Personal Information, Context & Privacy
In Context-Aware Services

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Introduction

• Terms
  – Personal information (PI)
  – Privacy
  – Context Awareness

• Trends
  – Service proliferation
  – Society, business & technology
  – Costly & intractable
Use-cases

• Enriching entities situation
  – Roles, activities, proximity/location/position

• Facilitation Vs. enhancement
  – RouteCall - RestaurantLocator

• Optimal
  – Collect, aggregate, process & analyse

• Interaction spheres
  – Individual/community, Govern & private sector
Privacy concerns

- Westin's defnt
- PI trading - re-purposes
- Spheres integration
- Privacy expectations
- Lacking PET/PPT in context-aware
Threats

- Multiple situations /sensors – service history / tracking
- Interpretation & representation leaks
- Transmission leaks – eavesdrop
- Integrity & reputation attacks
- ID thefts, impersonation, harvesting, cloning
  - Unknown future scenarios
Framework

• Aim
  – Disclose right context & PI, to the right, at the right

• Key components
  – Model of the context data
  – Profile the privacy policies
Model context data

• Model context data
  – Source, owner, access schemes – quality
Privacy profiles

- XML notation
- Service declares
  - Identity attributes
  - PI / preference attributes
  - Processing / handling

```xml
<policy:detail="privacy policy">
  <policy:policy_head="introduction">
    <policy:policy_use="information"/>
    <policy:policy_owner="resto-loco"/>
    <policy:policy_validity="indefinate"/>
  </policy:policy_head>
  <policy:policy_part="rule 1">
    <policy:info_request>
      <policy:value="name"/>
      <policy:value="address"/>
      <policy:value="meal"/>
    </policy:info_request>
    <policy:value="info_purpose">
      <policy:value="restaurant"/>
    </policy:value>
    <policy:value="info_retention="string">
      <policy:value="6 hours"/>
    </policy:value>
    <policy:value="info_benefit="string">
      <policy:value="preferred meal"/>
    </policy:value>
    <policy:value="disclose_sphere="string">
      <policy:value="community"/>
    </policy:value>
  </policy:policy_part>
</policy:detail>
```
Implementation

- Local – resident on mobile terminal
  - login
  - create own u_policy
  - compare policies
  - log & notify

- Remote deployment – personal server
  - login
  - create own u_policy
  - compare policies
  - log & increment key if compliant policies

Alice’s PDA

ubiquitous network

Resto-loco service provider

creates own privacy policy

process data in compliance with policies

Resto-loco service provider

creates own sp_policy

sp_policy + key + context

process data in compliance with policies

Alice’s remote server

verifies & compares policies

log & increment key

personal_data

Internet

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Implementation ...

• Mobile terminals
  – Devices - Nokia N810, N95
  – Language – Python (pyMaemo, pyS60)
  – Interaction – Bluetooth, WLAN
Discussions

• Context & PI chain of custody

• Vested interest
  – Who's, from whom, benefits, for how long

• Non-compliance
  – Recourse / Recovery

• Privacy guarantee
Discussions ...

• Balance one's privacy Vs. societal good
  – Pandemics, terrorists

• Users attitudes Vs. actual behaviours
  – Demand for PET, immediate benefits

• Constrained devices

• Privacy aware UI
  – Privacy sliders?
Conclusion

• Situations affecting PI demanded
  – Tailored, seamless services
• Eminent privacy leaks
  – Technology, society, business models evolve
• Long term designs
  – Over single entity-instance responsibility
• Seamlessness
  – without excessive erosion
• Realistic scenarios