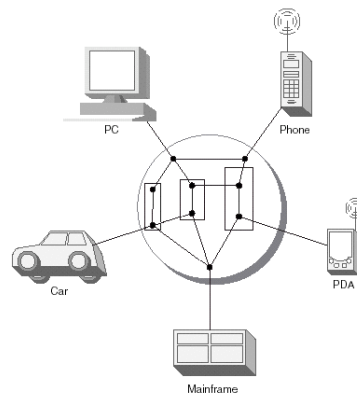# Detecting Feature Interactions in Web Services

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Web Services

- Web services are a way of *packaging* and *publishing* functionality to the network for use by other applications
- Web services can aggregate other web services from a *web of services* to provide a higher-level set of features

Web Services

- Paradigm for constructing distributed applications
  - Lack of centralized control (# businesses)
  - Diversity of technology platforms
  - Rapid evolution of business environment
- Much work to date on low level concerns
  - Publishing, discovering, and invoking of services
- Service integration raise significant challenges
  - Little research on managing interactions

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Composition of Web Services

- Explicit composition
  - Flow
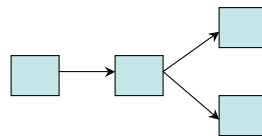
- Implicit composition
  - Parallelism

  - Side effect

side effect   uses

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2
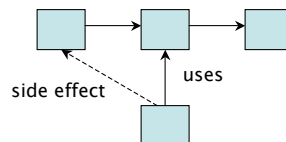
Feature Interaction Problem

- Coordination of features so that their composition achieves the desired result at application level
  - We use "feature" and "service" interchangably here
- Root causes (from telephony)
  - Conflicting goals
  - Competition for resources
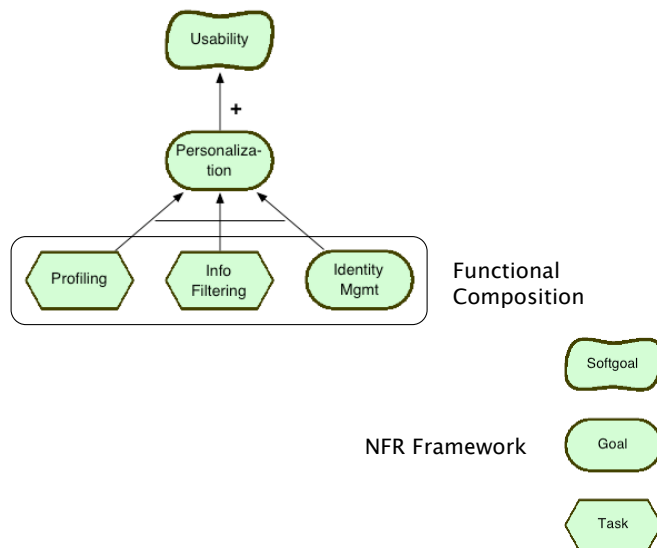 - Changing assumptions
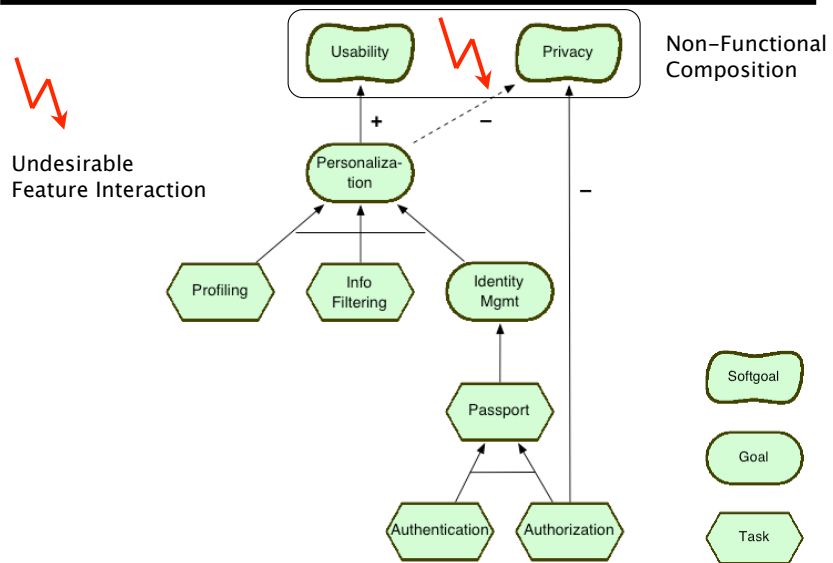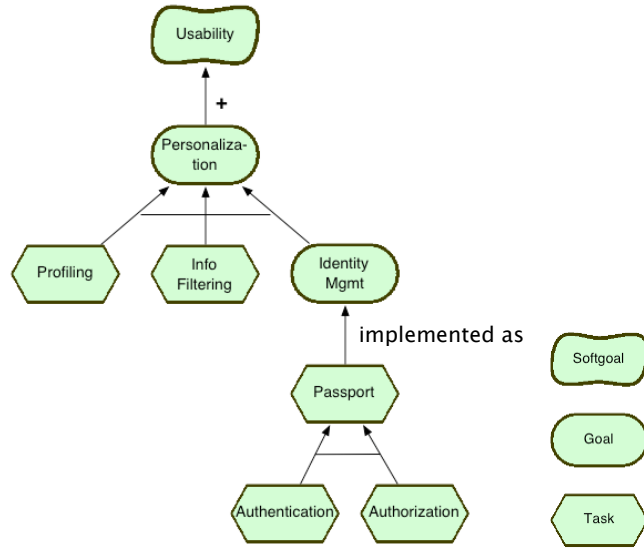 - Design evolution
  - … ? (web services)

Functional and Non-Functional

- Most interactions studied of functional nature
  - eg between CW and CFB (telephony)
- However, each functional composition impacts the satisfaction of non-functional requirements
  - Mostly neglected by current research!
- Feature interactions in web services not really studied (some work on SoC, AOP, …)

Example: Personalized Services

- m-Commerce
  - Personalization through information filtering
  - Based on user identity and profile
- Many design issues
  - Dynamic composition
  - Trust
  - Privacy concerns
  - …

Usability

+

Personaliza-
tion

Profiling　　Info Filtering　　Identity Mgmt

Functional Composition

Softgoal

NFR Framework　　Goal

Task

4

Slide 9

Usability

+

Personaliza-
tion

Profiling   Info
             Filtering   Identity
                          Mgmt

implemented as

Passport

Authentication   Authorization

Softgoal

Goal

Task

Slide 10

Usability   Privacy   Non-Functional
                            Composition

Undesirable
Feature Interaction

+   −

Personaliza-
tion   −

Profiling   Info
             Filtering   Identity
                          Mgmt

Softgoal

Passport

Goal

Authentication   Authorization   Task

Analysis

- Current identity services such as Passport blur the line between authentication and authorization
  – Identifying the user (authentication)
  – Giving site access to user profile (authorization)
- Once user authenticates to Passport-enabled site all information is shared with the site
- Potential solution is to restrict identity service to authentication, and control access to profile within user agent (eg following the P3P proposal)

Conclusion

- Feature interaction in web services
  – Functional and non-functional
- Our research on *non*-functional interactions
  – Use of NFR framework
- Goal is to develop a FI benchmark for WS
  – Set of interactions between web services
- Patterns for service composition
  – Represent NFRs as patterns