

The Social Semantic Desktop



Hands on PIMO



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<http://nepomuk.semanticdesktop.org>

Background Information about PIM

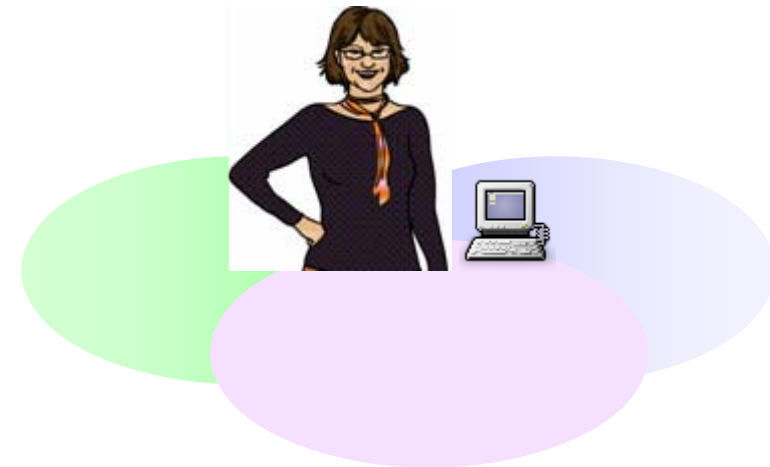
- **Personal Information Management PIM**
- **Personal Information PI**
 - different interpretations possible:
 - **owned, accessed, controlled by the Person**
 - directed at a Person
 - about a Person, but kept by someone else
 - relevant for Person
- **Personal Space of Information PSI**
 - all information elements within the definition of **PI**
 - tools to interact with the information, Personal Knowledge Workspace
 - borders unknown, fuzzy, overlaps with other's **PSI**

Book: Personal Information Management

William Jones and Jaime Teevan (2007)

Book: Keeping Found Things Found

William Jones (2008)



Background Information about PIM

- **PIM activities by Knowledge Workers**
 - **filing** information for retrieval and storage
 - (re) **finding** information
 - **organizing** information and meta-level activities
- **Personal Information Collection PIC**
 - a list (category) of items, used to support activities
- **Typical behaviours observed in field studies**
 - character of workers differ: pilers VS filers
 - walking the same beaten paths to known information
 - orienteering: looking where you are to know the next step, knowing how you get there
 - fulltext search as last resort
- **No education for workers provided!**

Finding and Reminding: File Organization from the Desktop

Deborah Barreau and Bonnie A Nardi (1995)

The perfect search engine is not enough: a study of orienteering behavior in directed search

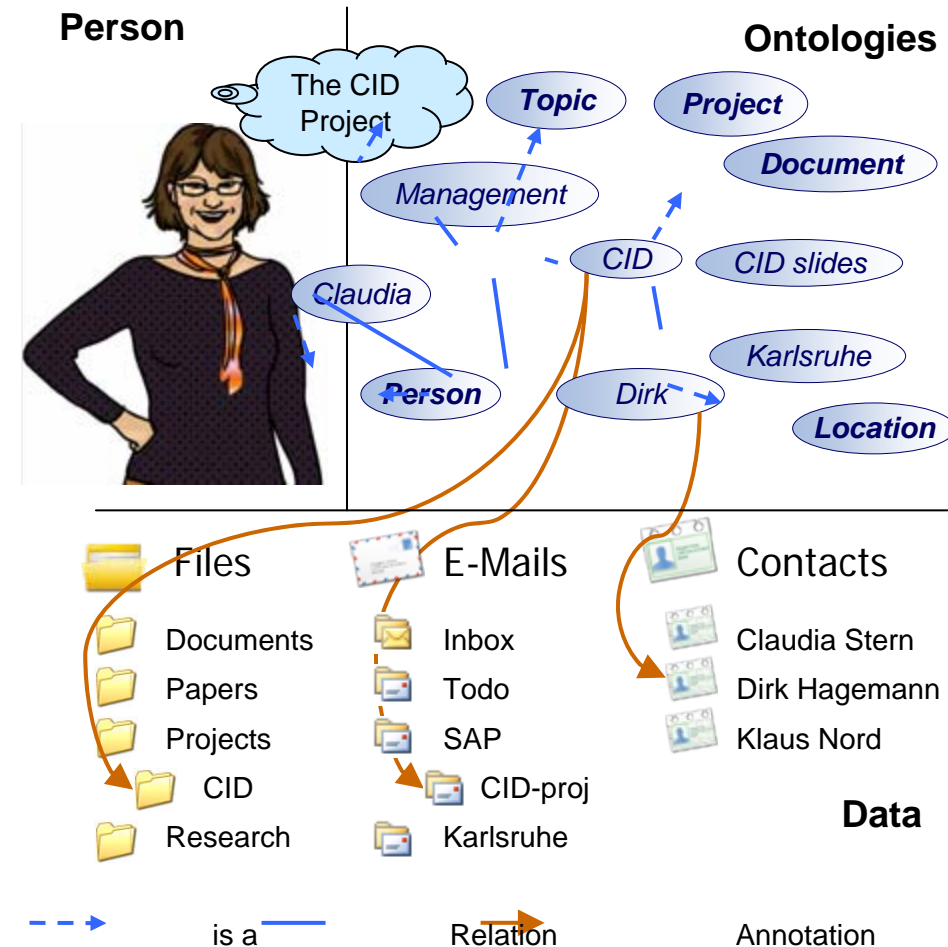
Teevan, Alvarado, Ackerman, Karger (2004)



Incar-08

Personal Information Model *PIMO*

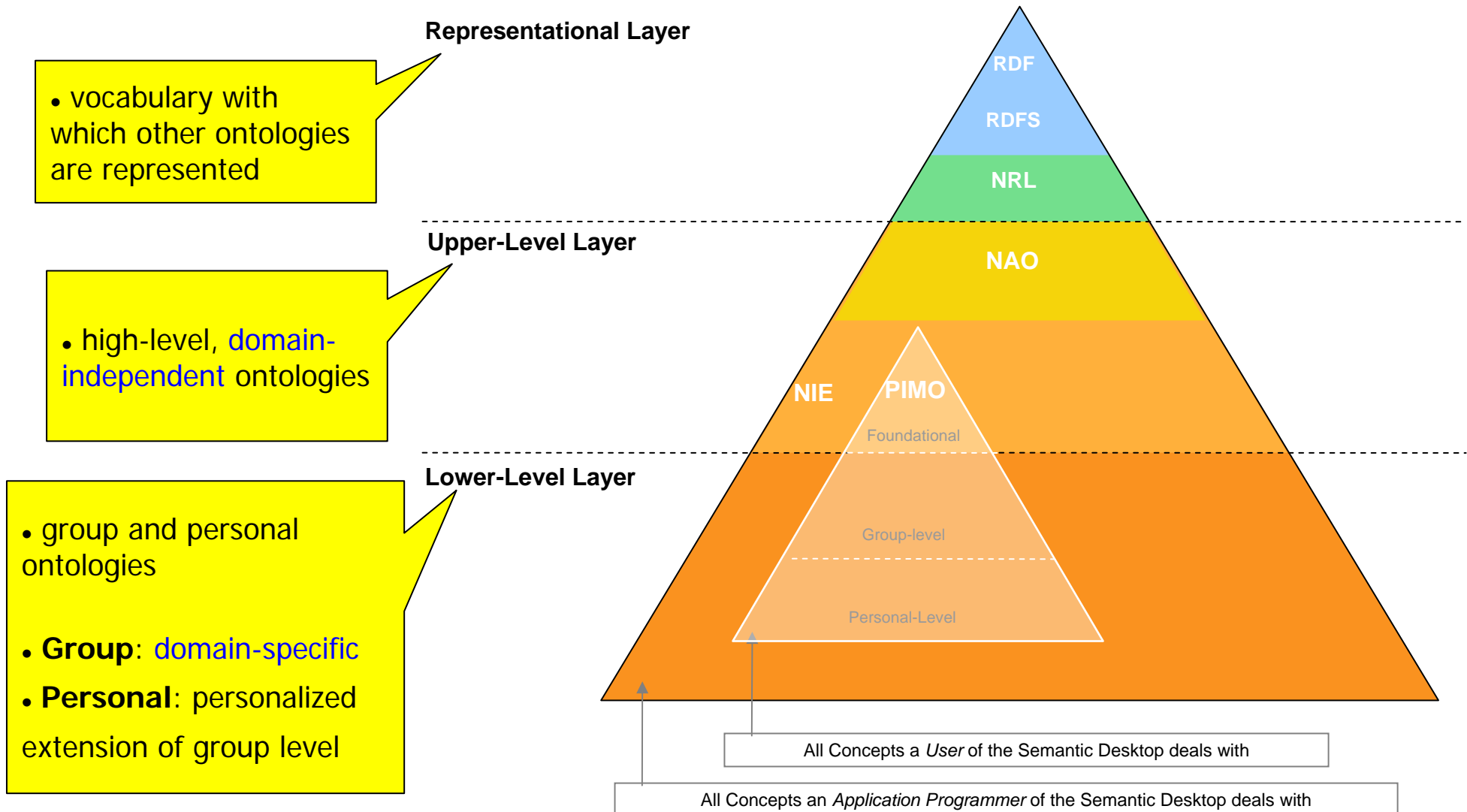
- documents, e-mails, websites are “tagged” with concepts
- represents personal mental model
- **formal**: classes, concepts, relations in **RDFS**
- **basic classes** predefined
- user generated **classes, concepts, relations**
- **extensible with**
 - organizational knowledge
 - ontologies
 - extracted data



PIMO - a Framework for Representing Personal Information Models
Sauermann, van Elst, Dengel (2007)

<http://www.dfki.uni-kl.de/~sauermann/papers/sauermann+2007b.pdf>

NEPOMUK Ontologies





- **existing** data
- needed for
knowledge work
- domain **independent**

Information Elements

<http://www.flickr.com/photos/uniqueo/2667162885/>

- “**NIE**” identifies both the NIE **ontology** and the NIE **framework** of ontologies
- builds on **NRL** – Nepomuk Representational Language (= RDFS + extensions)
- Representing existing information, not replacing existing file formats
- Integration and reuse amongst ontologies in the framework

NIE

Two Parts

DataObjects represent **physical entities** that contain **data**.

files, mailboxes etc.

Bitstreams which need to be **interpreted** as InformationElement.

InformationElement is a piece of information stored within a data object.

hasPart

isPartOf

generatorOption

mime Type

generator

contentCreated

mainTextContent

characterSet

subject

Archive

Folder

Trash

OperatingSystem


Executable

Application




Font

MediaStream





NEO

Name...	Claudia Stern
Position:	Research Manager
Firma:	SAP
Speichern unter:	Stern, Claudia 




E-Mail...	 claudi-1@csc.kth.se 
Anzeigen als:	Claudia Stern (clau 
Webseite:	
IM-Adresse:	

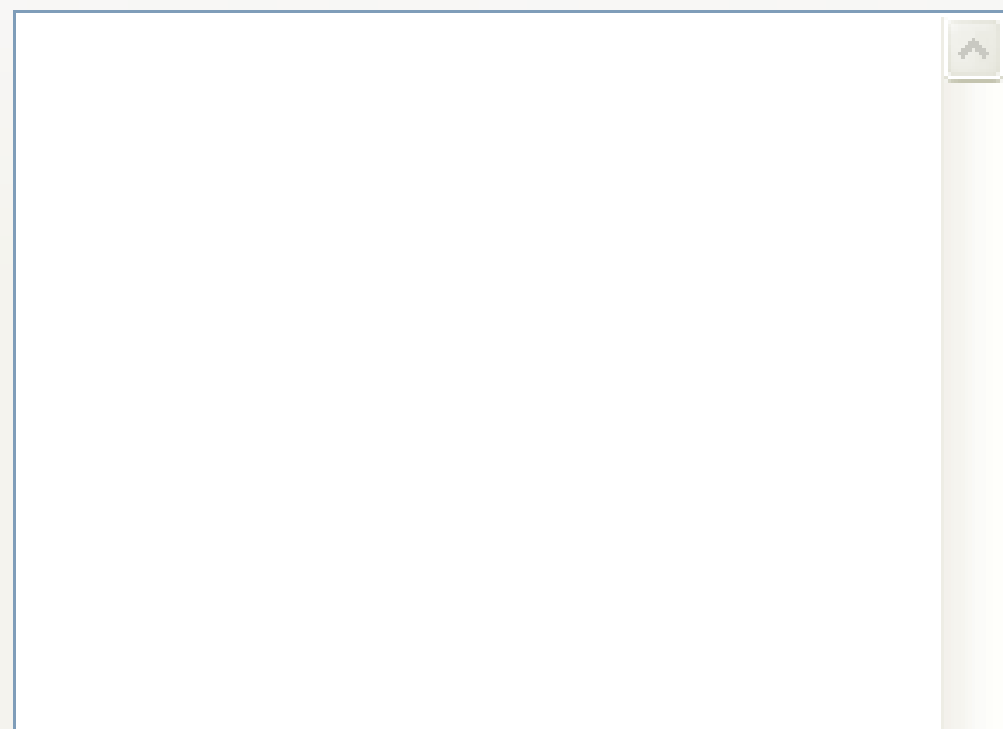
Telefonnummern

Geschäftlich...		+49 (721) 123456
Privat...		
Fax geschäftl....		
Mobiltelefon...		+49 (175) 1234567

Adressen

Geschäftlich...		Vincenz-Priessnitz-Str. 1 Karlsruhe 76131 Germany
-----------------	---	--

☒ Dies ist die Postanschrift





Name: Claudia Stern
 Position: Research Manager
 Email: clauda@necolab.us
 Phone: +49 (0)11 122556
 Address: Vincenz-Preisstr. 1, 76133 Germany



@prefix nco: <http://www.semanticdesktop.org/ontologies/2007/03/22/nco#> .

@prefix nie: <http://www.semanticdesktop.org/ontologies/2007/01/19/nie#> .

<outlook://contact/000000009C998B6AFC07904AAAE310F168000F604052000>

a nie:Information

URI



• identifies Information Object

nie:title "Claudia Stern"

nco:fullname "Claudia Stern"

nco:nameFamily "Stern"

nco:nameGiven "Claudia"

to identify yourself, all these work for the task

• outlook://contact/1 , addressbook://1,

nco:hasEmail "clauda@necolab.us"

• urn:uuid:b086ad95-b056-47ec-86aa-fb907ee3e6ee

nco:hasPostalAddress

<outlook://contact/000000009C998B6AFC07904AAAE310F168000F604052000_BusinessAddress>;

nie:dataSource <http://nepomuk.semanticdesktop.org/datawrapper/aperture/rootUri/outlook>;

nie:isPartOf <outlook://folder/000000009C998B6AFC07904AAAE310F168000F622810000>.

Name: Claudia Stern
Position: Research Manager
Print: SAP
Speichern unter: Stern, Claudia
Telefonnummern:
Geschäftlich: +49 (0)11 122556
Privat: +49 (0)11 122556
Fax geschäftlich: +49 (0)11 122556
Mobiltelefon: +49 (0)11 122556
Adressen:
Geschäftlich: Vincenzo-Presenza-Str. 1
76133 Karlsruhe
Germany
☒ Dies ist die Postanschrift



@prefix nco: <http://www.semanticdesktop.org/ontologies/2007/03/22/nco#> .
@prefix nie: <http://www.semanticdesktop.org/ontologies/2007/01/19/nie#> .
<outlook://contact/000000009C998B6AFC07904AAAE310F168000F604052000>

a nie:InformationElement, nco:Contact;

Type

- a nie:InformationElement
- a nie:Contact

A software converting data does not discriminate between Person and Organization, you can:

- a nie:PersonContact

nie:dataSource <http://nepomuk.semanticdesktop.org/datawrapper/aperture/rootUri/outlook>;
nie:isPartOf <outlook://folder/000000009C998B6AFC07904AAAE310F168000F622810000>.

Name: Claudia Stern
 Position: Research Manager
 Email: clauda-1@csc.kth.se
 Anzeigen als: Claudia Stern (dpu)
 Drina: SAR
 @beater:
 PH-Adresse:
 Stern, Claudia
 SpeichergröÙe:
 Telefonnummern:
 Geschäftlich: +49 (0)211 122556
 Privat:
 Fax geschäftl.:
 Mobiltelefon: +49 (0)211 1225567
 Adressen:
 Geschäftlich: Vinzenz-Preisnitz-Str. 1
 76133 Karlsruhe
 Germany
☒ Dies ist die Postanschrift



@prefix nco: <http://www.semanticdesktop.org/ontologies/2007/03/22/nco#> .

@prefix nie: <http://www.semanticdesktop.org/ontologies/2007/01/19/nie#> .

<outlook://contact/000000009C998B

Statements

a nie:InformationElement, nco:C

nie:title "Claudia Stern";

nco:fullname "Claudia Stern";

nco:nameFamily "Stern";

nco:nameGiven "Claudia";

nco:hasEmailAddress <urn:uuid:2cc48d56-7c30-4ba1-8b01-f7adebb620b3>.

<urn:uuid:2cc48d56-7c30-4ba1-8b01-f7adebb620b3> a nco:EmailAddress ;

nco:emailAddress "claudi-1@csc.kth.se" .

- nie:title to be able to show anything in a GUI (= the "label")
- nameFamily, nameGiven

Name: Claudia Stern
 Position: Research Manager
 Email: clauda@csc.kth.se
 Print: SAP
 Speichergröße: Stern, Claudia
 Telefonnummern:
 Geschäftlich: +49 (0)211 122556
 Privat:
 Fax geschäftl.:
 Mobiltelefon: +49 (0)211 1225567
 Adresse:
 Geschäftlich: Vinzenz-Preisnitz-Str. 1
 76133 Karlsruhe
 Germany
☒ Dies ist die Postanschrift



@prefix nco: <http://www.semanticdesktop.org/ontologies/2007/03/22/nco#> .

@prefix nie: <http://www.semanticdesktop.org/ontologies/2007/01/19/nie#> .

<outlook://contact/000000009C998B6AFC07904AAEC310F168000F604052000>

a nie:InformationElement, nco:Contact;

nie:title "Claudia Stern";
 nco:fullname "Claudia Stern";
 nco:nameFamily "Stern";
 nco:nameGiven "Claudia";

Sub-Resources for details

- hasEmailAddress -> EmailAddress
- to be able to annotate intended use

nco:hasEmailAddress <urn:uuid:2cc48d56-7c30-4ba1-8b01-f7adebb620b3> .

<urn:uuid:2cc48d56-7c30-4ba1-8b01-f7adebb620b3> a nco:EmailAddress ;
 nco:emailAddress "claudi-1@csc.kth.se" .



@prefix nco: <<http://www.semanticdesktop.org/ontologies/2007/03/22/nco#>> .

@prefix nie: <<http://www.semanticdesktop.org/ontologies/2007/01/19/nie#>> .

<outlook://contact/000000009C998B6AFC07904AAEC310F168000F604052000>

a nie:InformationElement, nco:Contact

Sub-Resources for details

- for complex structures

nco:hasPostalAddress

<outlook://contact/000000009C998B6AFC07904AAEC310F168000F604052000_BusinessAddress>;

<outlook://contact/000000009C998B6AFC07904AAEC310F168000F604052000_BusinessAddress>

a nco:PostalAddress ;

nco:streetAddress "Vincenz-Priessnitz-Str. 1" ;

nco:locality "Karlsruhe" ;

nco:country "Germany" ;

nco:contactMediumComment "work" ;

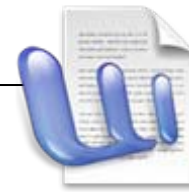
nco:postalcode "76131" .

Second Example: A document

- a “Word” File -> a NIE DataObject and a PaginatedTextDocument



Second Example: A document



@prefix nie: <http://www.semanticdesktop.org/ontologies/2007/01/19/nie#> .
@prefix nco: <http://www.semanticdesktop.org/ontologies/2007/03/22/nco#> .
@prefix nfo: <http://www.semanticdesktop.org/ontologies/2007/03/22/nfo#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<file://C:/home/claudia_stern/documents/projects/CID/ProjectDescription6.doc>
a nfo:FileDataObject;
nfo:fileName "ProjectDescription6.doc";
nfo:fileSize "401408"^^xsd:long;

Data Object

nie:cr
nie:in

hands-on:

create this NOW!

- URI for Information Element *D* and *C*
- *D* – type – nfo:PaginatedTextDocument
- *D* – nco:contributor – *C*
- *C* – type nco:Contact
- *C* – nco:fullname "Claudia Stern"

Information
Element

<urn:uuid:6653ac77-8198-471e-87d7-5b7e54407eed> a nco:Contact;
nco:fullname "Claudia Stern" .

7eff>.

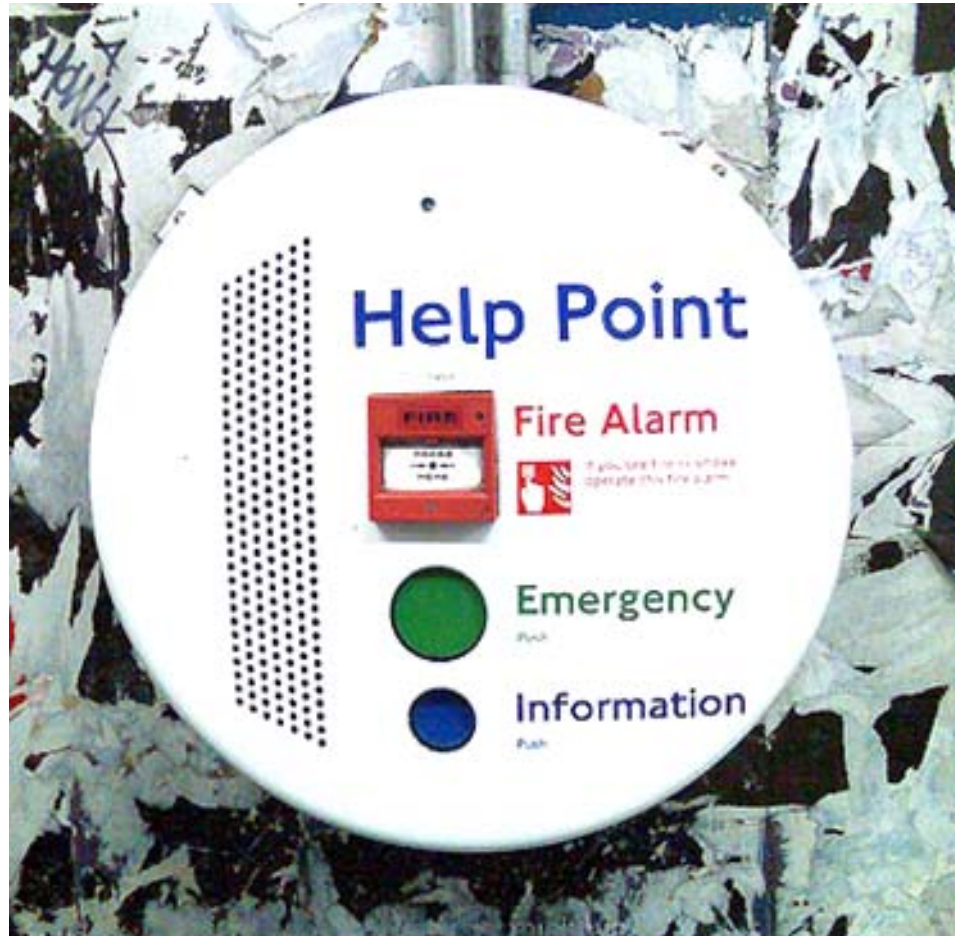
CID/ProjectDescription6.doc>;
CID. CID is investigating intero...";
eed>.

Summary

- **Data Objects** represent **physical entities** that contain **data**. Bitstreams which need to be **interpreted**.
 - **Information Elements** represent facts
- NIE Ontologies are **integrated**
- Extracted data is **not integrated nor aligned**, extracting the data involves **no intelligence**

Questions?

- 3 minutes for questions



<http://www.flickr.com/photos/markhillary/1347412899/>

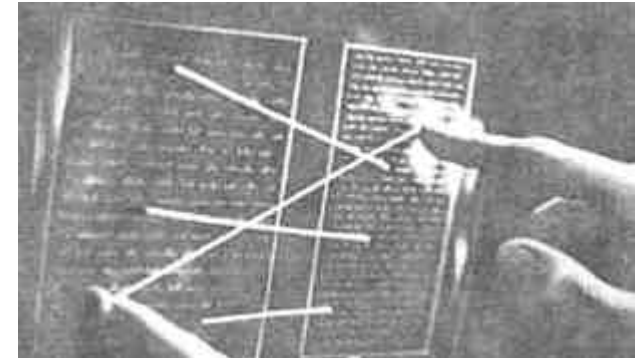


Incar-08

Some Questions towards PIMO

So far so good, but ...

- **How to categorize it for retrieval?**
 - It is about the project "CID" !
 - It is a "Project Description" !
 - It's by "Claudia"
- **Didn't the same Claudia show up in the address book?**
- **In my knowledge workflow:**
How can the ontology and user align?



Ted Nelson, Xanadu

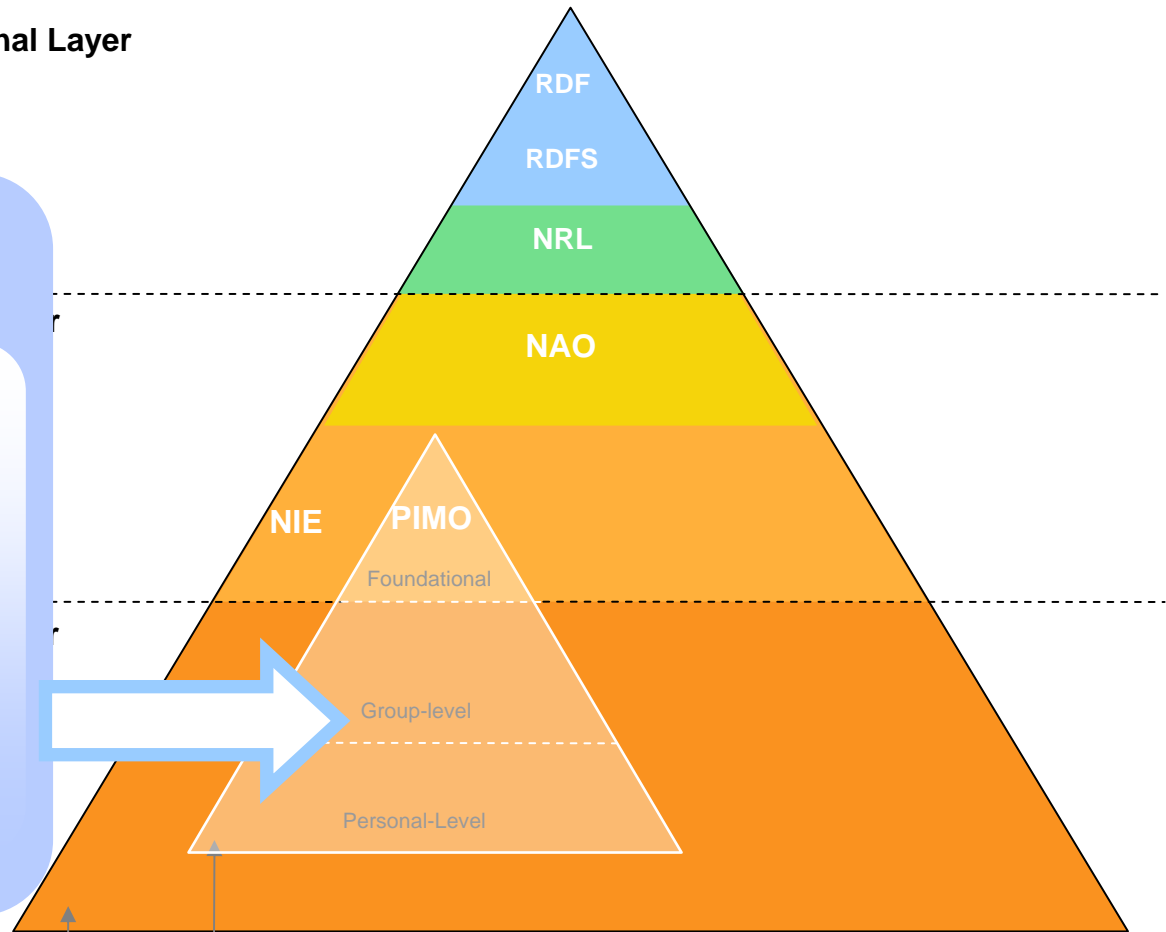
NEPOMUK Ontologies

Representational Layer

Knowledge Worker

Individual activities
in PSI workflows:

- filing
- finding
- thinking



All Concepts a *User* of the Semantic Desktop deals with

All Concepts an *Application Programmer* of the Semantic Desktop deals with

Personal Information Model

- represents Personal Information Models of individuals.
- consists of

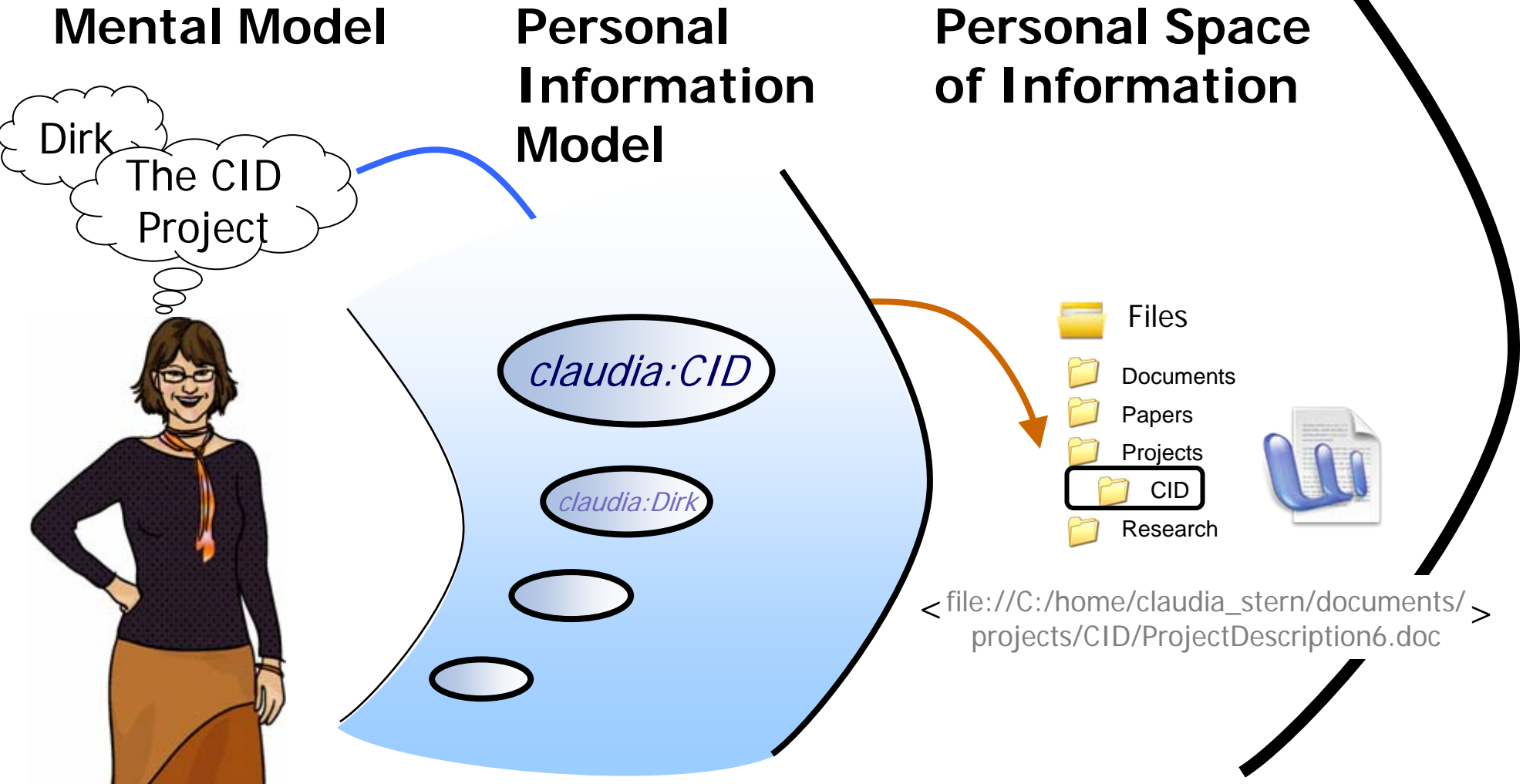
RDF Vocabulary

- class:PIMO
- class:Thing
- identifiers
- relations
- information fusion

Upper Ontology

- basic concepts in PIM
- Person, Location, Event, Organization, Topic, Document, Time

The knowledge worker's world-view on information



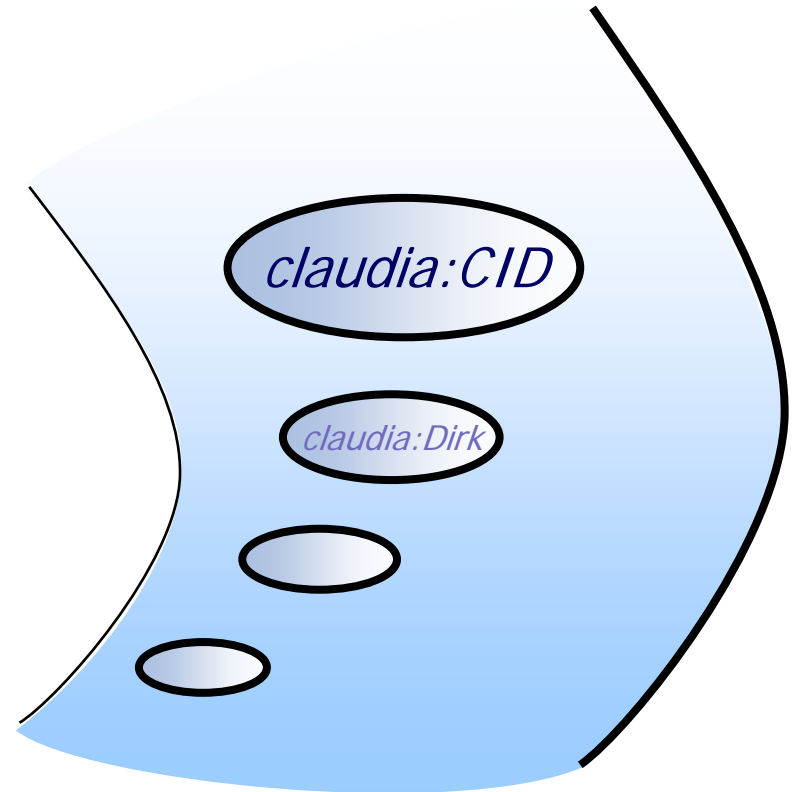
Creating a user-PIMO

What to do:

- create a user-PIMO: one model for each knowledge worker
- store in **system**

Why?

- create structure
- use identification space, **namespace**
 - identify user
 - identify Things
- store **facts**
- for filing & finding & thinking



The namespace of the knowledge worker

Multiple choices for protocol and addressing scheme.

PIMO is user-bound

http is server bound
xmpp is user bound

- `http://<group-host>/<username>/pimo/`
- `semdesk://<user-xmpp-id>/things/`

hands-on

`semdesk://claudia@example.com/things/`



Knowledge Worker and his user-PIMO

@prefix claudia: <semdesk://claudia@example.com/things/>.

@prefix pimo: <http://www.semanticdesktop.org/ontologies/2007/11/01/pimo#>.

claudia:Claudia a pimo:Person;
 nao:prefLabel "Claudia Stern";
 nco:hasEmailAddress mailto:claudia@example.com.
mailto:claudia@example.com a nco:EmailAddress;
 nco:contactMediumComment "work";
 nco:emailAddress "claudia@example.com".

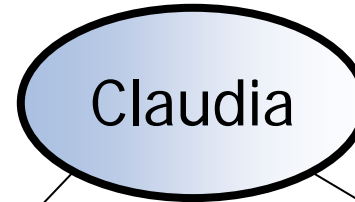
} User

claudia:PIMO a pimo:PersonalInformationModel;
 pimo:creator claudia:Claudia;
 nao:hasDefaultNamespace "semdesk://claudia@example.com/things/";
 nao:hasDefaultNamespaceAbbreviation "claudia".

} PIMO

Aligning a Thing to Information Elements

claudia:Claudia a pimo:Person.



TextDocument
title "The CID Project"
creator

<urn:uuid:a>
fullname "Claudia Stern"

occurrence of Claudia



Contact <outlook://contact/F16>
fullname "Claudia Stern"

groundingOccurrence

Hands-on: create these alignments

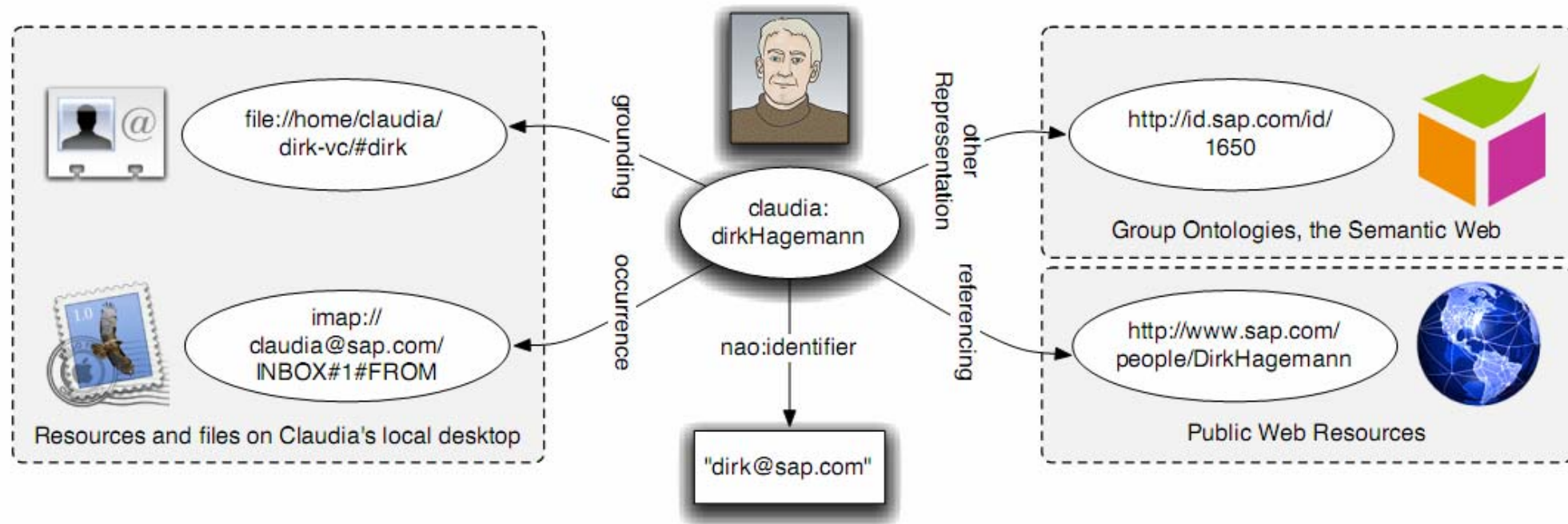
Create the alignments to get a unified view on "Claudia"

hands-on

claudia – pimo:occurrence - $\langle D \rangle$

claudia – pimo:groundingOccurrence - $\langle C \rangle$

Different ways of identification



Adding an identifier to the vCard allows software to keep track of an address book entry

hands-on

`<C>` - nco:contactUID – "jpim-d723b2dd1d841d2064ec20f73fe3b936".

In the future: we hope that global identifiers will be used more in knowledge work.

Short overview on Labeling and Rating

- Each Thing must have a `nao:prefLabel`
- It is recommended to add a `nao:personalIdentifier` this is equivalent to a "WikiName"
- Users can "rate" their items with 1..10 values.

hands-on

`<you:Claudia>` - `nao:prefLabel` – "Claudia Stern".
`<you:Claudia>` - `nao:personalIdentifier` – "ClaudiaS".
`<you:Claudia>` - `nao:numericRating` – "8"^^xsd:float.

Classes of Things are subjective

- *PIMO-Types* represent how the **user interprets** an information element, in the **Mental Model** **not** how the computer interprets it



Knowledge Worker:
It's a "**Project Description**",
I need it when I talk to strangers
about the project

```
claudia:CIDProjectFlier
a          claudia:ProjectDescription
prefLabel "The CID Project"
```

pimo:groundingOccurrence



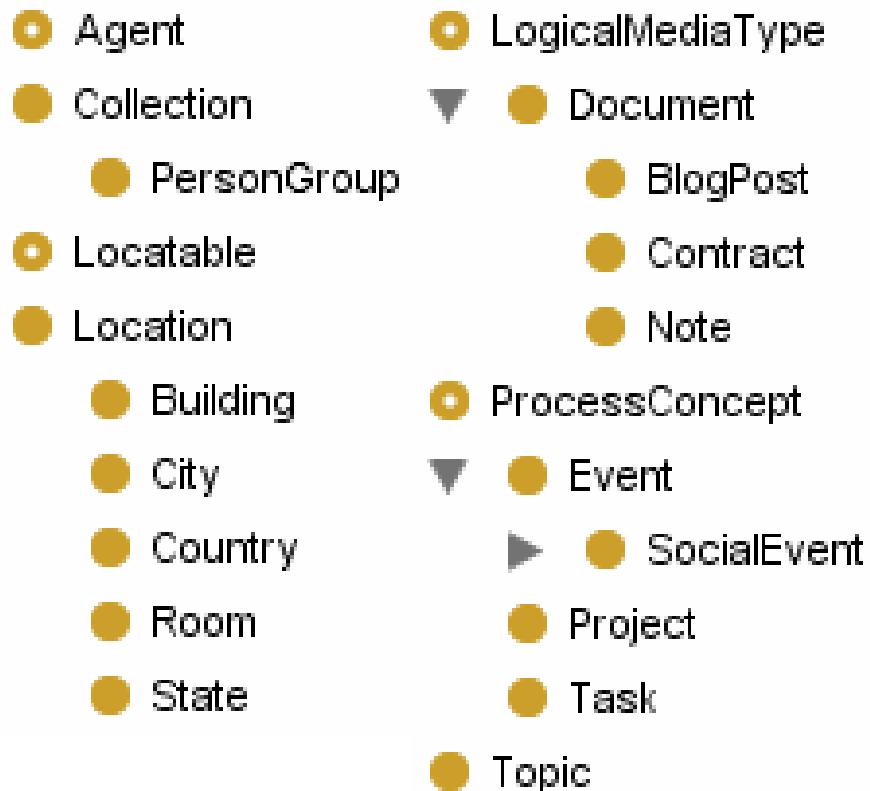
Computer:
"It's a Paginated Text Document,
from MS-Word"



```
TextDocument
title      "The CID Project"
```

- PIMO contains an upper ontology for classes relevant for knowledge workers
- **Person, Location, Event, Organization, Topic, Document, Time.**
- Allow categorization of Things into
 - Who is associated?
 - Where is this?
 - When is it?
 - What is it about?
 - Which Project, Which Task?

Six Thousand Words about Multi-Perspective Personal Document Management
Andreas Dengel, 2006



hands-on

- Write down on **pen&paper**
- 7 Things relevant for you
- make two subclasses of Document (!)
- one subclass of Organization

Leo says: Classes don't grow on trees:

Combining Context Ontology and Landmarks for Personal Information Management

Khalid Latif and A Min Tjoa, 2006

- For **categorization** and **organization** of **every Thing**
- Three basic relations
 - **isRelated**
 - **hasPart <-> partOf** (not transitive)
 - **hasTopic <-> isTopicOf** (any Thing can be a topic in this relation)

hands-on

- create 1 isRelated relation
- create 1 partOf relation
- create 1 hasTopic relation

- To related specific types
- example
 - **hasLocation** – range must be location, domain locatable

- Custom properties

hands-on

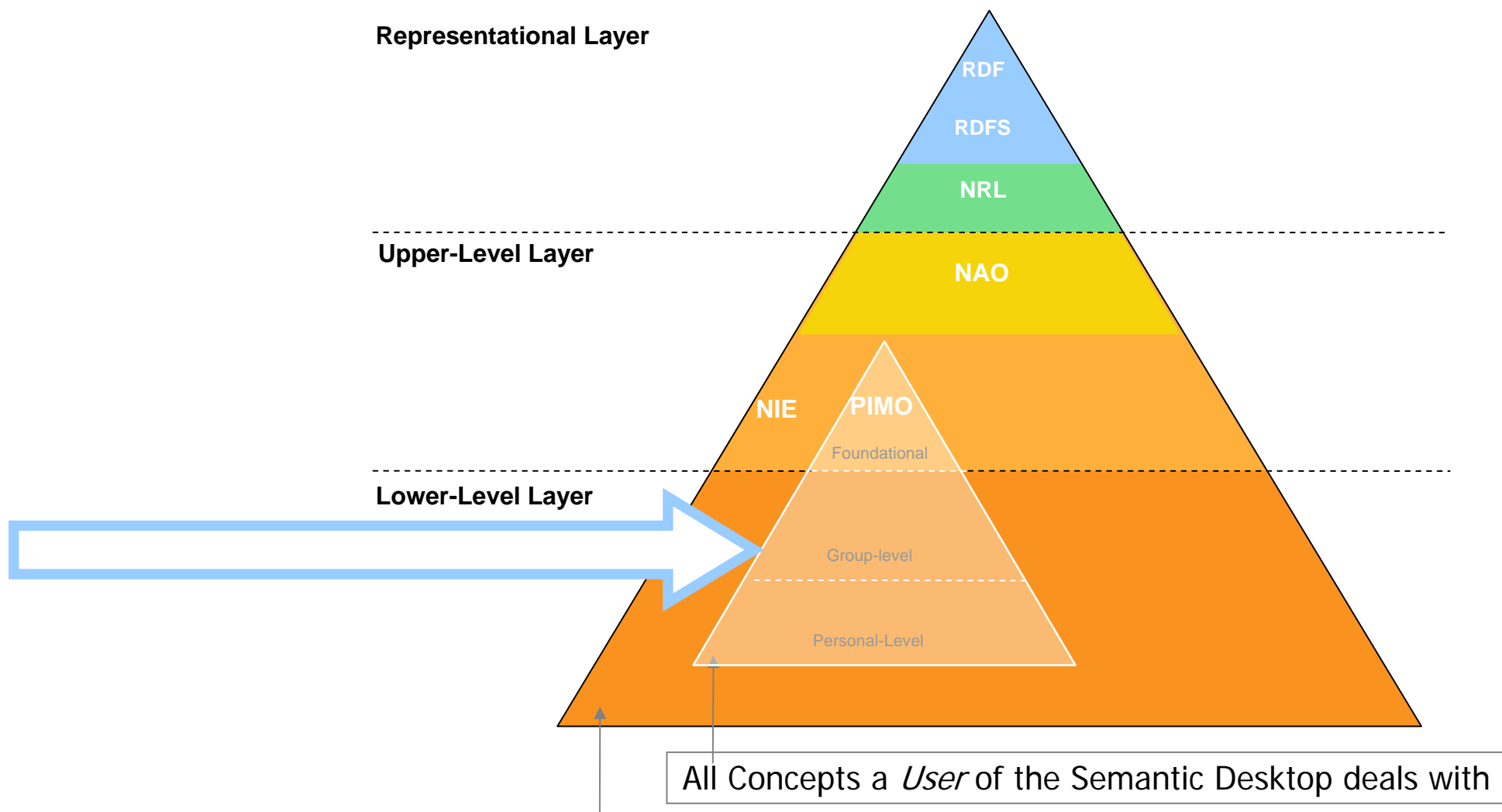
create a custom sub-property of pimo:isRelated

Collections of Things

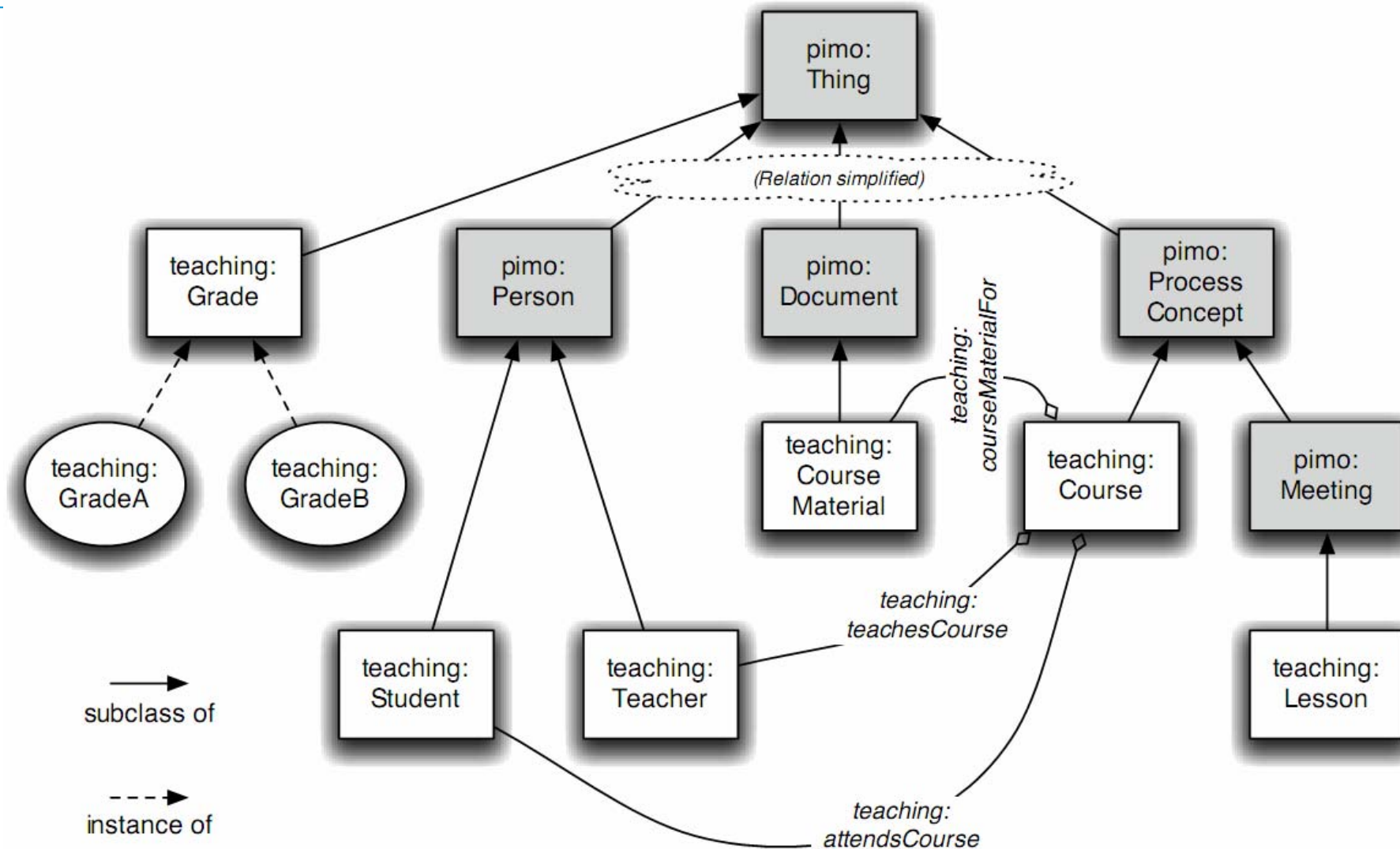
- To organize multiple things in lists for PIM
- Lists are instances of **pimo:Collection**
- **pimo:hasPart** is the relation
- also called "**Piles**" or "Personal Information Collections (**PICs**)".

- Knowledge workers can share ontologies
- Group ontologies – Organizational group, Project Group
 - Alignment between peers
- or domain ontologies – field of knowledge work, taxonomies
 - Alignment inside a group of experts in an area
- in the ontologies...

NEPOMUK Ontologies



Short overview: Teaching Domain



Hands-on: Annotating a file

claudia:BelfastBusTimetable

a pimo:Document;
nao:personalIdentifier "Belfast Bus Timetable";
pimo:hasTopic claudia:Belfast.
pimo:isDefinedBy claudia:PIMO;
pimo:groundingOccurrence
 <file://home/claudia/doc/tripplan.pdf>;

pimo:hasTopic

claudia:Belfast

a pimo:City;
nao:personalIdentifier "Belfast";
pimo:isDefinedBy claudia:PIMO.

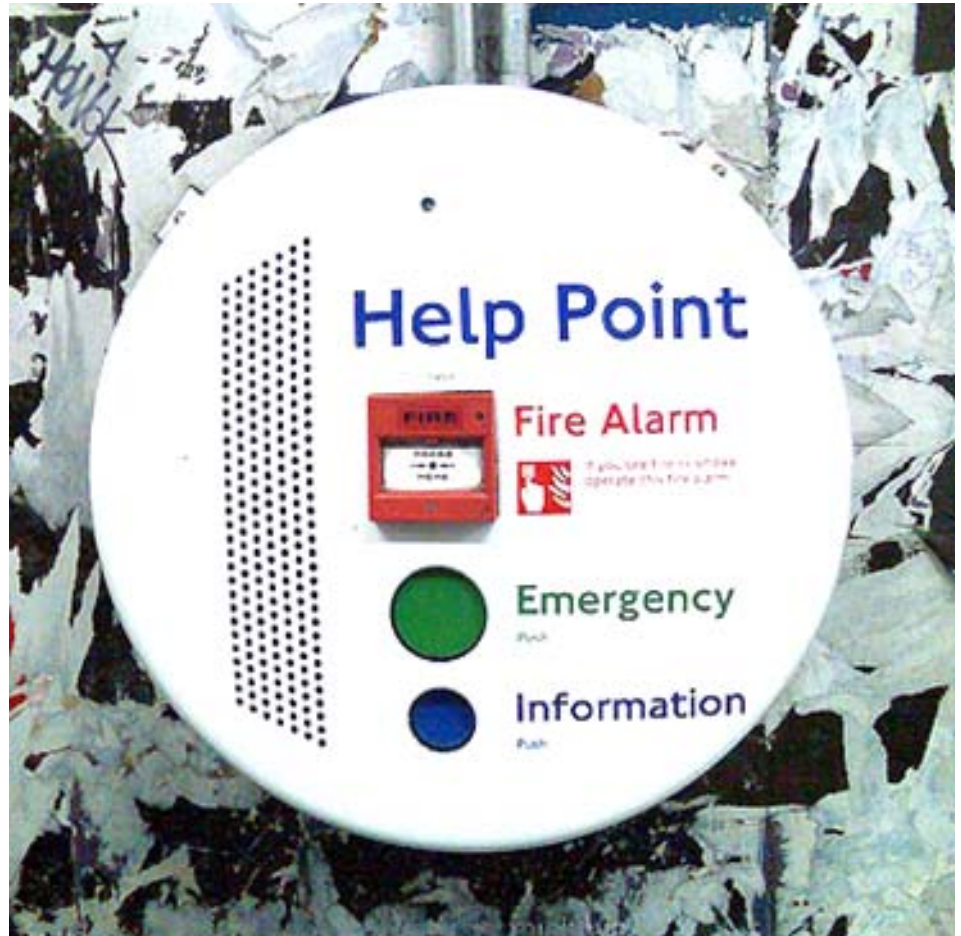
pimo:groundingOccurrence



<file://home/claudia/doc/tripplan.pdf>
a nie:TextDocument;
nie:title "Belfast Bus Timetable".

Questions?

- 3 minutes for questions



<http://www.flickr.com/photos/markhillary/1347412899/>

Comparison with other approaches

**all go in the same
general direction,**

**but started on
different paths**

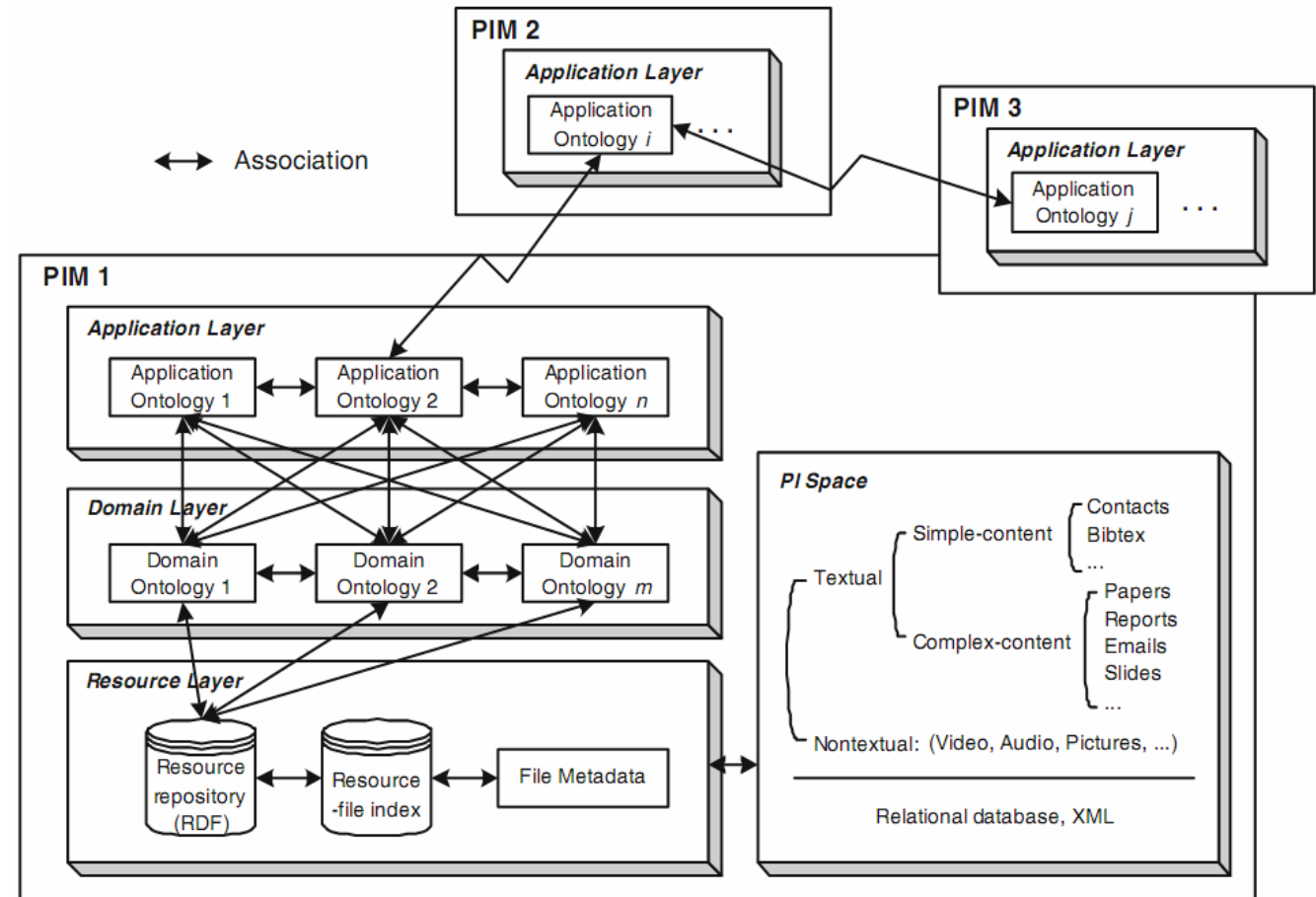


<http://www.flickr.com/photos/regolare/527627162/>

Alternative Approaches to PIMO: PIA

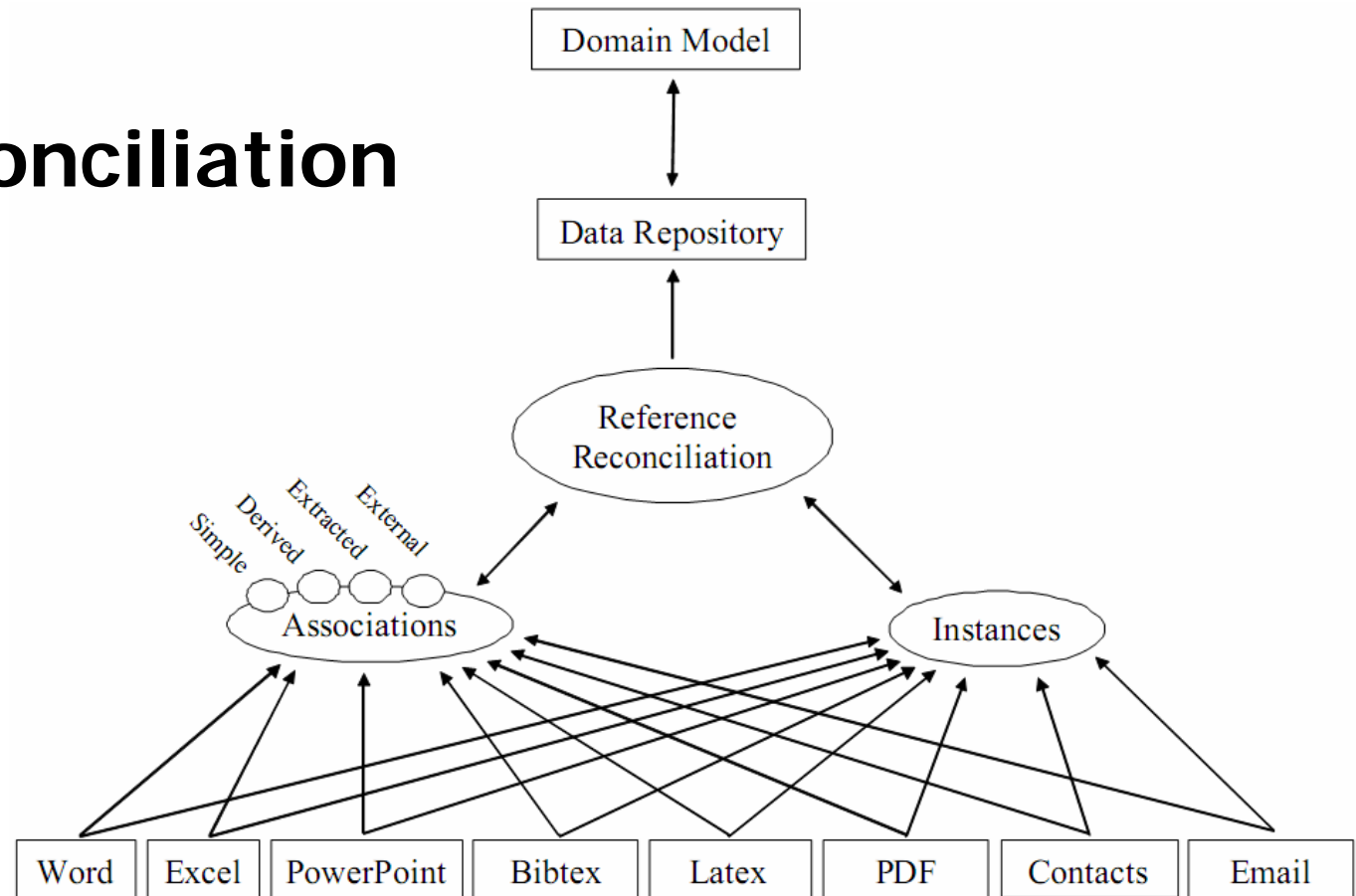
Isabel Cruz and Huiyong Xiao, 2005-2008

Personal Information Application PIA



A layered framework supporting personal information integration and application design for the semantic desktop
Isabel F. Cruz and Huiyong Xiao, The VLDB Journal, 2008

focus on reference reconciliation



A Platform for Personal Information Management and Integration.
Xin Dong and Alon Y. Halevy, CIDR, 2005

Other papers relevant for PIMO

- *Combining Context Ontology and Landmarks for Personal Information Management*
Khalid Latif and A Min Tjoa, ICOCI 2006
- *Lessons for the future of Semantic Desktops learnt from 10 years of experience with the IDELIANCE Semantic Networks Manager*
Jean Rohmer, SemDeskWS 2005

Data-flow between services

User Interfaces



read/write PIMO

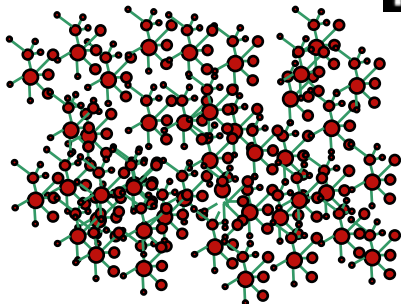
Alignment

- analyzes files and e-mails (and more)
- matching to existing things
- creating new things

Aperture.sf.net

- crawling framework
- converts all data to RDF

PIMO



RDF

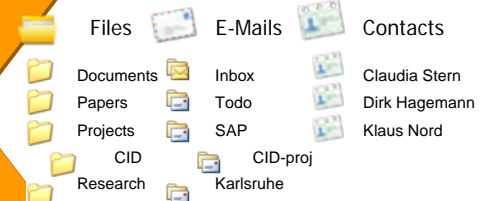


matching
to PIMO

adapting
to RDF

Data

Person's files and e-mails



The Social Semantic Desktop



mash it up!

`</Pimo>`
`</rdf:RDF>`

PIMO!

Leo Sauermann

leo.sauermann@dfki.de
<http://www.dfki.de/~sauermann/>

Danke an Jesus, Ingrid Brunner-Sauermann, Heiko Maus, Sven Schwarz, Ansgar Bernardi, Andreas Dengel, Frank Osterfeld, Dominik Heim, Man Luo, Jean Broekstra, Giovanni Tummarello, Michael Zeltner, Stephan Baumann, Gunnar A Grimnes, Ludger Van Elst, Harald Holz, Stefan Decker, Malte Kiesel, und alle anderen auf #swig



<http://nepomuk.semanticdesktop.org>

