



User Interoperability

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Outline

- User Interoperability
- Interoperability of DLs/DLSs with respect to users
 - User Modeling
 - User Profiling
 - User Context
 - User Management
- Interoperability of users
 - Collaboration
 - Participation
 - Privacy

User Interoperability

- User Interoperability Definition
 - a. **Interoperability of DLs/DLSs** with regard to what is captured within each DL/DLS about users
 - b. **Interoperability of users** through their use of the DL/DLS
- User Interoperability Issues
 - a. **Interoperability of DLs/DLSs** with respect to users
 - ✓ user modeling, user profiling, user context, user management
 - b. **Interoperability of users**
 - ✓ collaboration, participation, privacy

Interoperability of DLs/DLSs with respect to users

- The “**object**” of interoperation
 - can be arbitrary
 - can be an attribute of the user (e.g., user credentials, user demographics)
 - can be simple (e.g., keywords)
 - or complex in structure (e.g. ontologies, queries, layouts)
 - can be at the data or at the model/schema level

Interoperability of DLs/DLSs with respect to users (cont.)

- The “**purpose**” of interoperation
 - preserving user characteristics across systems (transparent user mobility from one system to the next)
 - mapping user characteristics from one system to the next (non-transparent user mobility)
 - integrating user characteristics maintained about the same user in two different systems

Interoperability of DLs/DLSs with respect to users (cont.)

- **Use cases** by combining “objects” and “purposes”
 - consolidating a user’s preferences as perceived from his/her presence in multiple systems
 - retaining the user’s access rights as the system transfers him/her to another system
 - ...

User Modeling

- **User modeling**: creating a user model for a DL that represents essential information about users
- **Attributes** of the user that could be reflected in a DL
 - user credentials
 - user demographics
 - user access rights
 - user preferences
 - user interests
 - user background
 - user level of maturity and expertise
 - ...

User Modeling (cont.)

- Users are “entities” with model-based profiles for
 - different access to content (rights)
 - different access to system functionalities (roles)
 - explicit or implicit preferences affecting the results of user operations
 - differentiating based on the user context
- A user model of a DL should be rich enough to capture these aspects

User Model Interoperability

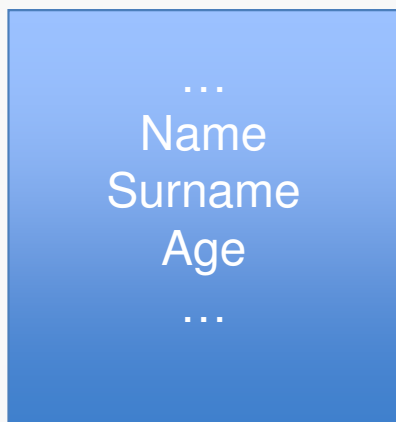
- **Interoperable user models:** enable propagation of user information across different DLs
- Up to now, no generally accepted user model



- **State-of-the-art approaches**
 - Shared Format Approach, e.g., standards, ontologies
 - Conversion Approach, i.e., convert syntax and semantics of one model to another

Conversion Approach

User Model 1



User Model 2



User Profiling

- **User profiling**: collecting information about a user to generate user's profile, depending on the current user model
- Challenges
 - user rights propagation from one DL to the other
 - reconciliation of different and, in some cases, even conflicting preferences or user profile characteristics
 - information is stored in different data structures

User Profiling (cont.)

- Profile acquisition (**explicit**)
 - User registration
 - User states search “objective”/search keywords at beginning of a session (information need)
 - Explicit relevance feedback
- Profile acquisition (**implicit**)
 - Log more general user (-system) interaction
 - Implicit relevance feedback
 - Mining of log files to obtain “higher level” properties

User Profiling Interoperability

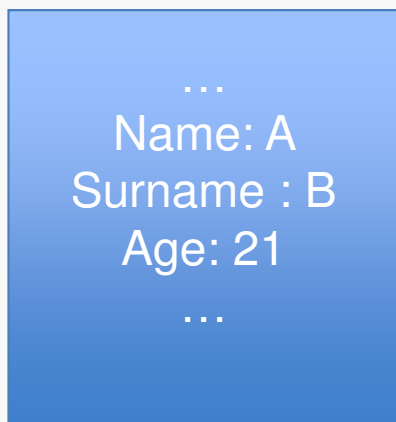
- **User profiling interoperability**: supporting mechanisms of reconciliation of different/conflicting user profile characteristics



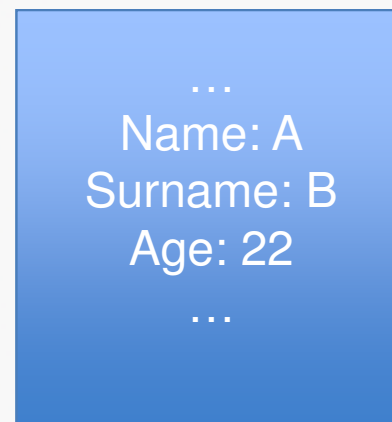
- **State-of-the-art approaches**
 - Data reconciliation rules in case of conflict
 - value concatenated with the current value
 - current value replaced
 - decision based on a given formula (e.g., time-stamping, trust value of the user for corresponding DL)

Reconciliation

User Model 1



User Model 2



Age: 21 or 22?

User Context

- **User context:** “external” factors affecting user profiles regarding user interactions with a DL
- Borders of “external” and “internal” factors hazy
- Context may include the user
 - situation
 - location
 - time
 - role
 - presence of other users
 - ... any other RM domain

User Context Interoperability

- **User context interoperability**: supporting compliant context descriptions and interpreting user information in a concrete way given the same context



- **State-of-the-art approaches**
 - context models, i.e., context captured in user models
 - context-passport, i.e., compact representation of user's current context model accompanying user during navigation

User Management

- **User management:** managing electronic identities that are strongly associated to users' privileges
- User management systems manage electronic identities, thus acting as IDentity Management Systems (IDMS)

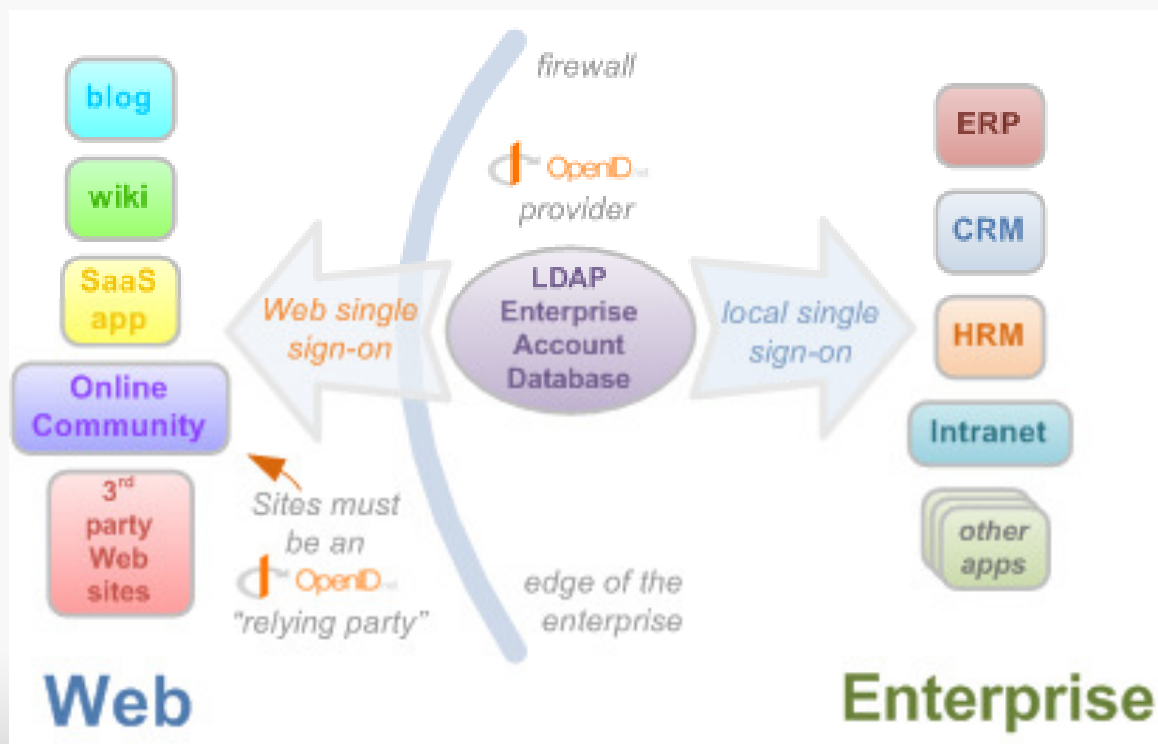
User Management Interoperability

- **User management interoperability:** heterogeneous DL systems apply concrete, shared, but transparent to the end-user authentication and authorization policies
- **Federated identity**, i.e., technologies & standards enable portability of identity information across autonomous security domains
 - Goal: enable users of one domain to securely access data or systems of another domain without the need for user administration



- **State-of-the-art approaches**
 - Federated identity through use of **open industry standards** and/or **openly published specifications** to achieve interoperability for common **use cases** (e.g., cross-domain web-based single sign-on, cross-domain user account provisioning, cross-domain user attribute exchange)

User Management Interoperability



Interoperability of Users

- Through the DL, users are able to
 - collaborate
 - communicate
 - cooperate
- The DLS supports them in
 - knowledge sharing
 - sense making
 - identifying new and/or hidden semantics
- The DLS preserves user privacy and generates a sense of trust

Collaboration

- Content should be available to
 - single users
 - cooperating user groups or communities
- Content exchange between users must be
 - simple
 - intuitive
 - transparent

Collaboration (cont.)

- **User collaboration:** enabling users to directly interact and collaborate with each other or implicitly benefit from the actions of other users in a DL or across different DLs
- DLs: from simple content providers to “platforms” for creative work and production of new knowledge

Collaboration (cont.)

- Two types of collaboration:
 - Indirect
 - Direct
- **Indirect** (passive): work of one user may somehow benefit anonymously from the work (actions) of other users
- **Direct**: several users agree to work together as a team exploring and making use of DL resources
- Trust and privacy play an important role

Collaboration (cont.)

- The most frequently mechanisms used for indirect collaboration are:
 - Collaborative-based **filtering**
 - Processing of **usage statistics** and the use of **recommendations** as a mean of collaboration
 - **Annotations**: users may add content complementary to the existing information of a digital object represented in the library and thus share ideas
 - **Tags**: light form of annotation and used as a method to categorize objects
 - **Rankings**: a user oriented operation which allows users to share their opinion on a given object
 - Collection of digital objects: organize information space according to their own **subjective perspective**
 - Users providing **links** amongst digital object

Collaboration (cont.)

- Direct collaboration: several users agree to work together as a team exploring and making use of DL resources
- More advanced situations: users use collaborative tools to create new content (shared repository) or act on existing one
- Collaborative tools: software environments supporting various forms of interaction among people

Participation

- **User participation:** engaging users in active participation in the evolution of a DL, both at the content and the operational level
- Making content more “available” & attractive to users
- Not easy allowing users to be at the same time
 - content consumers
 - content providers (in some sense)

Participation (cont.)

- Appropriate functionality
 - annotation services
 - translations or transcriptions and other, more active ways to contribute to the DL content
- Crucial issues
 - moderation
 - approval of changes
 - reconciliation
 - provision of different user views on the same content

Participation (cont.)

- **State-of-the-art approaches**
 - Need for additional tools and services that take into account
 - Social Network tools like Facebook, mySpace, and Twitter
 - Forum tools
 - Examples
 - Flickr Commons (partner w/ Library Congress + 15 other institutions)
 - Noosphere serving as the PlanetMath project's software platform

Privacy

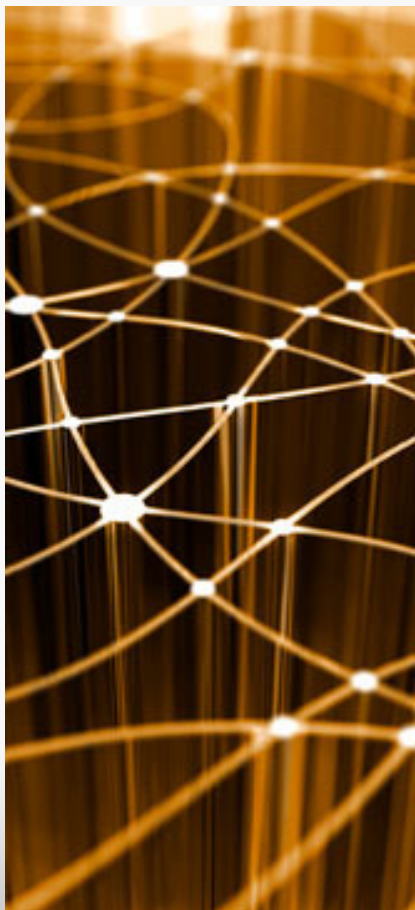
- **User privacy**: controlling the degree to which user make information about their interests and activities public in the context of user communities that DLs support
- Several types of privacy
 - (static and dynamic) privacy of the users accessing the DL
 - privacy of the DL digital objects, that may depend on the context of usage, the purpose, who is requesting the objects, etc.
 - privacy of data, due to
 - multimedia nature of data,
 - presence of annotations,
 - possible laws and regulations certain objects are subject to

Privacy (cont.)

- Archiving Users' Data and Users' Privacy
 - library user data can potentially reveal tastes and preferences of library's users as consumers
 - this information is of value to sellers of goods and services

- DLs as Online Communities
 - libraries support social relationships introducing users to others with similar interests and fostering creation of user communities

...raise an important set of issues relating to privacy and acceptability...



Thank you