DELOS WP2 - Task 10

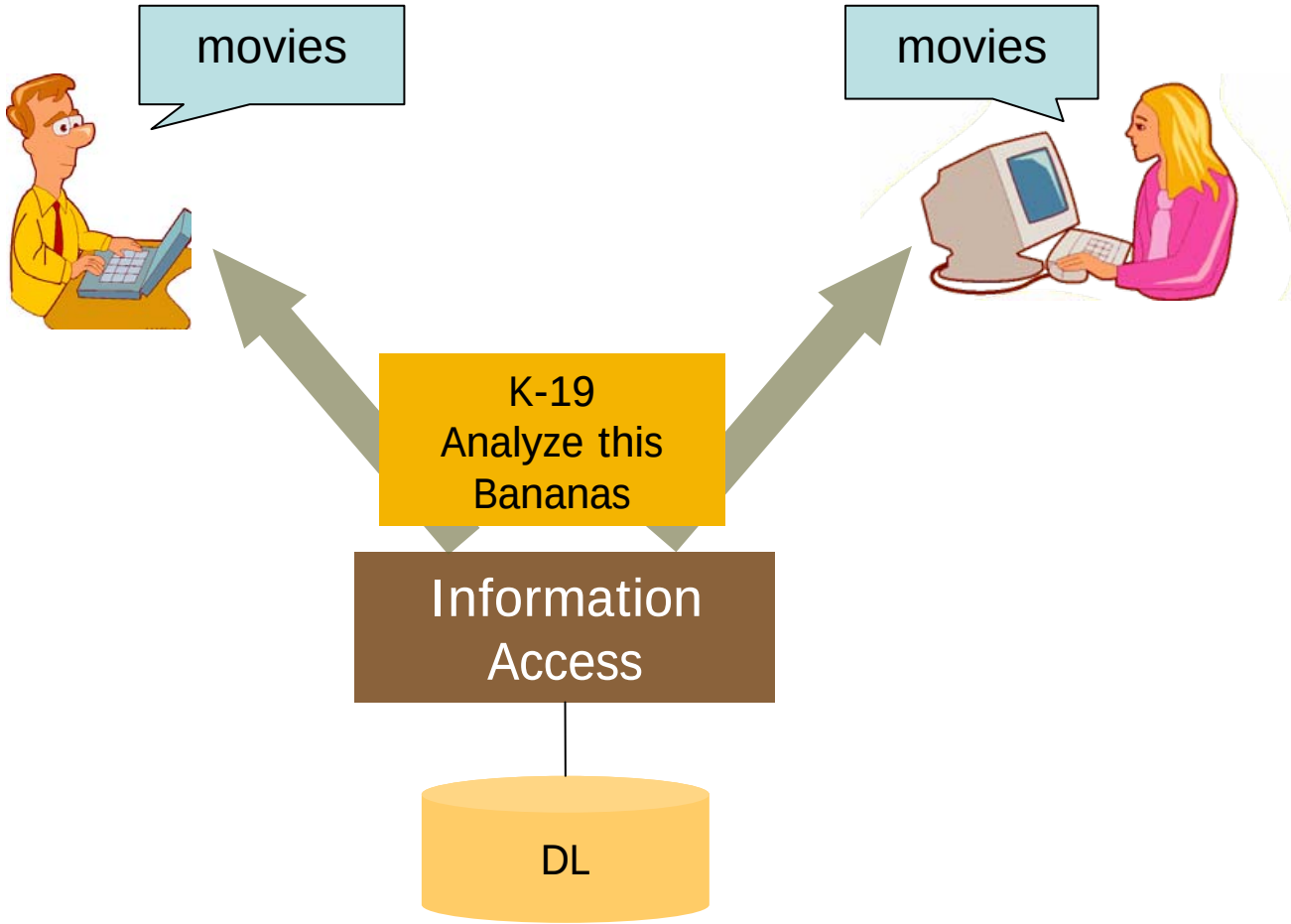
Modeling of User Preferences in Digital Libraries

DELOS All Task Meeting
Paris, January 30-31, 2006

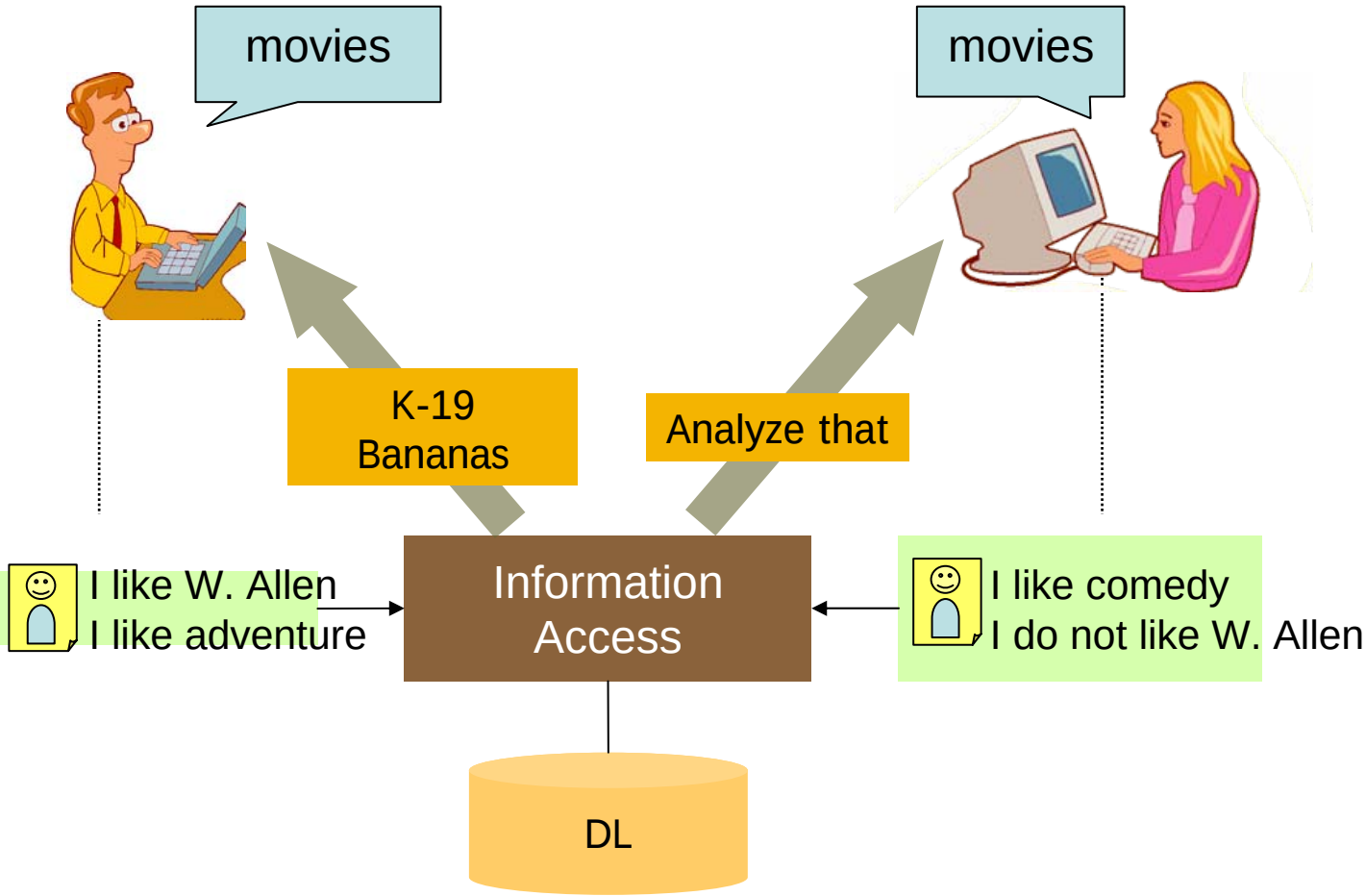
Task members

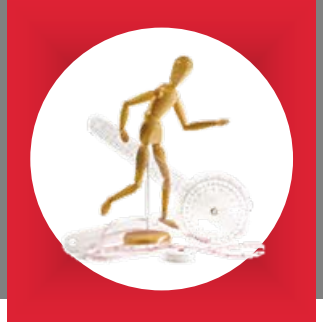
- University of Paris (coordinator)
- University of Athens
- FORTH
- CNR ISTI

Information Access in a DL

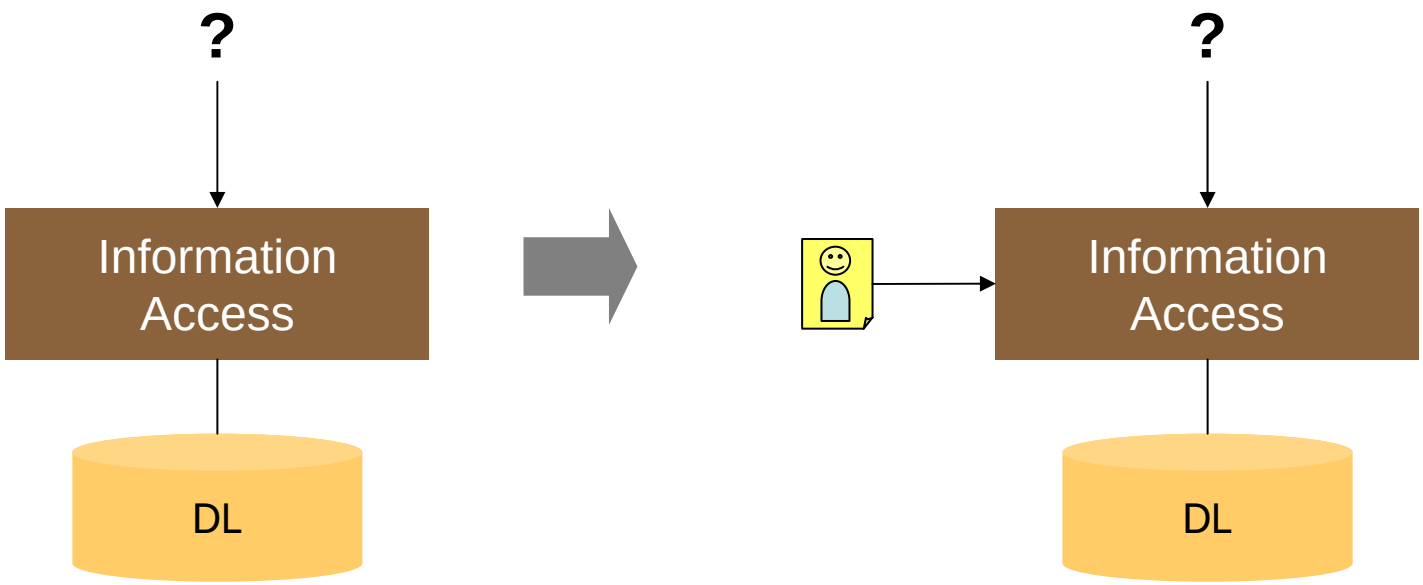


Information Access in a DL





Preferences in DLs



Task Overview

Task objectives

study a formal framework for specifying user preferences

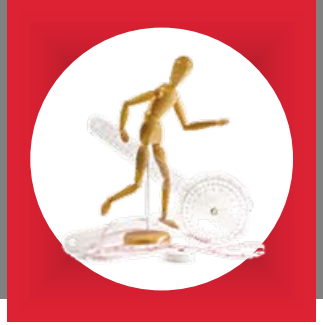
design algorithms for supporting preferences

enrich the digital library services with preference capabilities

Expected results

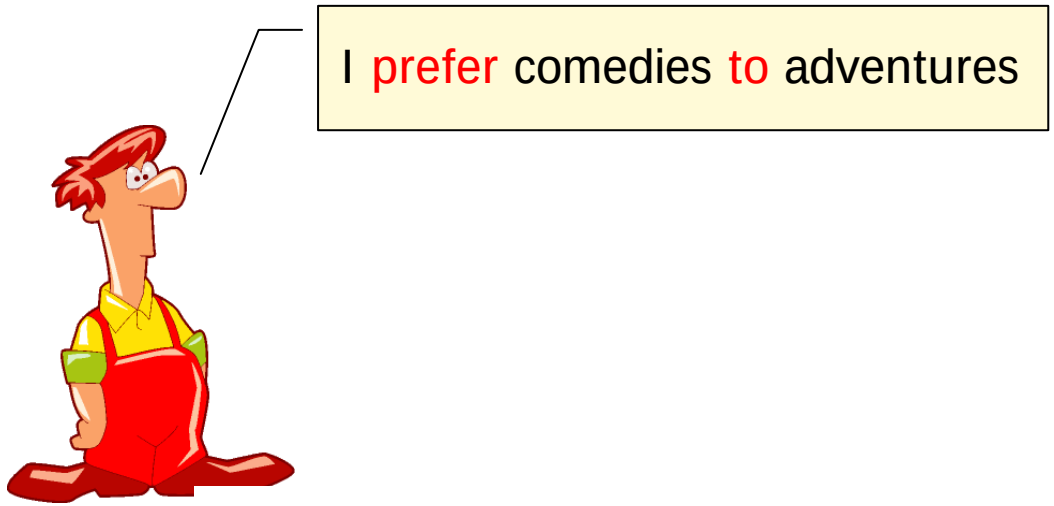
formal framework for the definition of preferences

demonstrator toolkit



Background on Preferences

Qualitative approach

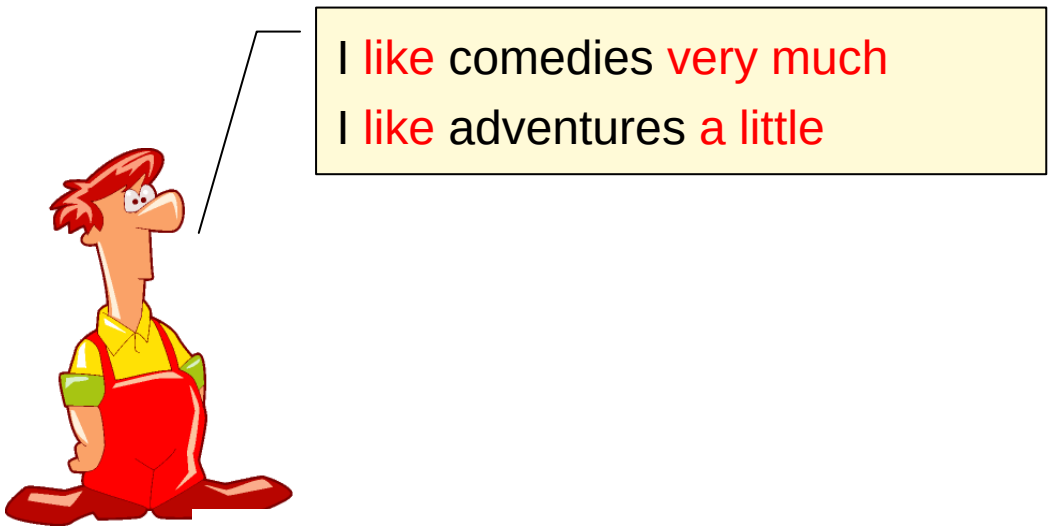


Preferences between objects are expressed using **preference relations**

I like A better than B

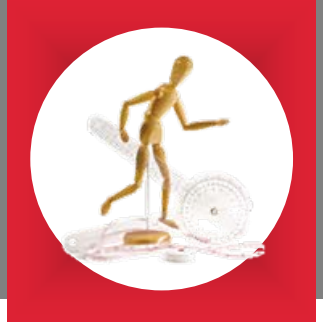
Background on Preferences

Quantitative approach



Preference for an object is expressed using **scores**

I (do not) like A that much



Progress

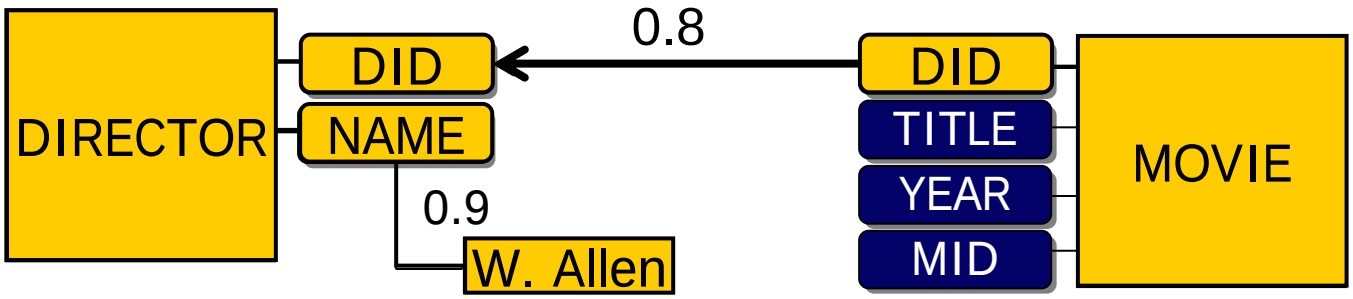
- Quantitative preference modeling (ICDE05)
- Qualitative preference modeling (HDMS05)
- Query tuning based on user preferences (FoIKS06)
- Integration of query context factors in query personalization with user preferences (SIGMOD05)

Quantitative preference modeling

Preference

< q, d> atomic condition q

degree of interest d $\in$ [0, 1]



< MOVIE.did = DIRECTOR.did, 0.8 >

< DIRECTOR.name = ‘W.Allen’, 0.9 >

Stored preferences

< MOVIE.did = DIRECTOR.did and
DIRECTOR.name = ‘W.Allen’, $0.9 * 0.8$ >

Implicit preferences

Qualitative preference modeling

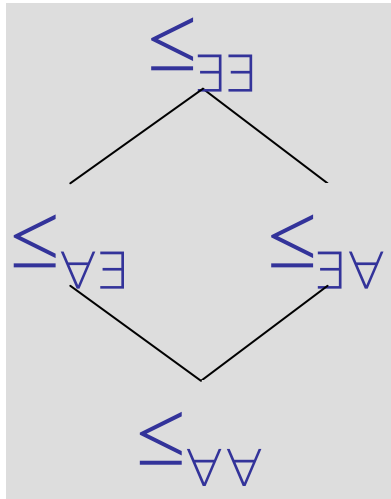
- Let $X=\{x_1,x_2,\ldots,x_n\}$ be a collection of objects. For every object x_i and attribute (or relationship) prop, let $\text{prop}(x_i)=\{y_1,y_2,\ldots,y_m\}$ be the set of its values (or its related objects) from some partial order $(\text{Y}, \leq)$
- 4 different relations may be defined on X:

$$x \leq_{\forall\exists} x' \text{ iff } \forall y \in \text{prop}(x)\ \exists y' \in \text{prop}(x')\ y \leq y'$$

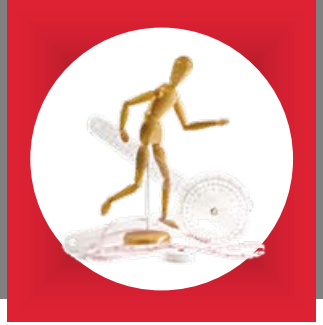
$$x \leq_{\exists\forall} x' \text{ iff } \exists y \in \text{prop}(x)\ \forall y' \in \text{prop}(x')\ y \leq y'$$

$$x \leq_{\forall\forall} x' \text{ iff } \forall y \in \text{prop}(x)\ \forall y' \in \text{prop}(x')\ y \leq y'$$

$$x \leq_{\exists\exists} x' \text{ iff } \exists y \in \text{prop}(x)\ \exists y' \in \text{prop}(x')\ y \leq y'$$



- These relations can be used to define a partial order on equivalence classes



Qualitative preference modeling

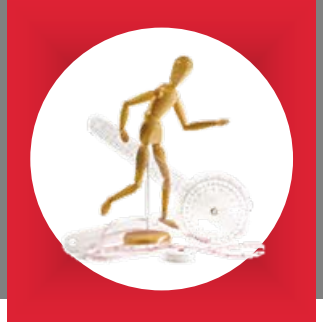
- A preference-based query over a data collection is a triple
  $Q := (q, \leq, k)$, where:
  - q: a regular query providing filtering conditions,
  - $\leq$: a partial preorder relation over the values of attributes (or relationships),
  - k: a positive integer indicating a top-k answer request
    - q and $\leq$ may refer to different attributes or relationships of the filtered data collection

Query Personalization

dynamically enhancing a query
with related preferences from a user profile
for providing personalized answers

“Overpersonalized” queries may

- be expensive
- produce empty results



Integration of query context

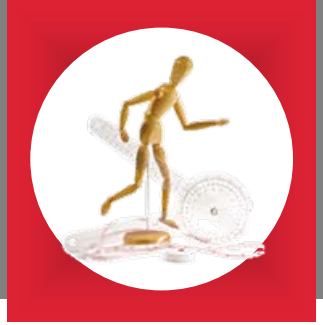
Objective

- provide most interesting results to the user
  take into account the current context

Current context = response time

+

answer size

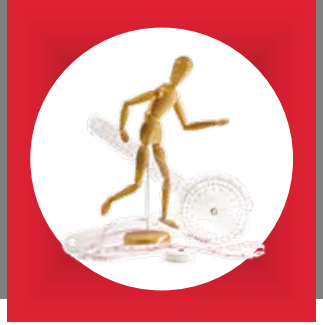


Integration of query context

Example

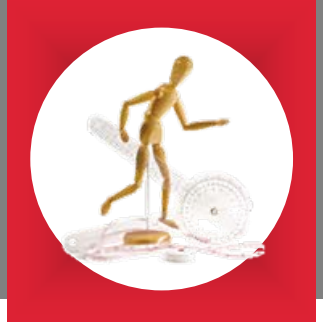
- More expensive queries
- Extensive results

- Quicker answers
- Shorter result list

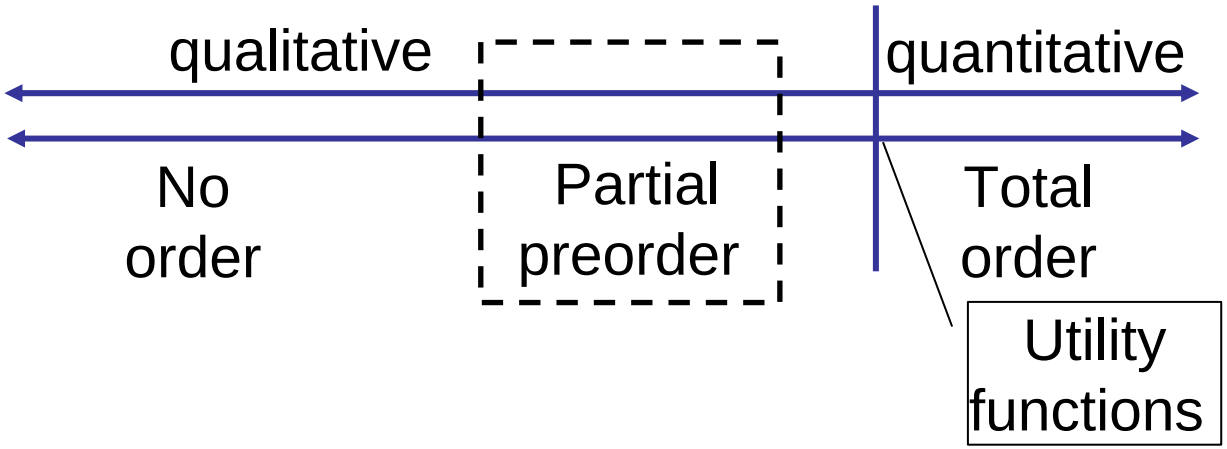


Query tuning based on user preferences

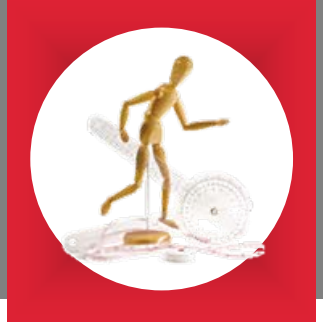
- query tuning



Current plans

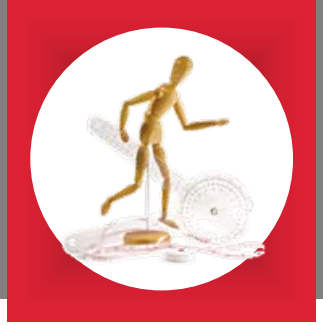


- Integration of results
  - Unifying foundations
- Implementation and testing of algorithms



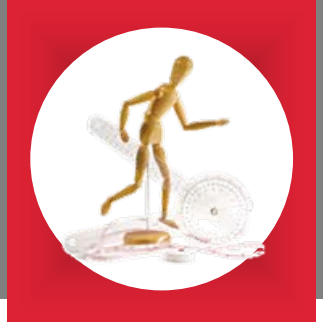
Future plans

- Preference Modeling (continuation)
  - Exploring new forms of preferences
  - Consensus ranking



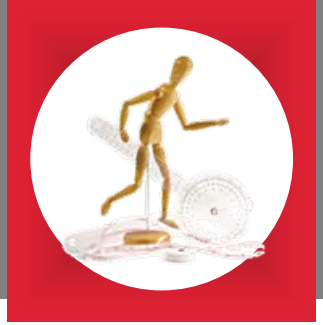
Future plans

- Interplay between qualitative & quantitative preferences
  - Commonalities and differences
  - User models combining both types
  - Query personalization using combined profiles
  - Incremental update of combined profiles



Future plans

- Computational Model
  - Query-initiated (pull)
  - System-initiated (push)



Future plans

- Integration with task 2.9: context modelling
  - context-dependent preferences
  - preferences as context