Towards Integrated Policy Management for Privacy

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Context

- Joint work with Marco Casassa Mont & Siani Pearson [HP Labs], Sadie Creese & Michael Goldsmith [Warwick IDL]
- EnCoRe project
  - http://www.encore-project.info
  - "Ensuring Consent and Revocation"
  - Goal is to manage and enforce users' privacy (consent and revocation) preferences in enterprise information systems

Privacy Policies

- Cannot underestimate importance of adequate information handling practices in enterprises to ensure
  - Continued ability to collect information
  - Privacy of individuals
- Legal requirements (National, EU), Codes of Practice, Corporate privacy policies

Enforcing Privacy Policies

- There are many different levels of requirements and no common representation or consistent means of enforcement across an enterprise
- Automated enforcement is simple for lowest levels of policy only (e.g. Access control policies)
  - Automated enforcement of privacy policies not very successful (cf. P3P)

Policy management levels

- In an enterprise, privacy requirements will be typically handled at different levels by different experts
  - Legal requirements – legal team
  - Data access requirements – IT team
- Hierarchy of policies (privacy requirements)
- There may be overlaps and conflicts between requirements at different levels

Policy management approaches

- In our view, taking an approach to dealing with privacy requirements that is too low level

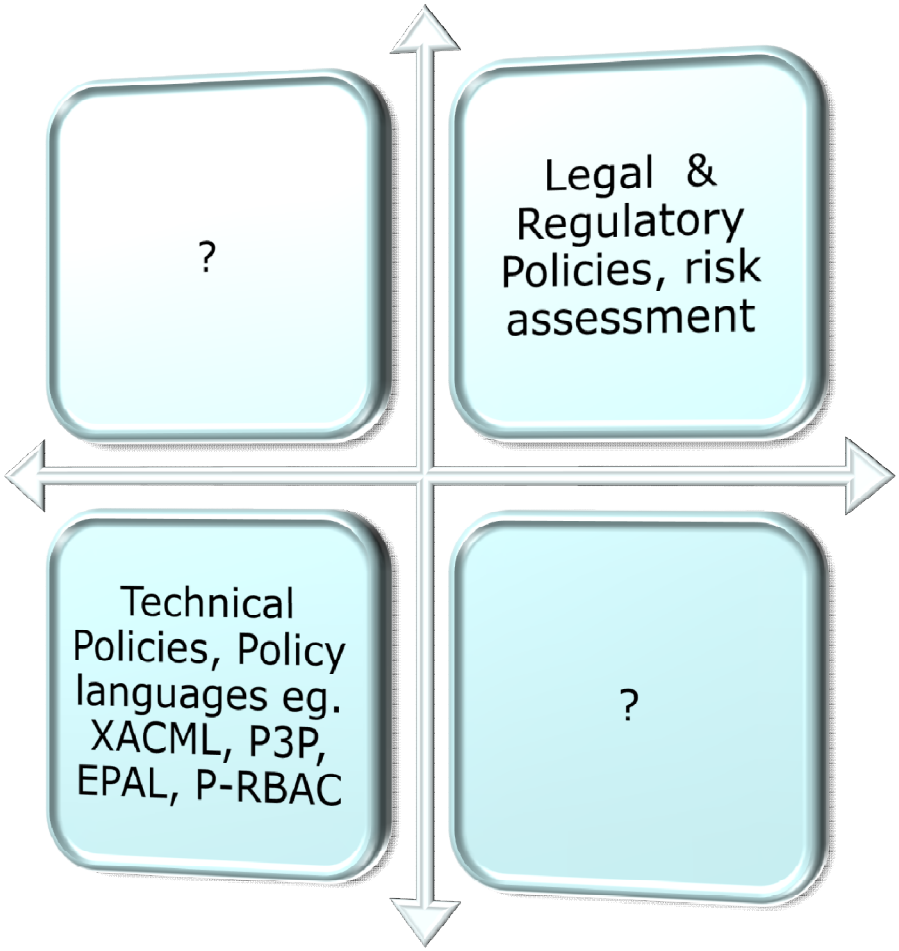
  (e.g. focusing only on XACML representation of access control restrictions)

  misses important legal aspects and outcomes of risk assessment

Policy management approaches

- Pragmatic approaches
  - Risk assessment (standard business practice)
  - Typically results in non-reusable solutions
- Technical approaches
  - Focus on designing languages and software tools for policies of a particular kind *[only]*

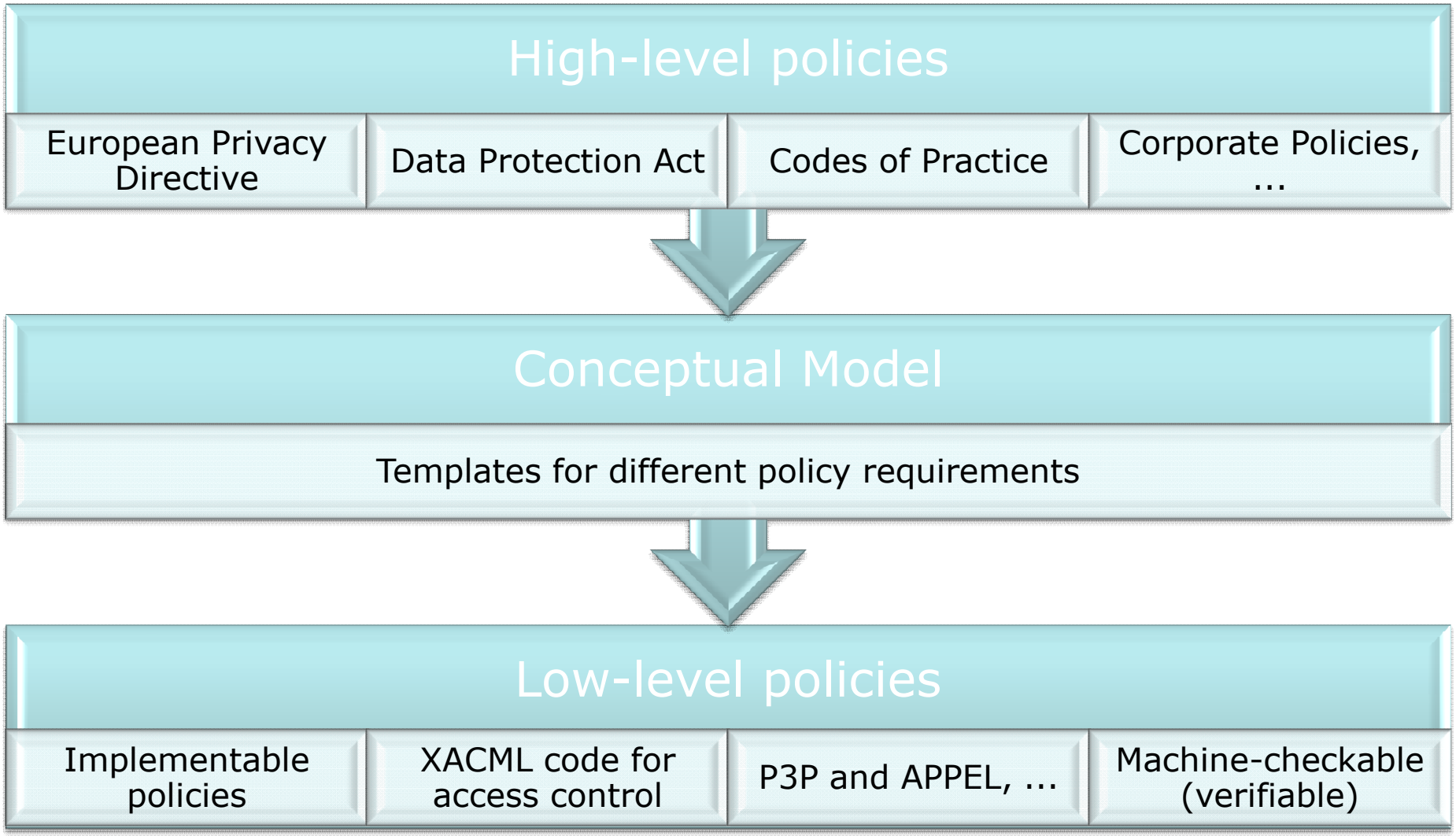
Policy Levels vs. Approaches



Reconciling policy requirements

- Low-level approaches have the advantage of automation
- High-level approaches account for overall security concerns, the law, and the business processes in an enterprise
- Can we obtain the benefits of both by building a conceptual model?

Conceptual Model for Policies



More about conceptual model

- Conceptual model may take different forms
  - Varying levels of formality can be useful
  - Just identifying typical clause structures of legal texts can provide clarity
  - More formal models can enable automatic checking that
    - A lower-level policy satisfies the requirements of a higher-level one (policy refinement)
    - Policy statements do not conflict with one another

Examples

- In the paper we have considered examples of policy statements e.g. for transborder data flow, ...
- Privacy-aware access control e.g.

IF (Data Requestor wants to access personal data D for Purpose P)
AND (data subject has given consent for this data)
THEN Allow Access
ELSE Deny Access

Privacy-aware access control

(This diagram is courtesy of Marco Casassa Mont, HP Labs)

Database tables with PII data and customers' consents

T1

uid	Name	Condition	Diagnosis
1	Alice	Alcoholic	Cirrhosis
2	Rob	Drug-addicted	HIV
3	Julie	Contagious illness	Hepatitis

T2

Consent	Marketing	Research
1	✓	X
2	X	X
3	✓	✓

Encoded access-control policy

If role == "Statistician" & intent == "Marketing"
Then
Allow Access (T1.Condition,T1.Diagnosis)
& Enforce (Consent)

Else If role == "Scientist" & intent == "Research"
Then
Allow Access (T1.Diagnosis)
& Enforce (Consent)

Else Deny Access

Access Table T1
(Select ALL from T1)
Intent = "Marketing"

Privacy Policy Enforcement

Enforcement: Filter data

```
SELECT "-",Condition, Diagnosis
FROM T1, T2
WHERE T1.uid=T2.Consent AND
      T2.Marketing="YES"
```

uid	Name	Condition	Diagnosis
1	-	Alcoholism	Cirrhosis
2	-	-	-
3	-	Contagious Illness	Hepatitis

Filtered-out data

Summary of position

- Current approaches to policy specification and enforcement are either too high-level or too low-level
- The EnCoRe project is developing an approach that balances risk assessment and high-level requirements with low-level considerations, esp. what is implementable using current policy languages and tools

Related and Future Work

- We have already considered how privacy policies in P3P may be translated to a form suitable for automated verification
  - See http://go.warwick.ac.uk/nikos/publications
- We hope to develop a formal access control model that is designed to express privacy policies at all the levels that they arise