Towards the Policy-Aware Web

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About NICTA

- Federally funded ICT research institute
- 5 Labs (SYDx2, CAN, MEL, BNE)
- 2 Offices (ADE, PER)
- 500+ Staff (includes 200+ PhD Students)
- Research
  - Strategic: Water, Traffic, Public Safety
  - 50+ Research Projects
  - Policy Information Systems Architecture (PISA)
- Education, Linkages, Commercialisation
Web History

- Web (1.0)
  - Simple (yet effective) infrastructure
  - HTTP, HTML, URI
  - Web Server, Web Browser
- Point Upgrades:
  - XML, SOAP, Web Services, Semantic Web
- Next?
Web 2.0 Meme Map

- Flickr, del.icio.us: Tagging, not taxonomy
- PageRank, eBay reputation: Amazon reviews: user as contributor
- Blogs: Participation, not publishing
- BitTorrent: Radical Decentralization
- Gmail, Google Maps and AJAX: Rich User Experiences
- Google AdSense: Customer self-service, enabling the long tail
- Wikipedia: Radical Trust

Core Competencies:
- Services, not packaged software
- Architecture of Participation
- Cost-effective scalability
- Remixed, data source and data transformations
- Software above the level of a single device
- Harnessing collective intelligence

Strategic Positioning:
- Web as Platform

User Positioning:
- You control your own data

Play
- Rich User Experience
- Small Pieces Loosely Joined (web as components)

The Long Tail
- "An attitude, not a technology"

Data as the "Intel Inside"
- The perpetual beta

Software that gets better the more people use it
- Granular addressability of content
- Emerging: User behavior not predetermined
- The Right to Remix: "Some rights reserved"

Hackability
Web 2.0

Web 1.0 Stack
- Hardware
- Operating System
- Database
- App Server
- Application

Web 2.0 Stack
- Hardware
- Operating System
- Database
- Web Services
- App Server
- Coordination Layer
- Application
- Internet Inside the stack
User Experience...
User Rules...

The Policy Aware Web...
A bit of History...

W3C PICS - Late 90s

W3C P3P - 2000
Policies Everywhere

- Privacy
- Rights
- Identity
- Access Control
- Context
- Preference
- QoS
- ...

...
State of Policies

• Numerous Formal and Informal efforts
• W3C: P3P
• EU Projects: PRIME
• ODRL Initiative
• OASIS: XACML
• All have addressed the needs of their target communities
• Need to now take a step back...otherwise...
(PICS-1.1 "http://www.gcf.org/v2.5"
  by "John Doe"
  labels on "1994.11.05T08:15-0500"
    until "1995.12.31T23:59-0000"
    for "http://w3.org/PICS/Overview.html"
    ratings (suds 0.5 density 0 color/hue 1)
  for "http://w3.org/PICS/Underview.html"
  by "Jane Doe"
  ratings (subject 2 density 1 color/hue 1))
<STATEMENT>
  <CONSEQUENCE>
    We use this information when you make a purchase.
  </CONSEQUENCE>
  <PURPOSE><current/></PURPOSE>
  <RECIPIENT><ours/></RECIPIENT>
  <RETENTION><stated-purpose/></RETENTION>
</DATA-GROUP>
  <CATEGORIES>
    <purchase/>
  </CATEGORIES>
</DATA-GROUP>
</STATEMENT>
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Definitions

1. Definitions

a. "Collective Work" means a work, such as a periodical issue, anthology or encyclopedia, in which the Work in its entirety in unmodified form, along with a number of other contributions, constituting separate and independent works in themselves, are assembled into a collective whole. A work that constitutes a Collective Work will not be considered a Derivative Work (as defined below) for the purposes of this License.

b. "Derivative Work" means a work based upon the Work or upon the Work and other pre-existing works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, abridgment, condensation, or any other form in which the Work may be recast, transformed, or adapted, except that a work that constitutes a Collective Work will not be considered a Derivative Work for the purpose of this License. For the avoidance of doubt, where the Work is a musical composition or sound recording, the synchronization of the Work in timed-relation with a moving image ("synching") will be considered a Derivative Work for the purpose of this License.
<table>
<thead>
<tr>
<th>Google Advanced Search</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Find results</strong></td>
</tr>
<tr>
<td>with all of the words</td>
</tr>
<tr>
<td>with the <strong>exact phrase</strong></td>
</tr>
<tr>
<td>with <strong>at least one</strong> of the words</td>
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<tr>
<td>without the words</td>
</tr>
<tr>
<td><strong>Language</strong></td>
</tr>
<tr>
<td>Return pages written in</td>
</tr>
<tr>
<td>any language</td>
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<tr>
<td><strong>File Format</strong></td>
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<tr>
<td>Only return results of the file format</td>
</tr>
<tr>
<td>any format</td>
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<tr>
<td><strong>Date</strong></td>
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<tr>
<td>Return web pages updated in the</td>
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<td>anytime</td>
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<tr>
<td><strong>Occurrences</strong></td>
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<tr>
<td>Return results where the terms occur</td>
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<tr>
<td>anywhere in the page</td>
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<tr>
<td><strong>Domain</strong></td>
</tr>
<tr>
<td>Only return results from the site or domain</td>
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<tr>
<td><strong>Usage Rights</strong></td>
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<tr>
<td>Return results that are</td>
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<td>not filtered by license</td>
</tr>
<tr>
<td>free to use or share, even commercially</td>
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<tr>
<td><strong>SafeSearch</strong></td>
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<td>No filtering</td>
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<tr>
<td>Filter using SafeSearch</td>
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<tr>
<td>free to use share or modify</td>
</tr>
<tr>
<td>free to use, share or modify, even commercially</td>
</tr>
</tbody>
</table>
More Rights
As the authorized rightholder of music you buy from the iTunes Music Store:

- You don’t need an Internet connection to listen to your purchased music.
- You can include your purchased music in custom playlists and burn it to a CD.
- You can listen to your purchased music on an unlimited number of iPod devices.
- You can share your music on four other computers.
- Your purchased music is yours forever; you don’t need to subscribe to any service.
- You can use your purchased music in applications other than iTunes. For example, you can use it in a movie you make or in a presentation you create.
Context Model

Fact
Fact
Fact

Situation

Preference

User

Rating

Action
XACML Access Control Model

Diagram of the XACML Access Control Model with entities including Target, Policy, Obligation, Subject, Resource, Action, Environment, Rule Combining Algorithm, Rule, Condition, and Effect.
What is Common...

- Content, Resource, Assets, Objects, Target
- Constraints, Condition, Ratings, Preferences
- Obligations, Requirements, Duties, Preconditions, Effect
- Actions, Permissions
- Prohibitions ("not")
- Assertions, Facts, Context, Environment
- Parties, Users
- Policy, Rules
Common Model

Parties

Context

Actions

Constraints

Rules

Duties

Resource
Policy Framework

- Web Policy Framework Path...
  - Policy Requirements
  - Policy Abstract Reference Model (PARM)
  - Expression(s) of the PARM
  - PARM Architecture(s)
- Community/Sector based Ontologies and Vocabularies
Policy Framework

Expressed by

Policy Abstract Reference Model

Manifested in

Structured Web

Semantic Web

Web Services

AJAX

... Mobile OTA
Policy Requirements

- Transparency
- Compliance
- Accountability
- Trust
  - “enforcement” mechanisms V community acceptance
- Address Policy conflicts and preferences (priorities)
- Meet the dynamics of Context
Policy Models

- Capture the commonality of the community
  - Information Model
  - Negotiation Model
  - Enforcement Model
  - Consent Model
  - ...
- Support in the Web Infrastructure
Research Challenges

- How to Evaluate policies to make decisions
- How to enable Accountability for policy use and breaches
- How to deal with Inconsistencies across policies at the data and rule level
- How to Visualise large inter-related policies
- How to Reason across policies
- How to ensure Compliance to policies
- How to ensure Transparency across policies and
- How to Standardise a policy framework
Semantic Web Stack 2006

Growing Up

- Web Browser ⇒ Web User Agent
  - Manage User Policies
  - Trusted Behaviour
- Web Server ⇒ Web Content Agent
  - Manage Content Policies
  - Trusted Behaviour
Use Case #1

Web User Agent

My Policies

Rights Policy

Conflicts Privacy Policy

Web Content Agent

Content Policies
Use Case #2

Conflicts Rights Policy

My Policies

Web User Agent A

Rights Policies

Web Content Agent A

Content Policies

Web User Agent B

Conflicts Both Policy

My Policies

Web Content Agent B

Content Policies
Policy-Aware Web

- This is the real Web 2.0
  - This will truly move towards W3C “Leading the Web to Its Full Potential…”
  - New Web Infrastructure = New Opportunities

- Huge Opportunity
  - Numerous communities working on Policy Languages
  - Vertical nightmare...

- Huge Interest...Major Impact...
Questions...

What do you want from it?