DELOS
NETWORK OF EXCELLENCE ON DIGITAL LIBRARIES

Delos NoE - Task T4.8

Task-centered Information Management (TIM)

Task leader: **Tiziana Catarci**

ΕΘΝΙΚΟΝ & ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ
NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS

LANCASTER UNIVERSITY

Università di Roma "La Sapienza"

Task group composition

- University of Rome "La Sapienza"
  - Data integration, knowledge representation

- University of Athens
  - Personalization

- University of Lancaster
  - Human computer interaction

Outline

- Introduction to TIM
  - illustrating scenario
  - issues
  - technical challenges
- On-going work: OntoPIM
  - architecture
  - characteristics
- Future work

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Scenario – Business meeting

- July 1st. Message from Antonella for a meeting (Rome, 9th-10th Sep.+ pdf with agenda)
- July 1st. Check with my calendar-ok

- Aug. 20th. Find airplane tickets
  - select location
  - select dates
  - check prices
  - book tickets

- Sep. 2nd. Find hotel
  - select location
  - select dates
  - check prices
  - book tickets

- Sep. 21st. File cost expense statement
  - fill-in location
  - fill-in dates
  - fill-in amounts (prices)
  - sent statement

Issues

- Lots of useful data
  - our laptop can be seen as the most commonly and frequently used "personal digital library"!
- Repeat similar subtasks
- User has to find the right data and perform the right tasks at the right time

→It should be easier!

Idea: Let the computer do the work...

Technical challenges

- Heterogeneous and unstructured data
- No connection between data and tasks

- Solution:
  - Managing data with a personal ontology (what we have done until now)
  - Semantically encoded task model (just starting)

TIM

But ... (1/2)

- Semantic Save using personal ontology:
  - managing ontologies
  - managing personal ontology
  - fluid interface
  - personalised interaction
  - inference mechanisms
  - instance reconciliation problems
  - leverage user's effort
  - taking into account time

But ... (2/2)

- Semantically encoded task model
  - task inference hasn't worked in the past, however...
    we have the ontology
  - simple operations over generic ontologies 
  - complex tasks over personal ontology 
    - i.e. as composition of simple operations

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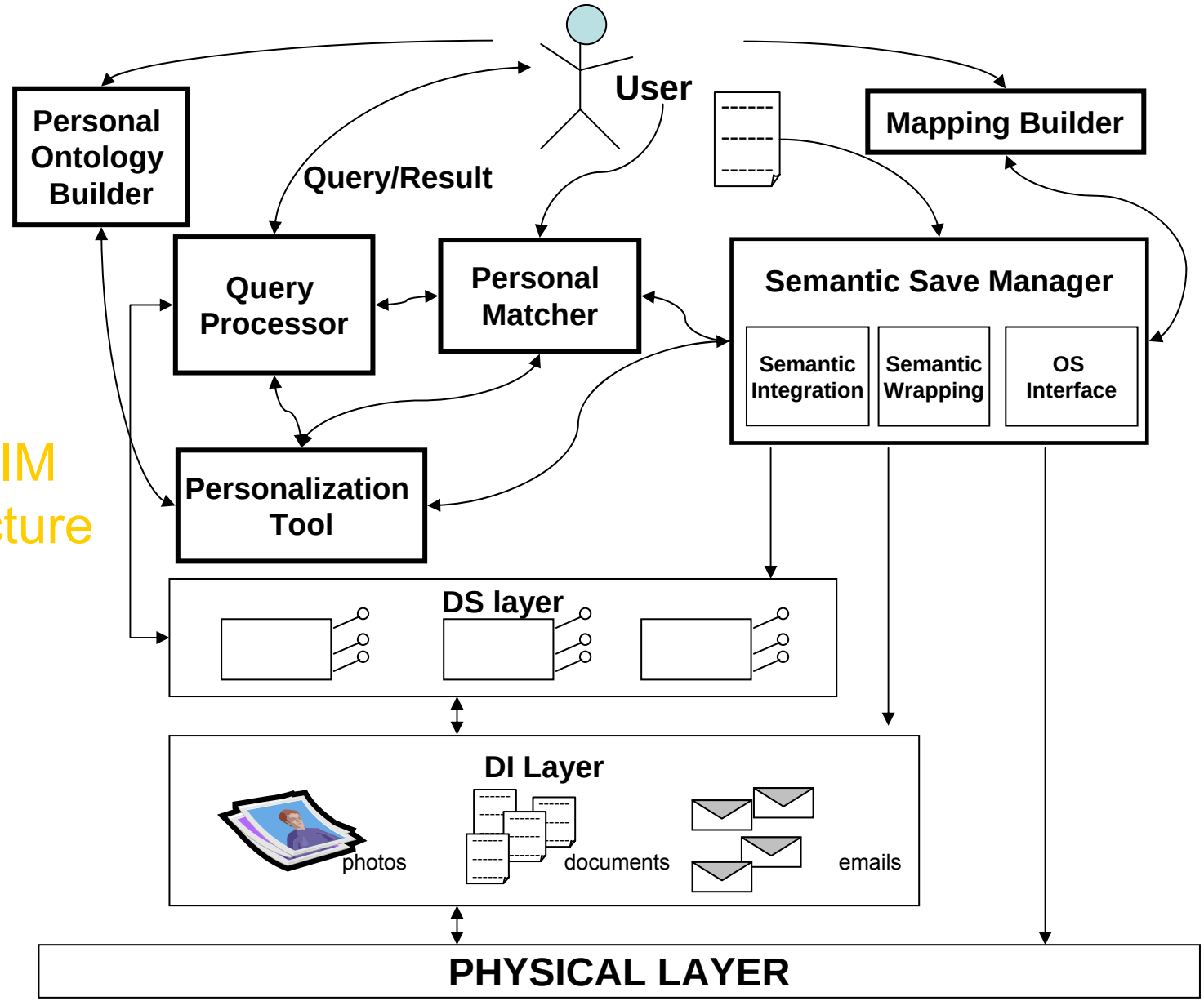
OntoPIM Architecture

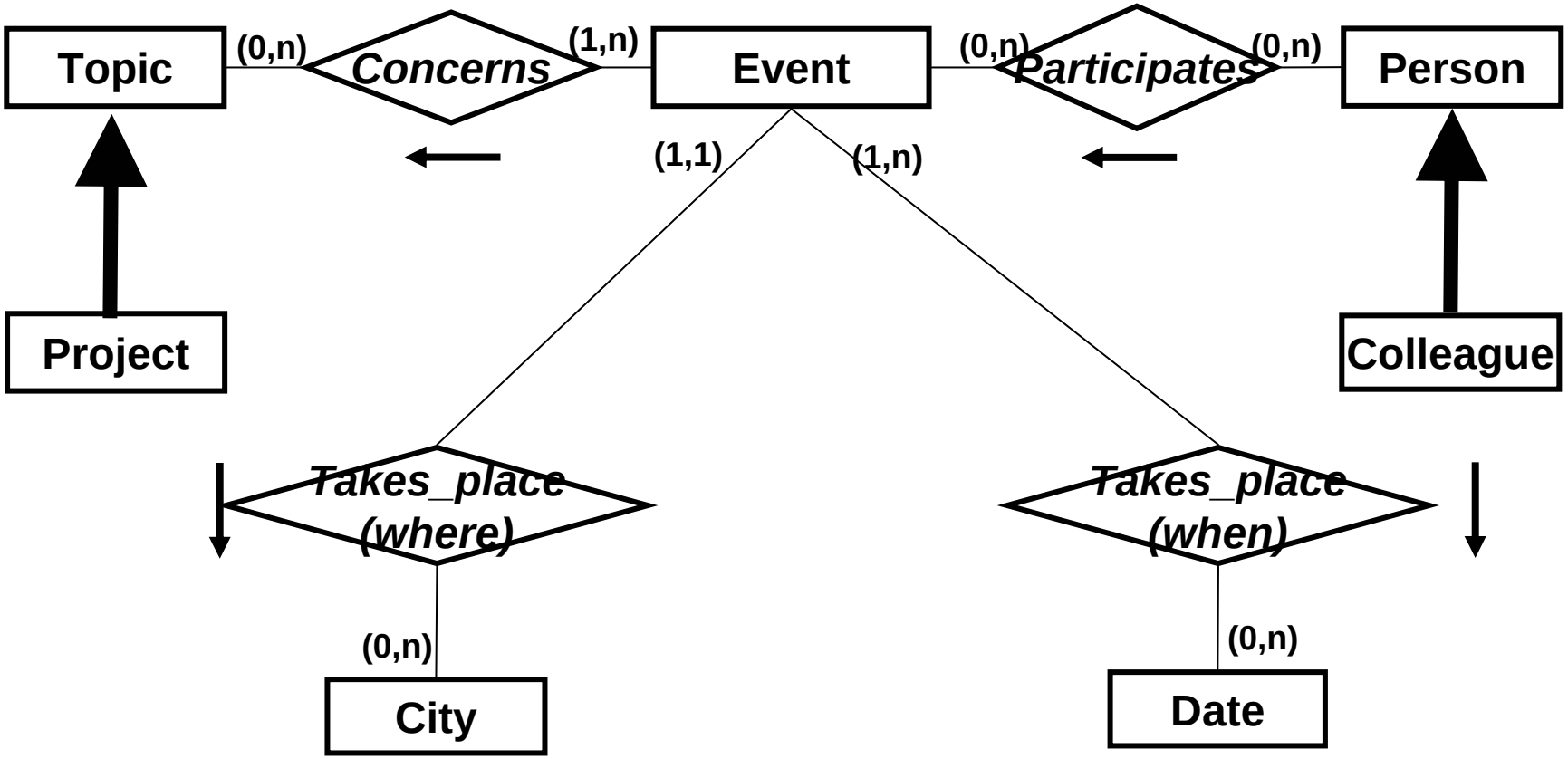


Personal Ontology

- Personal ontology: description of the user's domain of interest
  - simple Description Logic: DL-Lite
  - expressive query language to access data through the ontology: conjunctive query
  - low complexity
  - underlying system: QuOnto (based on a commercial DBMS for data storage)

Personal Ontology

Example

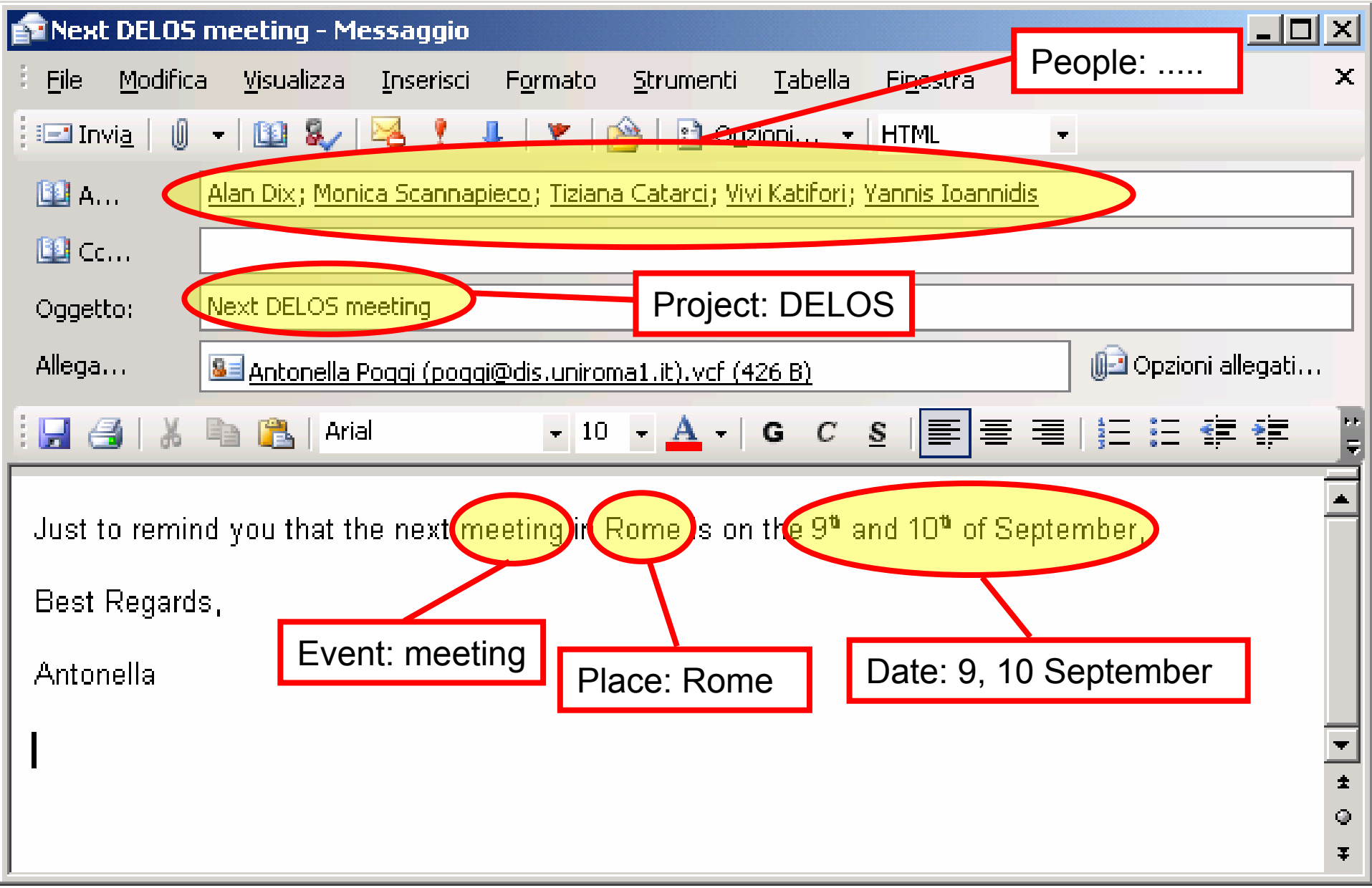


Semantic Wrapping

Domain-Independent information

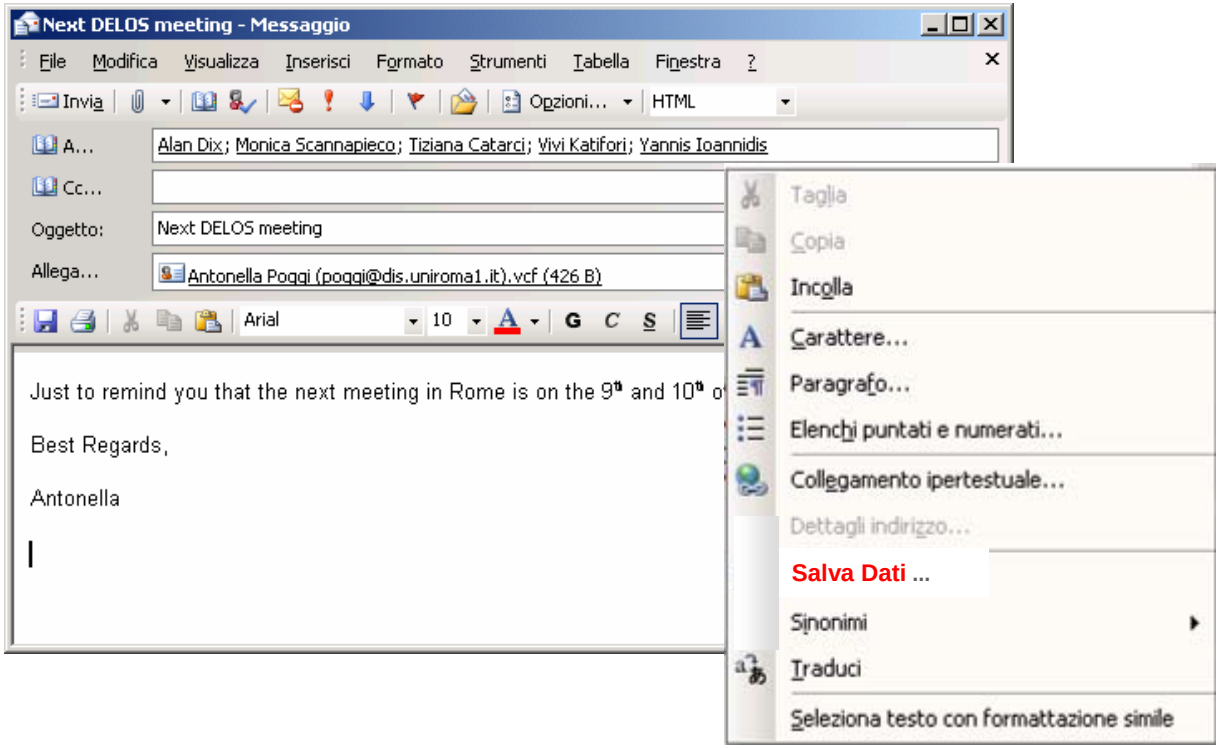
- Semantic wrapping
  - assigns a Domain Independent type to the objects that are saved
  - each DI type is characterized by a set of attributes (independent from the application that created the object)

DI attributes ↔ object metadata


Next DELOS meeting - Messaggio
File Modifica Visualizza Inserisci Formato Strumenti Tabella Finestra
People: .....
Invia
Opzioni...
HTML
A...
Alan Dix; Monica Scannapieco; Tiziana Catarci; Vivi Katifori; Yannis Ioannidis
Cc...
Oggetto:
Next DELOS meeting
Project: DELOS
Allega...
Antonella Poggi (poggi@dis.uniroma1.it).vcf (426 B)
Opzioni allegati...
Arial
10
Just to remind you that the next meeting in Rome is on the 9th and 10th of September,
Best Regards,
Antonella
Event: meeting
Place: Rome
Date: 9, 10 September

Semantic Wrapping

Example



DI type: Email

Sender: Antonella

Recipients: Alan, Monica, Tiziana, Vivi, Yannis

Date of creation: 01/07/05

Subject: Next DELOS meeting

OK **Annulla**

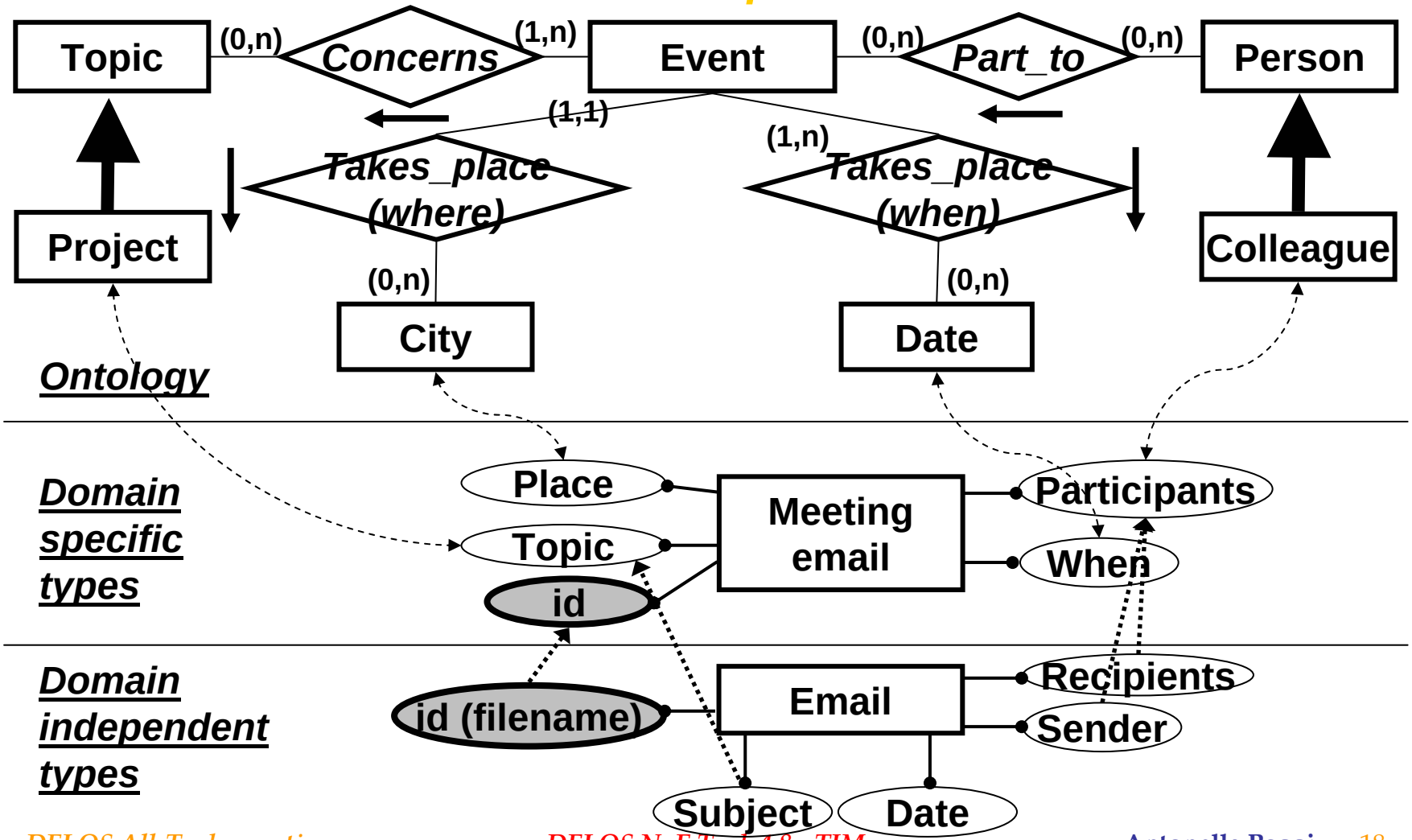
Semantic Integration
Domain-Specific information

- Semantic integration
  - Domain Specific types of data: establish a semantic relationship between the data and the Personal ontology
  - instances matching rules (based on given similarity relation) specify when two instances should be reconciled since they represent the same object of the real world
    - declarative approach to instance reconciliation

    ≠ procedural approach proposed in Semex [Dong & Levy - Sigmod 2005]
    - idea: use machine learning techniques to compute instance matching rules

Semantic Save Result

Example



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Future work

- computation of instance matching rules
- investigate what are the "actual" ontologies reflected by user's files/bookmark/mail
- considering time, evolving objects
- complex task definition
  - connection with web-services composition (?)

Others:

- personalisation issues
- ontology visualization
- management of personal multi-media data

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Thank you!

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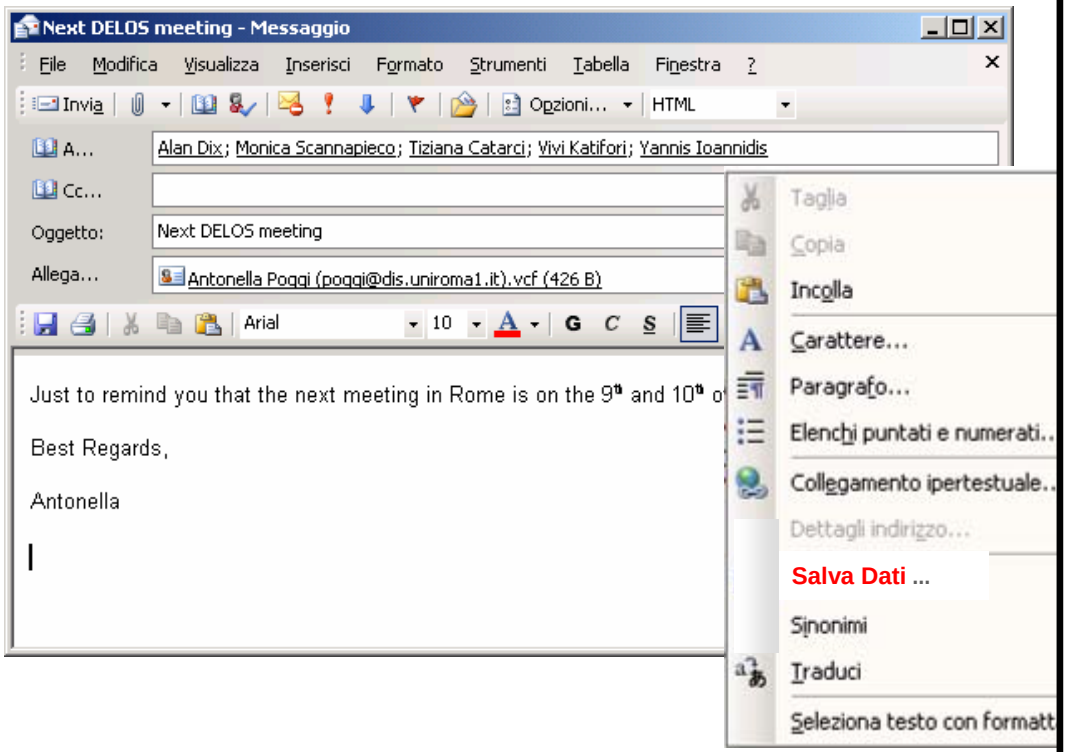
Backup

Semantic Integration

Example



I(x, Antonella), Person(x)

i.e. **Antonella** *represents an instance* **x** *of* **Person**

I(y, Alan), Person(y)

I(z, Yannis), Person(z)

I(w, Meeting), Event(w)

I(v,Rome), City(v)

I(p,Delos), Project(p)

Partecipates_to(x,w)

Partecipates_to(y,w)

Partecipates_to(z,w)

Takes_place(when) (w,20/09/05)

Takes_place(where) (w,v)

Concerns(w,p)

Semantic Integration

Matching rules

- $Person(x_1)$, $I(x_1,v)$, $Person(x_2)$, $I(x_2,v) \rightarrow x_1=x_2$

  one rule of this type for each concept

- $Person(x_1)$, $I(x_1,v_1)$, $Person(x_2)$, $I(x_2,v_2)$, $sim(v_1,v_2) \rightarrow x_1=x_2$

  problem: compute the similarity function

- *Other rules that can be learnt (future work!)*