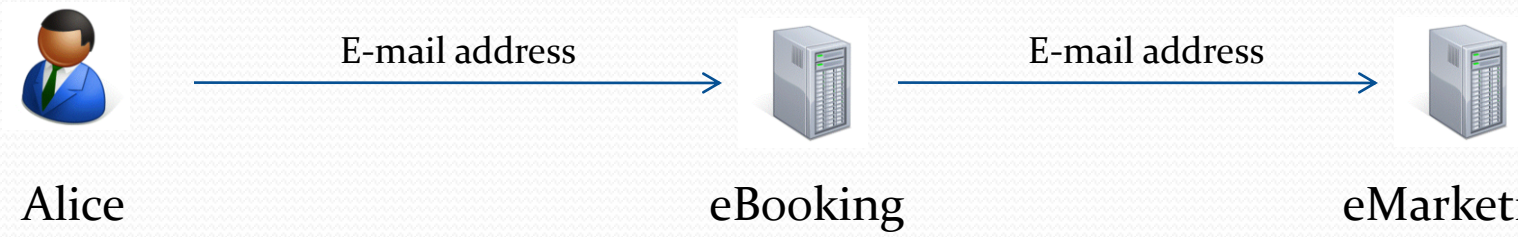
Example: SecPAL for Privacy



Alice's preference

Pr.1 Alice says x may use Email for p if
x is a BookingSvc,
where $p \in \{\text{Confirmation}, \text{Newsletter}, \text{Stats}\}$

Pr.2 Alice says x may delete Email within t

Pr.3 Alice says x may send Email to y if
x is a BookingSvc,
y is a TrustedPartner

Pr.4 Alice says CA can say x is a y

Pr.5 Alice says x can say y is a TrustedPartner if
x is a BookingSvc

PrQ.6 Alice says $\langle$Svc$\rangle$ is a RegisteredSvc? $\wedge$
$\exists t$ ($\langle$Svc$\rangle$ says $\langle$Svc$\rangle$ will delete Email within t? $\wedge$ $t \leq$ 30 days?)

eBooking's policy

Pl.1 eBooking says eBooking will delete Email within 15 days

Pl.2 CA says eBooking is a RegisteredSvc

Pl.3 CA says eBooking is a BookingSvc

PlQ.4 $\langle$Usr$\rangle$ says eBooking may use Email for Confirmation? $\wedge$
$\langle$Usr$\rangle$ says eBooking may use Email for Stats? $\wedge$
$\langle$Usr$\rangle$ says eBooking may delete Email within 15 days? $\wedge$
$\langle$Usr$\rangle$ says eBooking may send Email to eMarketing?

eBooking says eMarketing is a TrustedPartner

eMarketing's preferences

Pl′.1 eMarketing says eMarketing will delete Email within 30 days

Pl′.2 CA says eMarketing is a RegisteredSvc

PlQ′.3 $\langle$Usr$\rangle$ says eMarketing may use Email for Marketing? $\wedge$
$\langle$Usr$\rangle$ says eMarketing may delete Email within 30 days?

XACML as DH-aware AC?

Requirements	SecPAL for Privacy	DH-aware XACML
Specification of access control rules	may-assertions	XACML policy (+ extensions)
Authorization queries	may-queries	XACML query (input to PDP)
Specification of generic obligations	will-assertions	XACML-obligation (+ extensions)
Obligation queries	will-queries	-
Specification of attributes and rights	usual SecPAL assertions	SAML assertions

Actors	SecPAL for Privacy	DH-aware XACML
User agent	SecPAL engine	XACML PDP

Upper bound (may) in XACML

- Expressing the upper bound on behaviors (may verb) should be possible with XACML.
  - Data subject's preferences: a XACML policy
  - Data controller's preferences would be a set of queries.
- The user agent = Policy Decision Point.
- Extensions required:
  - handle “purpose”
  - placeholders that are instantiated before evaluating the query.

Lower bound (will) in XACML

- Data controller's side:
  - complete specification of XACML obligations
  - support for obligations that are not triggered by access control decision.
  - Part of this may be covered by ongoing work on a proposal for obligations1 in XACML 3.0.
- Data subject's side:
  - a language to query obligations would be necessary.

- Lower and upper bound should be comparable.

Questions and Discussion

- Should we consider XACML in such scenarios?
- Are lessons learned from extending SecPAL towards data handling applicable to XACML?
- Should XACML obligations support other types of triggers?
- How to serialize “XACML queries”?
- How to specify “obligation queries”?
- Multiple languages (upper and lower)?

Contact: LBussard@microsoft.com
Details on SecPAL (for Privacy): http://research.microsoft.com/SecPAL

Backup slides

SecPAL for Privacy: User's Preferences

Pr.1 Alice says x may use Email for p if
x is a BookingSvc,
where $p \in \{\text{Confirmation}, \text{Newsletter}, \text{Stats}\}$

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PrQ.6 Alice says $\langle \text{Svc} \rangle$ is a RegisteredSvc? $\wedge$
$\exists t$ ($\langle \text{Svc} \rangle$ says $\langle \text{Svc} \rangle$ will delete Email within t? $\wedge$ $t \leq$ 30 days?)

SecPAL for Privacy: Services' Policy

Pl.1 eBooking says eBooking will delete Email within 15 days

Pl.2 CA says eBooking is a RegisteredSvc

Pl.3 CA says eBooking is a BookingSvc

PlQ.4 ⟨Usr⟩ says eBooking may use Email for Confirmation? ∧
⟨Usr⟩ says eBooking may use Email for Stats? ∧
⟨Usr⟩ says eBooking may delete Email within 15 days? ∧
⟨Usr⟩ says eBooking may send Email to eMarketing?

eBooking says eMarketing is a TrustedPartner

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PlQ′.3 ⟨Usr⟩ says eMarketing may use Email for Marketing? ∧
⟨Usr⟩ says eMarketing may delete Email within 30 days?