The Role of Policy and Stakeholder Privacy Values in Requirements Engineering

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Objective

Encourage adoption of a more holistic view of application and specification, in which system or application is seen as an engine of policy enforcement and values attainment.
Agenda

- Background
- The Role of Policy in RE
- Privacy Goals
- Physical Privacy Metaphors
- Summary and Future work

Privacy and Privacy Policies

- Privacy
  - The right to be let alone
  - Control over what information about you is revealed, and to whom

- Privacy Policy
  - A comprehensive description of a Web site’s practices that is located on the site itself and may be easily accessed by visitors [FTC98]
Common Policy Problems

- Nonconformance to “standard”
  - Organisation for Economic Cooperation & Development
  - Federal Trade Commission
  - Fair Information Practices

- Ambiguity and misplaced trust
  - Policies are difficult to find/interpret

- Failure to implement policy
  - Inconsistencies are common

A TRUSTe licensee's privacy policy must disclose:
- what personal information is being gathered;
- how the information will be used;
- who the information will be shared with;
- the choices available regarding how collected information is used;
- safeguards in place to protect personal information from loss, misuse, or alteration; and
- how individuals can update or correct inaccuracies in information collected about them.
Toysmart

- Policy: no sharing of PI w/ 3rd parties
- *Wall Street Journal* ad to sell DB after going out of business last May
- Internet privacy activists protested
  - if the sale of that information were allowed, it could encourage a wave of other failing dot-coms to abandon privacy assurances in return for cash.
- Landmark case
  - privacy promises made while in business must be kept when you go out of business

The Problem

- Software systems fail to adequately address security and privacy issues during analysis & design.
- We (“Requirements Engineers”) have failed to apply our methods to generate privacy and security policies as well as the corresponding requirements.
Challenges

- Traditional RE techniques difficult to apply when:
  - rapidly changing technologies change policies
  - external pressure exists to disclose practices
- Need for prescriptive guidance to develop policy requirements [Trcek, PFIRES]
  - Security policy
  - Privacy policy

Role of Policy in RE: Policies vs. Requirements

- Similarities
  - express desire or worth, rather than fact
  - primarily statements in the optative mood, they specify what must or ought to be done
- Differences
  - scope of policies is broader than requirements
  - privacy policies are more charged w/ societal values
  - policies are more open-ended than requirements
  - requirements cover one system; policies cover several
- Alignment
  - bringing policy and requirements into agreement
Goal-Based Specification

- Teleological models - directed goal network
  - Goals, subgoals, actors, obstacles

- Strategic Goals
  - reflect high-level enterprise goals / long term, broad based initiatives

- Tactical Goals
  - involve short term goal achievement

Focusing on goals rather than requirements allows us to communicate with stakeholders in terms of their values

Scenario-Based Analysis

- Envisage how technical systems may change as a result of socio-technical changes

- Bringing tactical goals into alignment with the organization’s strategic goals
**Scenarios**

- **Use cases**
  - illustrate actual or desired sequences of satisfactory events

- **Abuse cases**
  - interventions lead to policy violation
    - security intrusion
    - disclosing information to 3rd party w/o permission

- **Misuse cases**
  - willful undermining of a policy
    - using information for purpose for which it is not intended

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**Aligning Values with Systems & Policy**

- Policies developed as an afterthought
- Many e-commerce systems fail to address consumer privacy values and concerns
- How do values affect system evolution and IT policy?
- Use goals to:
  - analyze conflicts w/ policies & corresponding web sites
  - Reconstruct implicit requirements met by privacy policies
Goal Mining for Privacy Requirements

- **Goal mining**
  - extracting pre-requirements goals from post-requirements text artifacts
  - reconstruct the implicit requirements met by the privacy policies

- **Taxonomy**:
  - Privacy Protection Goals
  - Privacy Vulnerability Goals
  - Respective Requirements

- **Goal**:
  - Library of stable, reusable privacy and security goals for SMaRT

Privacy Policy Analysis #1

- **ISPs**
  - AOL
  - Earthlink
  - Free Internet

- **Online Retailers**
  - Amazon
  - eNews
  - ToySmart

- **Traditional M.O. Catalog**
  - Banana Republic
  - Eddie Bauer
  - J Crew

- **Auction Sites**
  - Ebay
  - Reverse Auction
  - Sothebys

- **Drug Stores**
  - Drugstore.com
  - Eckerd Drugs
  - Long Drugs

- **Grocery Stores**
  - HomeGrocer
  - Lowes
  - Peapod

- **Travel Agencies**
  - American Express
  - Expedia
  - Travelocity

- **Trust Services**
  - BBBOnline
  - TRUSTe
  - Verisign
Privacy Policy Analysis #2

- **Pharmaceuticals**
  - Bayer
  - Glaxo Wellcome
  - Eli Lilly
  - Novartis (Ciba)
  - Pfizer
  - Pharmacia & Upjohn

- **Drug Stores**
  - Corner Drugstore
  - DestinationRx
  - Drugstore
  - Eckerd
  - Health Allies
  - Health Central
  - iVillage
  - Prescription Online
  - WebRX

- **Health Insurance**
  - AETNA
  - AFLAC
  - BCBS
  - CIGNA
  - eHealth Insurance
  - Kaiser Permanente
  - Online Health Plan

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Taxonomy

- **Privacy Protection Goals**
  - Access/Participation
  - Choice/Consent
  - Enforcement/Redress
  - Integrity/Security
  - Notice/Awareness

- **Privacy Vulnerability Goals**
  - Aggregation of Information
  - Collection of Information
  - Monitoring of Information
  - Personalization
  - Solicitation
  - Storage of Information
  - Transfer of Information
Privacy Protection Goals

- **Notice/Awareness**
  - NOTIFY users before data is collected
  - NOTIFY users of updates to privacy policy

- **Choice/Consent**
  - ALLOW customer to opt-in to sharing PII w/ member sites
  - OPT-IN to controlling whether to have PII stored

- **Access/Participation**
  - ALLOW customer to check their PII for accuracy
  - ALLOW customer to modify their PII

- **Integrity/Security**
  - CROSS-REFERENCE user info to find uses of multiple IDs or aliases

- **Enforcement/Redress**
  - DISCIPLINE associates/employees who violate privacy policy

Potential Privacy Invasions

- **Collection of Information**
  - COLLECT children’s names and ages when they enter contests
  - COLLECT user browsing patterns

- **Monitoring of Information**
  - MONITOR customer site usage patterns

- **Personalization**
  - CUSTOMIZE offers based on customer’s account and purchase records

- **Storage of Information**
  - STORE purchase records

- **Aggregation of Information**
  - AGGREGATE purchase info by zip code

- **Transfer of Information**
  - SHARE PII w/ third parties
Summary: Addressing the Problem

- Need to establish effective approaches for privacy and security requirements coverage
- Apply scenario management and goal-driven analysis strategies
- Apply metaphor analysis [Potts - RE’01]
- Ensure system requirements align with organizational policies

Recommendations & Future Work

- Studying values and perceptions of online consumers in conjunction with a requirements methodology => alignment
- Design systems that reflect values and protect our personal information
- Develop mechanisms to ensure that systems comply with policy
- Systematically analyze web policies and elucidate values ascribed to them
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- Questions?