

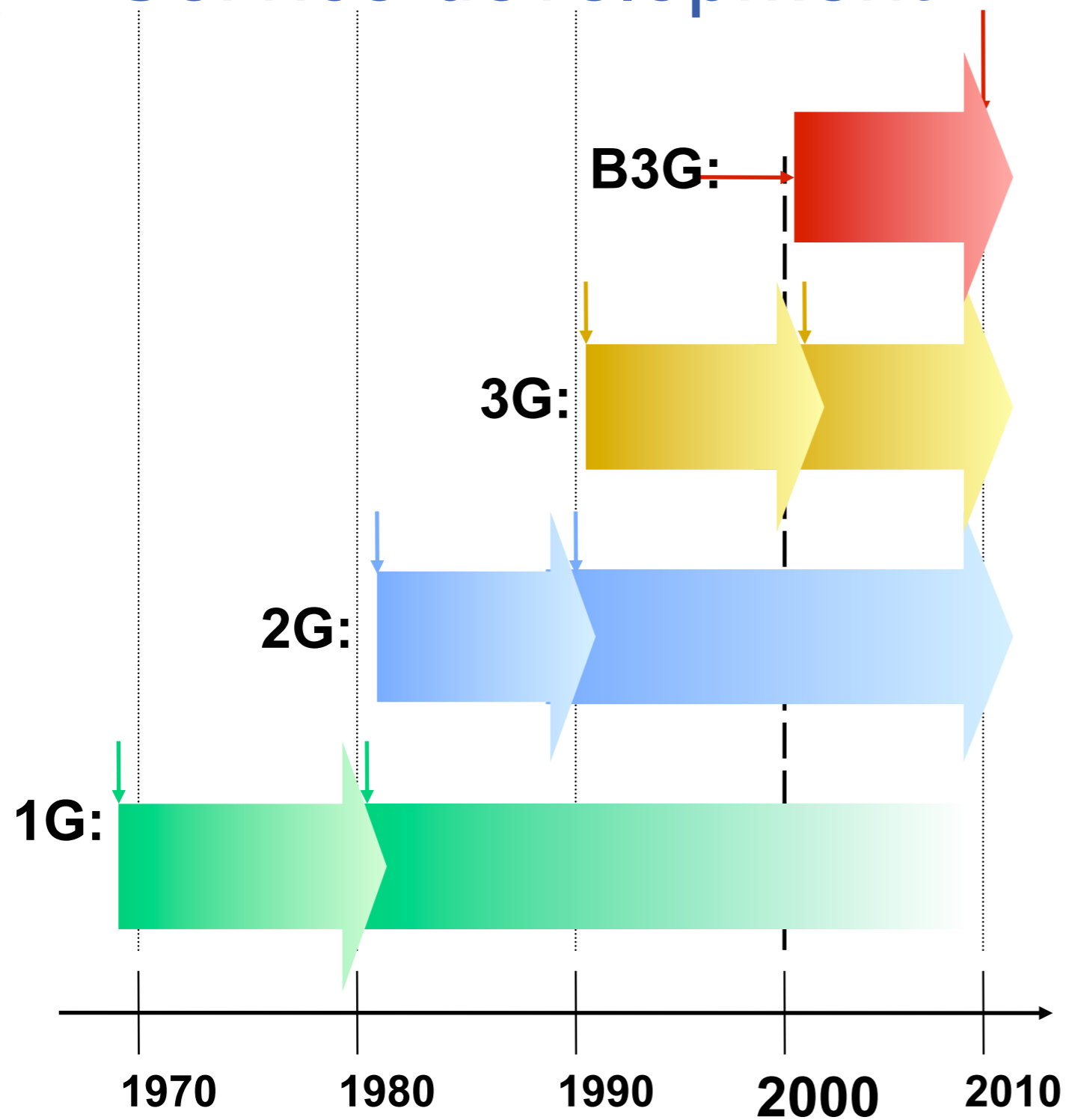
16th Summer School on Telecommunications, 2007: Semantic Service Creation for Mobile Users

Josef Noll, UniK/UiO
University Graduate
Center/University of Oslo
josef@unik.no

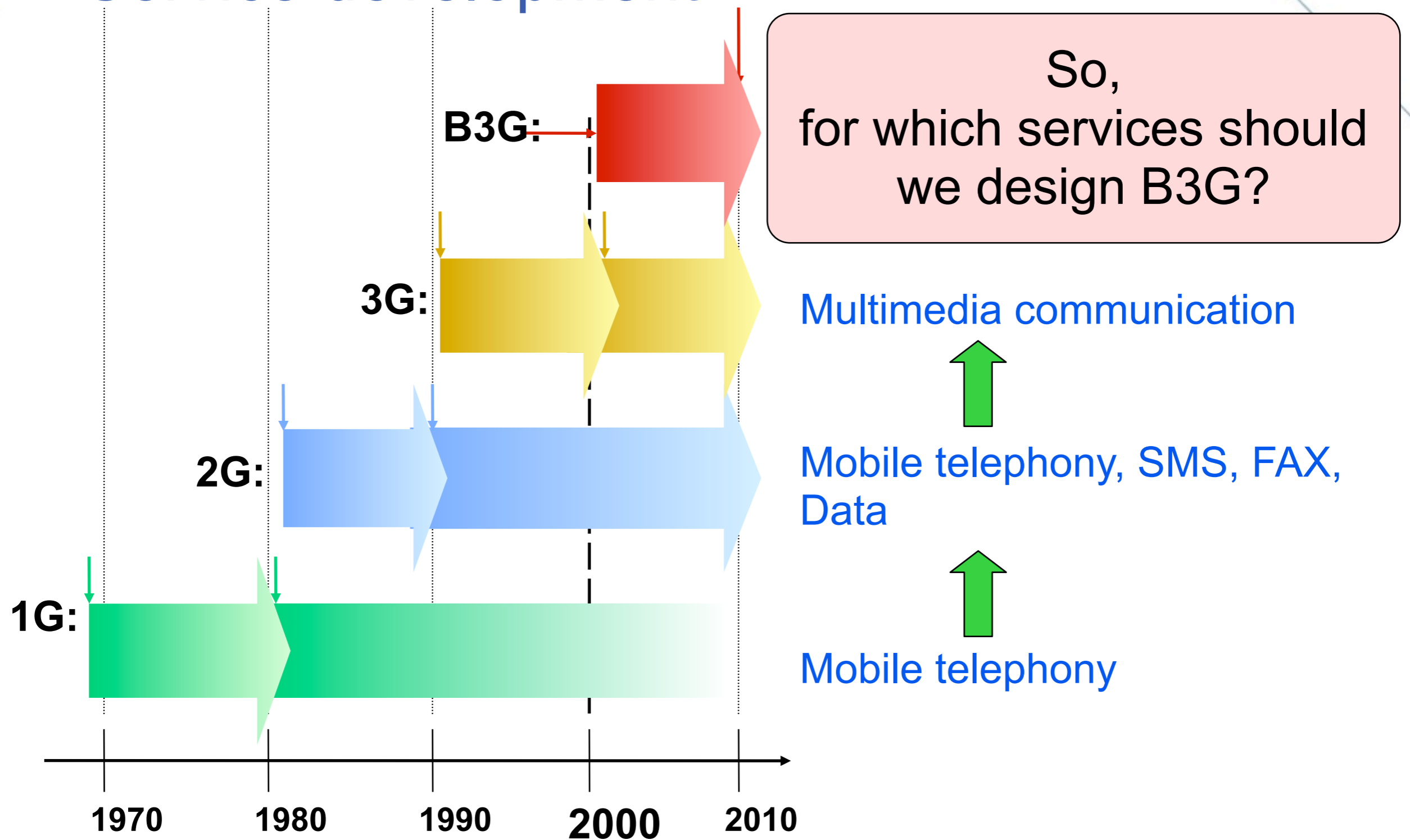
Overview

- Mobile Service Creation
 - Background
 - Challenges
 - Scenario
- Semantic Service Platform
 - Service Oriented Architecture
 - OSA, Parlay, ParlayX
 - Semantic Web Services
 - Adaptive Services Grid - ASG-platform.org
- Service realisation
 - Findings

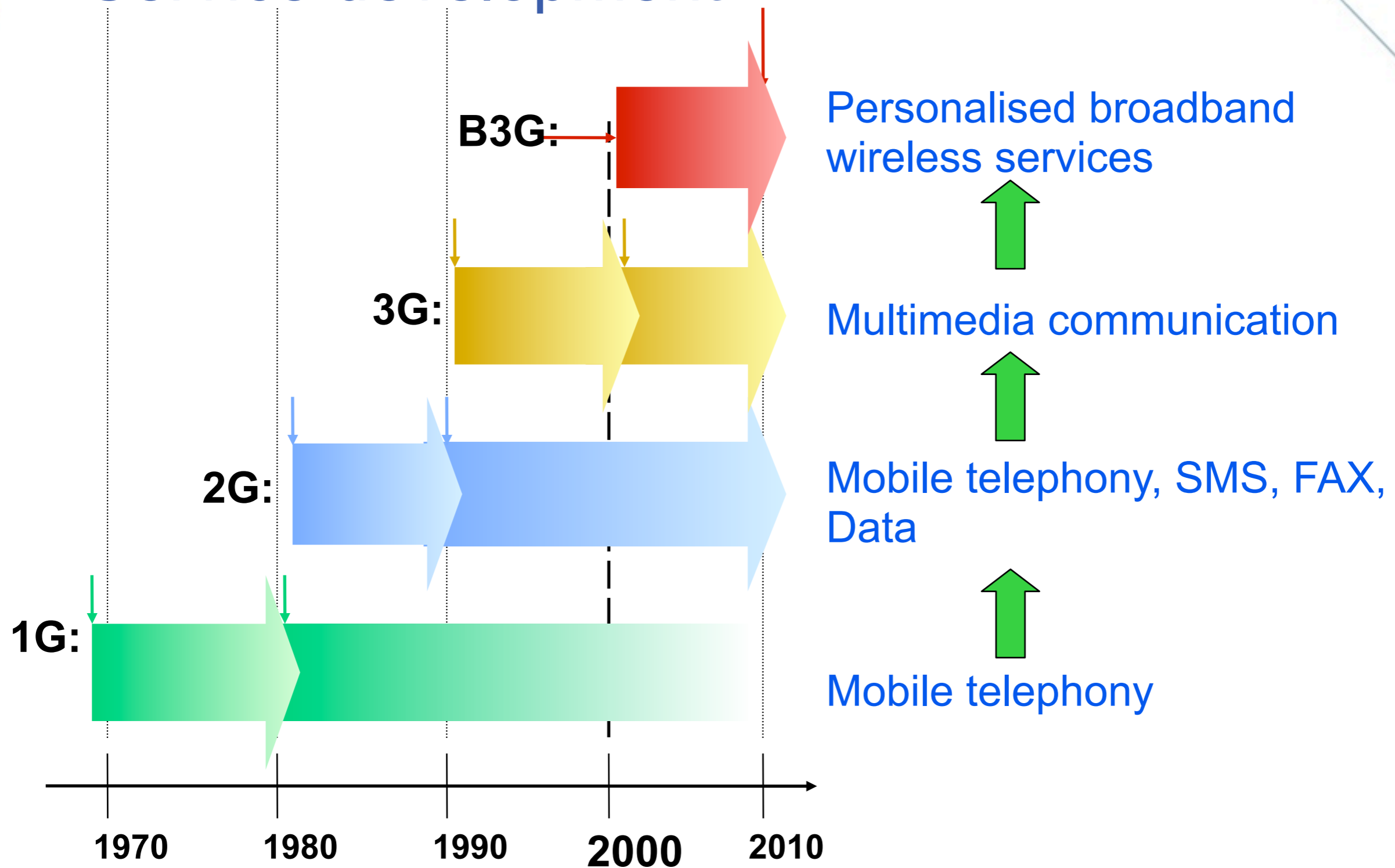
Service development



Service development



Service development



Roadmap Beyond 3G (B3G)



B3G

User preferences

Security, QoS, Price
 Appearance, User friendly
 Presence (context aware)
 Community (micro co-ordination connection, services)

It

Services

Media scaling
 Service discovery, Jini, Mobile Agents
 Management: network, security

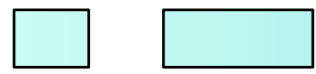
It is

Technology

Core Network
 Access network
 Terminals
 Supplementary technologies

1-2 Mbit/s everywhere
 200 Mbit/s in hot-spots

It is



2001

2005

2008/2010

5.2.2002

www.eurescom.de => P1145

page

source: Vision B3G, P1145 project, Eurescom Summit 2001

Roadmap Beyond 3G (B3G)



B3G

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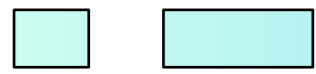
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2001

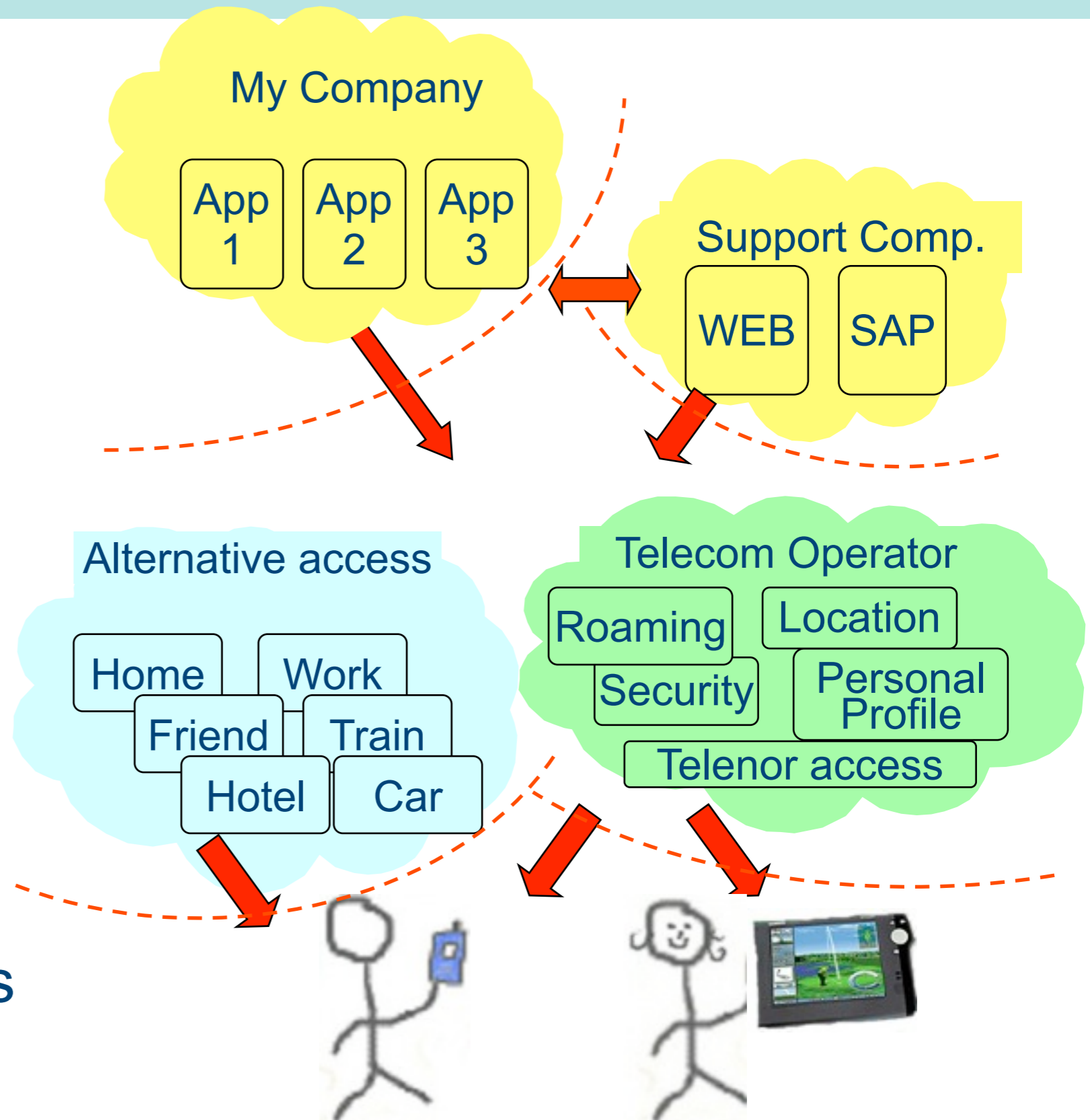


2005

2008/2010

Service centric view

- Everything is a service
 - network access
 - phone call
- Managed through service oriented architecture (SOA)
- Main deficiencies
 - phone services
 - wireless/mobile environment
 - proximity services (pop-up)



Industry requirements

Web services

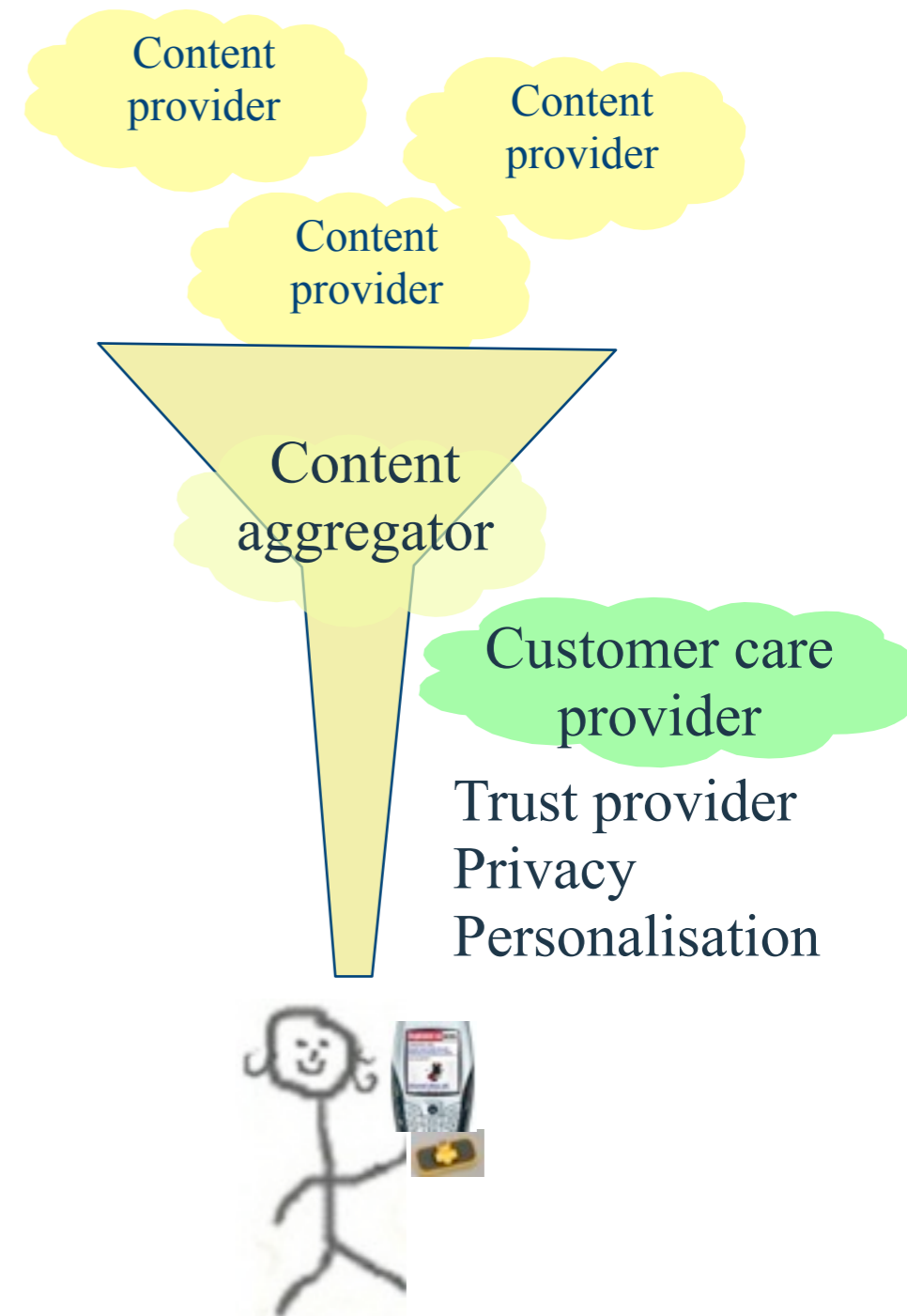
- Fixed service set, Static service composition, Low degree of automation
- Poor reliability
- Fixed Service Level Agreement

Semantic Web Services

- Flexible services, easy new services
- Alternative service provision
- Global, dynamic services

User-Centric View

- Customer preferences
 - Trust relation
 - Clear value proposition (convenience)
 - Information/advertisement overload
- Main duties for service players
 - Customer relation (paying the bill)
 - Service integration
 - New business ideas
 - Customer protection (information overload)



Looking ahead

- Mobile computing has original types of discovery
 1. Situated discovery

Services may be available through RFID or Felica
How are these services discovered?
 2. Policy/Environment-based discovery

Interaction with a given services is required in a given environment
Bus tickets

What do you mean with Service?

The mobile application view:

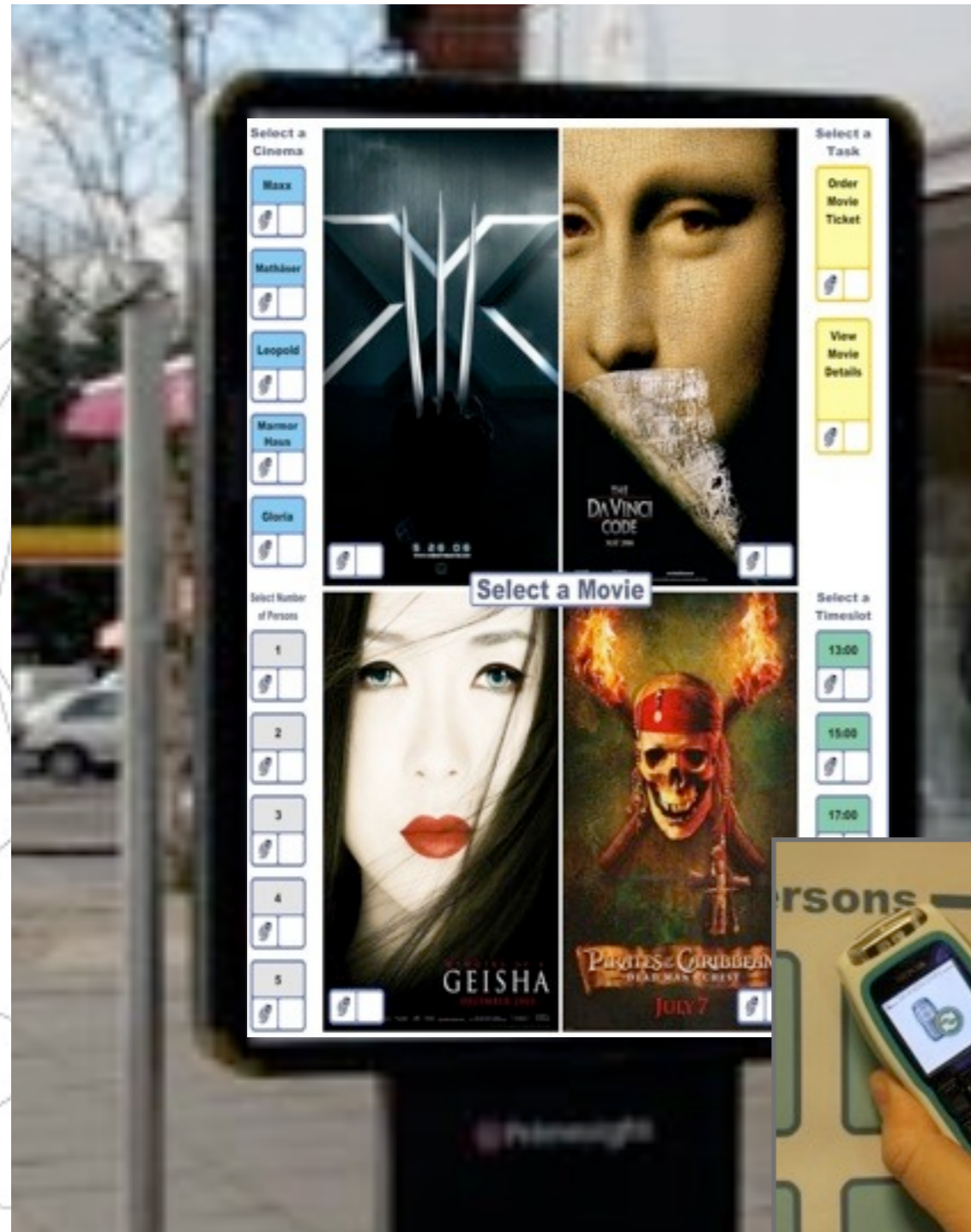
- 2D bar codes, NFC
- Bluetooth-based services
- Social Networking
- Supporting user in daily life



© 2006 by DoCoMo Communications Laboratories Europe GmbH

source: Massimo Paolucci, DoCoMo Eurolabs, "OWL-S for Mobile Users", Oct 2006

PERvasive Service Interaction



- Mobile users can interact with **arbitrary** objects tagged with electronic or visual tags
- Through this interaction the mobile user implicitly **interact with a service**
- Mobile user can **purchase goods** such as tickets, music etc; or acquire information about a location, products, transport etc.

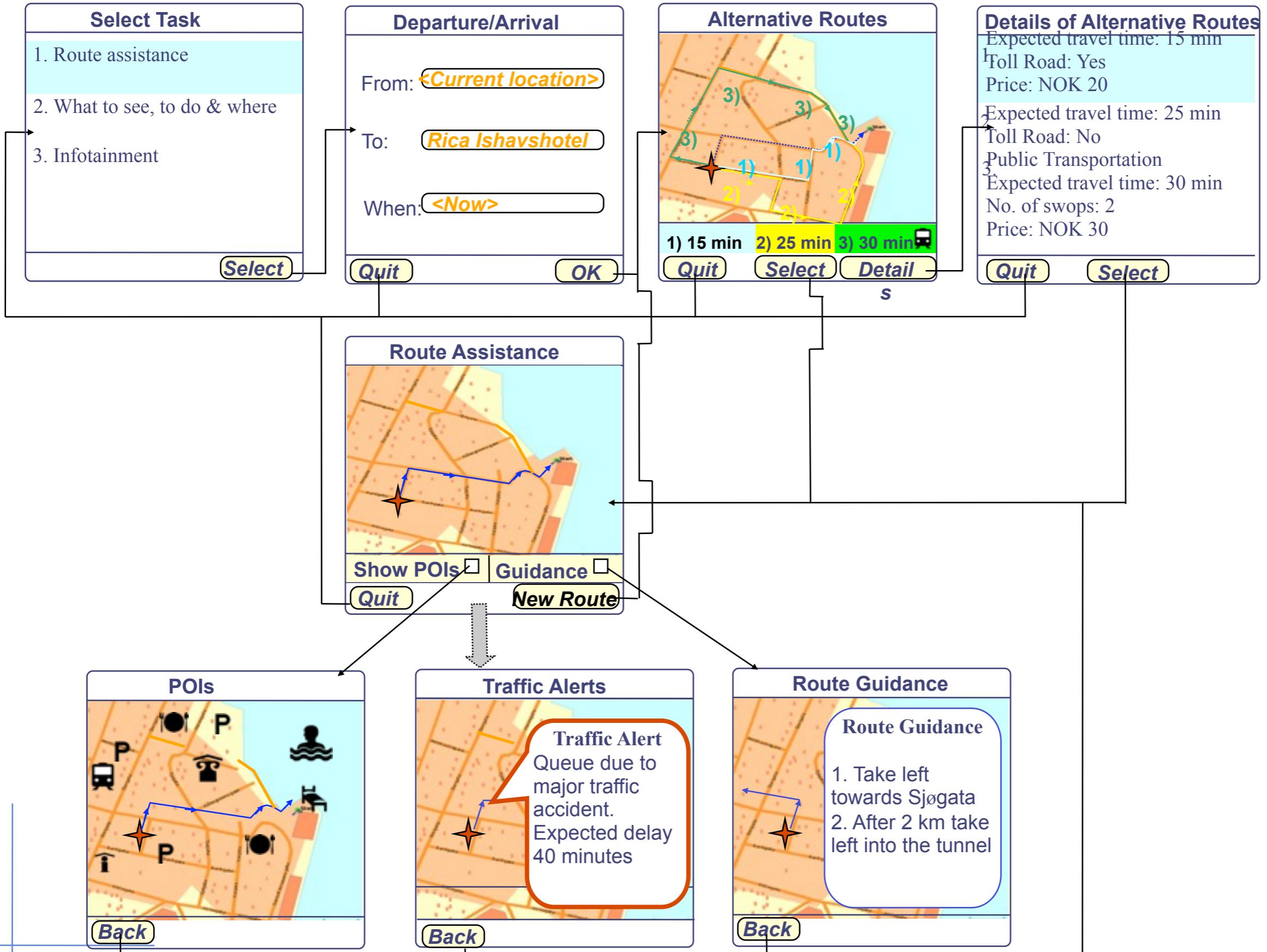


In collaboration with
Ludwig Maximilian
Universität
München

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Laboratories Europe GmbH

source: Massimo Paolucci, DoCoMo Eurolabs, "OWL-S for Mobile Users", Oct 2006

Telematics Application Flow



- Semantic Technologies
 - what are they
 - how can they help

Why Semantics?

■ Syntax vs. Semantics

Arab



لهندسة فنعم التطور : الاسم
أسنسيون غومزبيرز : المؤلفون
السعر : \$74.95
الكتاب : المنتج

<الاسم>لهندسة فنعم التطور </الاسم>
<المؤلفون>أسنسيون غومزبيرز </المؤلفون>
<السعر>\$74.95 </السعر>
<الكتاب>الكتاب </الكتاب>

English



Title: Ontological Engineering
Authors: Asunción Gómez-Pérez...
Price: \$74.95
Product: Book

```
<Title>Ontological Engineering</Title>  
<Author>Asunción Gómez-Pérez...</Author>  
<Price>$74.95</Price>  
<Product>Book</Product>
```

What do the tags **mean** for the machine?

Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universitat Carlos III de Madrid



Why Semantics?

■ Conceptual Level



lunch (.no)



lunch (.es)



The General Vision

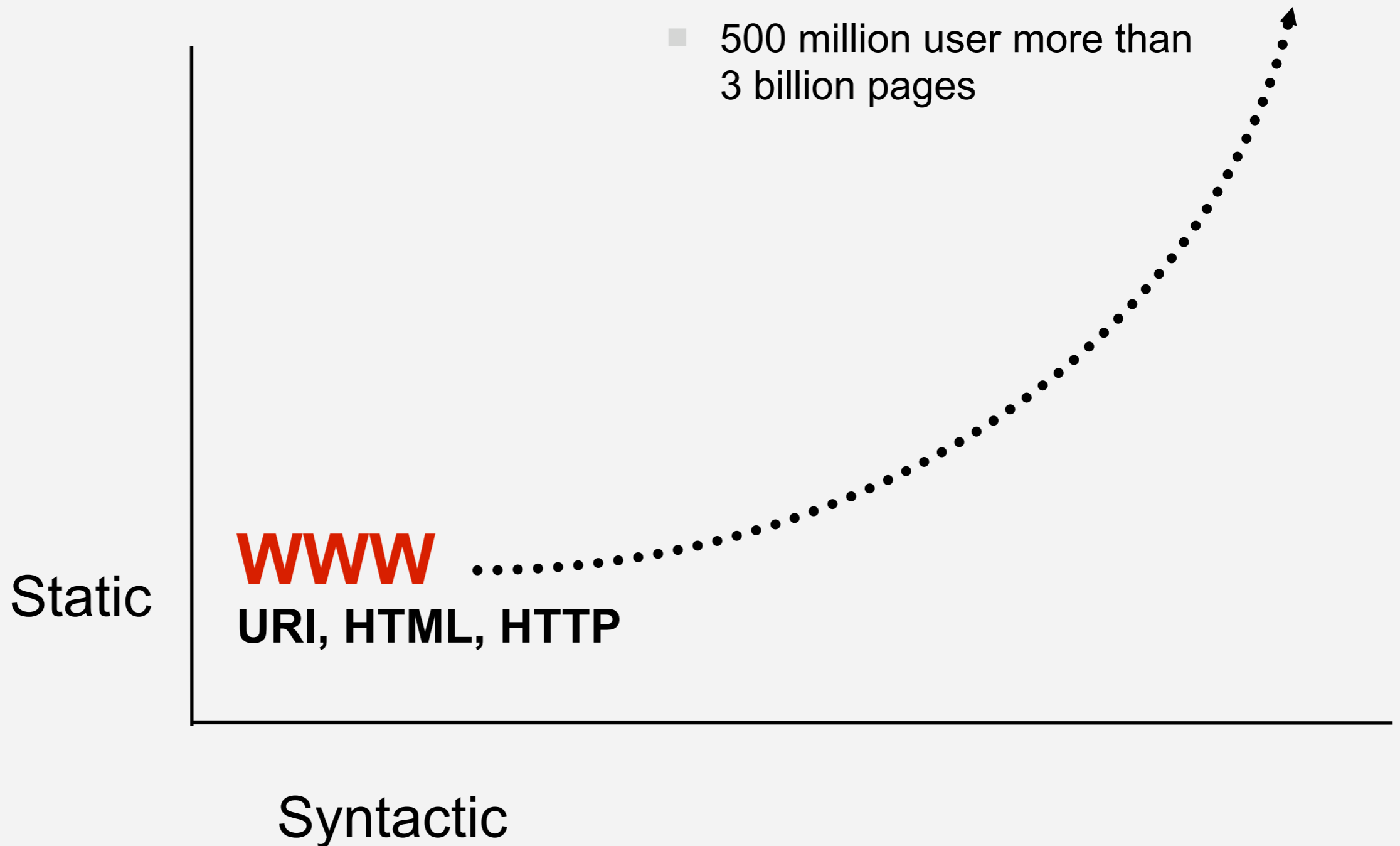


Syntactic

Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universidad Carlos III de Madrid

The General Vision



Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universitat Carlos III de Madrid



The General Vision

Static

WWW
URI, HTML, HTTP

Syntactic

Semantic

Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universidad Carlos III de Madrid



The General Vision

- Serious Problems in

- Information finding
- Information extracting
- Information representing
- Information interpreting
- Information maintaining

Static

WWW
URI, HTML, HTTP



Semantic Web
RDF, RDF(S), OWL

Syntactic

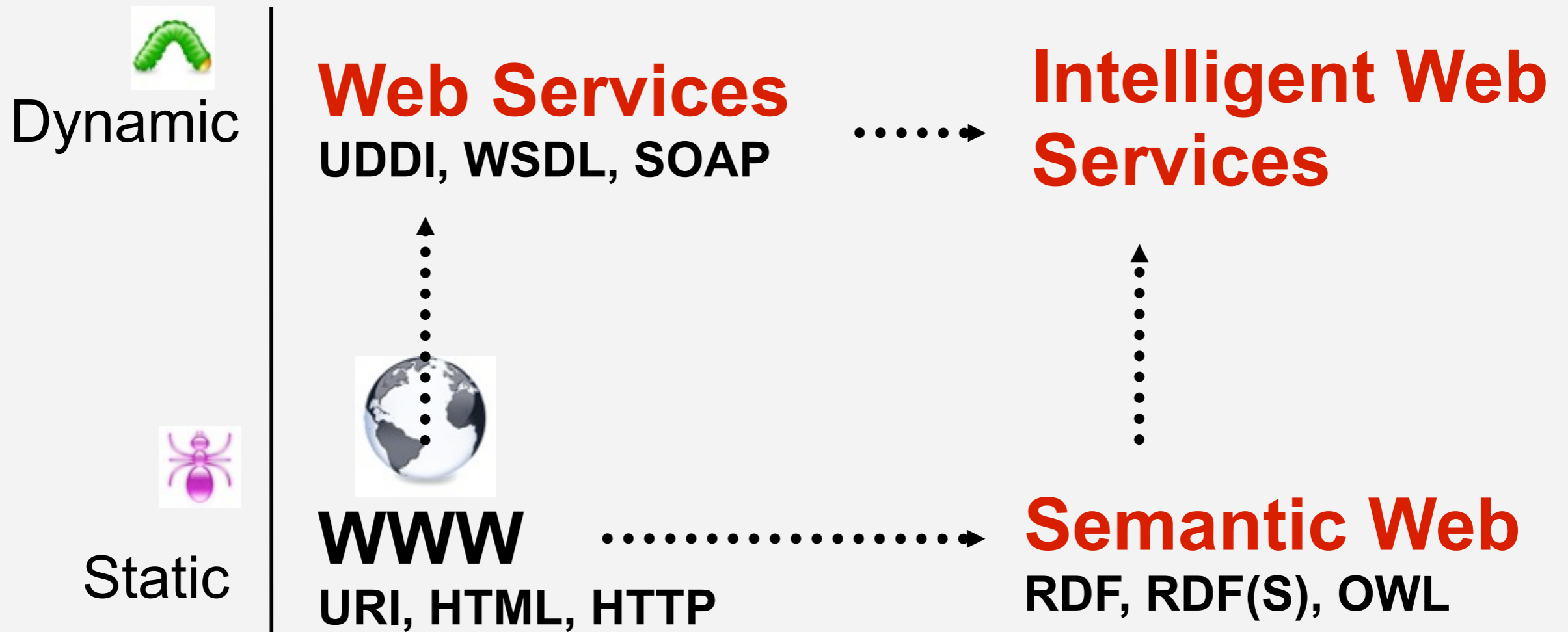
Semantic

Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universitat Carlos III de Madrid



Semantic Web Services

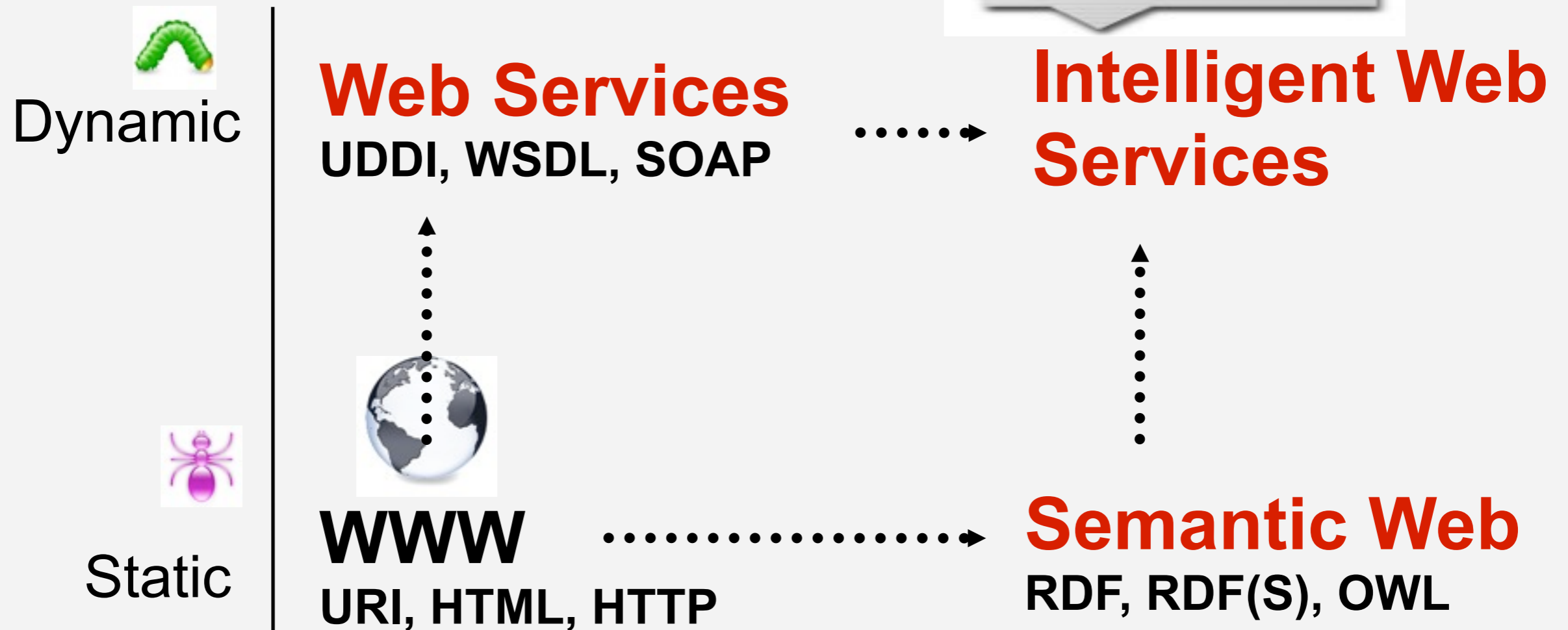


Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universitat Carlos III de Madrid



Semantic Web Services



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Source: Juan Miguel Gomez, Universitat Carlos III de Madrid

Semantics in Business: Knowledge Management

- Enable a paradigm switch in searching information
- From
 - Information Retrieval
- To
 - Question Answering
- This presentation illustrates an application in this line for one particular domain



Semantics in Business: Knowledge Management

- Enable a paradigm switch in searching information
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 - Question Answering

Google: "Josef Noll"

- This presentation illustrates an application in this line for one particular domain



Semantics in Business: Knowledge Management

- Enable a paradigm switch in searching information

■ From

Information Retrieval

■ To

Question Answering

Google: "Josef Noll"

Where has Josef Noll introduced Semantic Identity for the first time?

Who is? which media?...

- This presentation illustrates an application in this line for one particular domain



Ontology: Origins and History

[Source: Ian Horrocks, University of Manchester]

Ontology: Origins and History

- In Philosophy, fundamental branch of metaphysics
 - Studies “being” or “existence” and their **basic categories**
 - Aims to find out what **entities** and **types of entities** exist

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Ontology: Origins and History

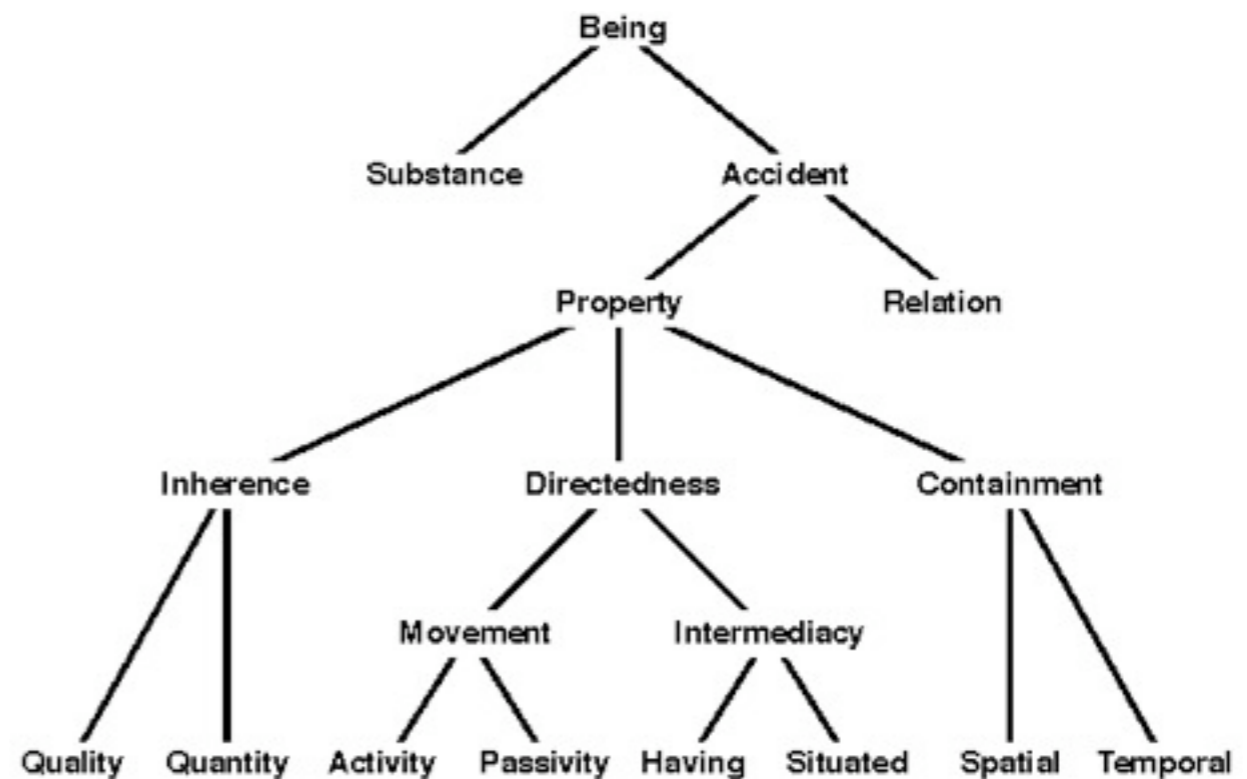
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Ontology: Origins and History

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Supreme genus:

Differentiae:

Subordinate genera:

Differentiae:

Subordinate genera:

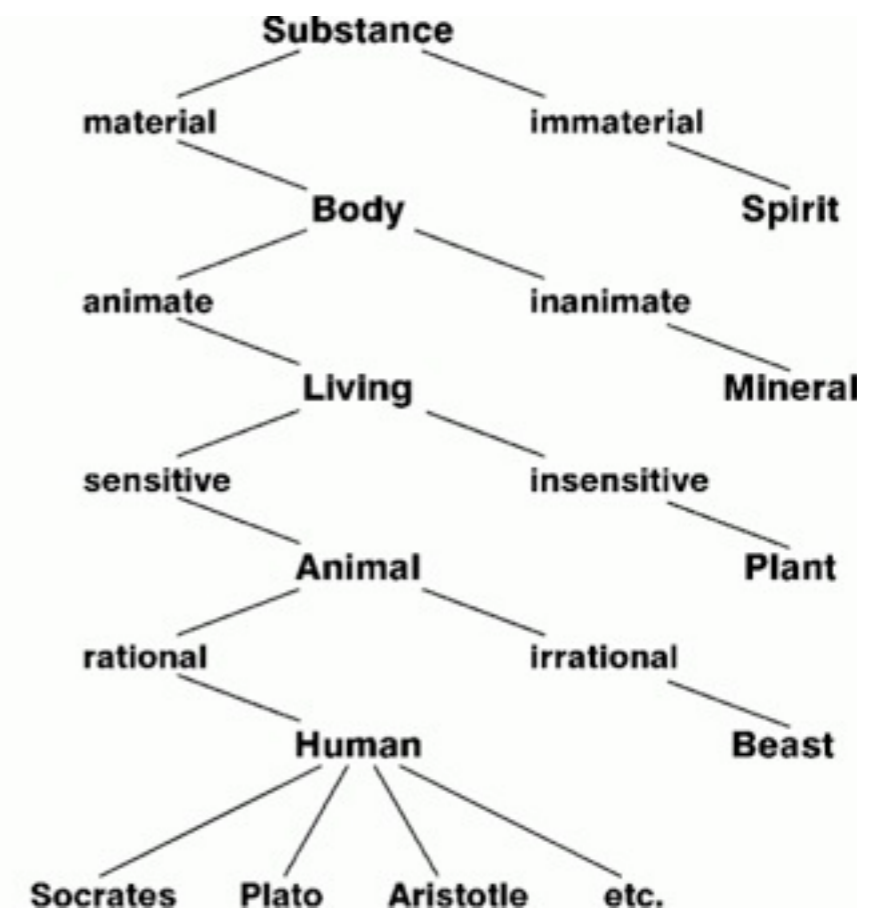
Differentiae:

Proximate genera:

Differentiae:

Species:

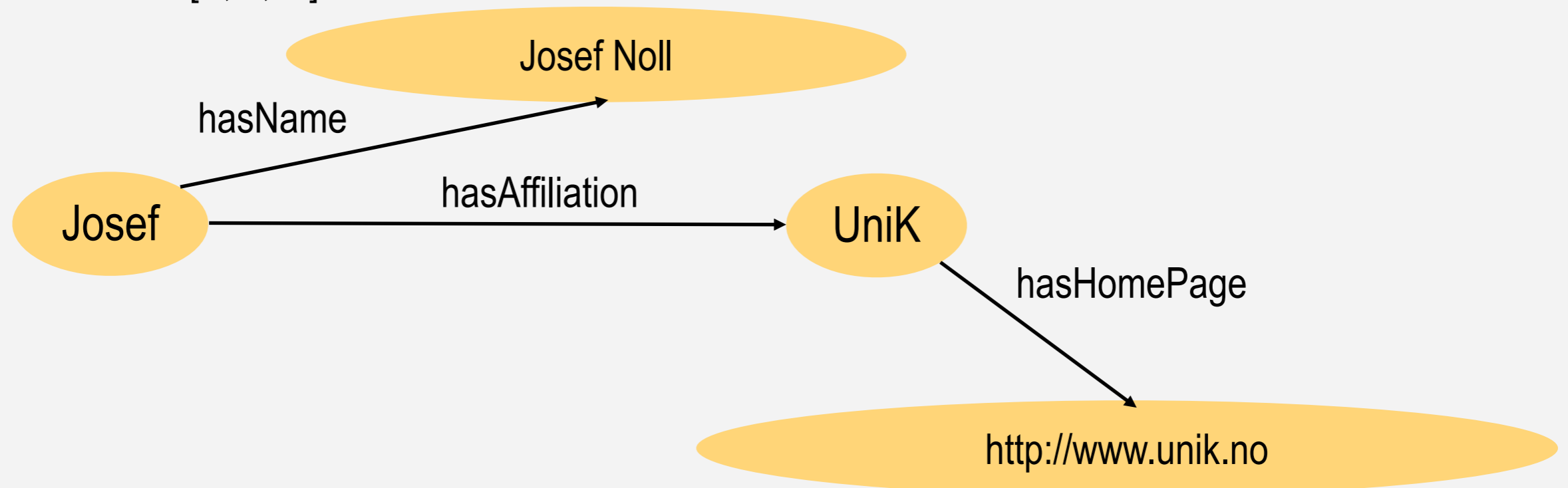
Individuals:



[Source: Ian Horrocks, University of Manchester]

Resource Description Framework (RDF)

- W3C recommendation (<http://www.w3.org/RDF>)
- RDF is graphical formalism (+ XML syntax + semantics)
 - for representing metadata
 - for describing the semantics of information in a machine- accessible way
- RDF is a basic ontology language
 - Resources are described in terms of properties and property values using RDF statements.
 - Statements are represented as triples, consisting of a subject, predicate and object. [S, P, O]



Semantic Technologies: Diamond in the Rough?

Source: Juan Miguel Gomez, Universitat Carlos III de Madrid



Web Ontology Language (OWL)

- Built on top of RDF(S) and renaming DAML+OIL primitives
- Three layers:
 - **OWL Lite**: a small subset, easier for frame-based tools to transition to, easier reasoning
 - **OWL DL**: description logic, decidable reasoning
 - **OWL Full**: RDF extension, allows meta-classes
- Several syntaxes:
 - **Abstract syntax**: easier to read and write manually, closely corresponds to DL
 - **RDF/XML**: OWL can be parsed as an RDF document, more verbose



Example Ontology (Protégé)

The screenshot displays the Protégé 3.1 ontology editor. The main window is titled "university Protégé 3.1" and shows a project named "university". The interface is divided into several panes:

- Subclass Relationship:** Shows an asserted hierarchy for the project "university". The hierarchy includes:
 - owl:Thing
 - Course
 - Department
 - CS_Department
 - EE_Department
 - FrenchUniversity
 - Library
 - Person
 - Faculty
 - TeachingFaculty
 - AssistantProfessor (highlighted)
 - Lecturer
 - Professor
 - ProfessorInHClorAI
 - Student
 - PhoneBook
 - ResearchArea
 - Schedule
 - University

- Class Editor:** Shows the editor for the class "AssistantProfessor" (instance of owl:Class). It includes:
- Name:** AssistantProfessor
- SameAs:** (empty)
- Annotations:** (empty table with columns Property, Value, La..)
- Asserted Conditions:**
 - TeachingFaculty (NECESSARY & SUFFICIENT)
 - hasTenure \ni false (NECESSARY)
 - \exists hasResearchArea ResearchArea (INHERITED)
- Properties:**
- hasResearchArea
 - ResearchArea
- hasTenure (multiple)
 - false [from Lecturer]
- Disjoints:**
- Lecturer
- Professor

[Source: Ian Horrocks, University of Manchester]

Example Ontology (Protégé)

The screenshot shows the Protégé 3.1 ontology editor interface. The main window displays the ontology structure on the left and the class editor for 'AssistantProfessor' on the right.

Left Panel: SUBCLASS RELATIONSHIP

- For Project: **university**
- Asserted Hierarchy
- owl:Thing
 - Course
 - Department
 - CS_Department
 - EE_Department
 - FrenchUniversity
 - Library
 - Person
 - Faculty
 - AssistantProfessor** (highlighted with a red circle)
 - Lecturer
 - Professor
 - ProfessorInHClorAI
 - Student
 - PhoneBook
 - ResearchArea
 - Schedule
 - University

Right Panel: CLASS EDITOR

For Class: **AssistantProfessor** (instance of owl:Class)

Name SameAs

- AssistantProfessor
- rdfs:comment

Annotations

Property	Value	La..

Asserted Inferred

Asserted Conditions

- TeachingFaculty (NECESSARY & SUFFICIENT)
- hasTenure \ni false (NECESSARY)
- \exists hasResearchArea ResearchArea (INHERITED)

Properties View

- hasResearchArea
 - ResearchArea
- hasTenure (multiple)
 - false [from Lecturer]

Disjoints

- Lecturer
- Professor

Logic View Properties View

[Source: Ian Horrocks, University of Manchester]

Example Ontology (Protégé)

The screenshot shows the Protégé 3.1 ontology editor interface. The main window displays the 'CLASS EDITOR' for the class 'AssistantProfessor'. The interface is divided into several panes:

- Subclass Relationship:** Shows the asserted hierarchy for the project 'university'. The hierarchy is: owl:Thing (parent) -> Course, Department, FrenchUniversity, Library, Person, Student, PhoneBook, ResearchArea, Schedule, University. Under 'Person', there is a 'Faculty' class which contains 'AssistantProfessor', 'Lecturer', and 'Professor'. 'Professor' has a subclass 'ProfessorInHClorAI'.
- Class Editor:** Shows the 'Name' as 'AssistantProfessor' and 'SameAs' as 'rdfs:comment'. It also has an 'Annotations' table with columns for Property, Value, and Language.
- Asserted Conditions:** Shows conditions for the class:
 - TeachingFaculty (NECESSARY & SUFFICIENT)
 - hasTenure \ni false (NECESSARY)
 - \exists hasResearchArea ResearchArea (INHERITED)
- Properties:** Shows the 'hasResearchArea' property with a 'ResearchArea' class as a value. It also shows the 'hasTenure' property with a 'false' value, noted as being inherited from 'Lecturer'.
- Disjoints:** Shows a disjunctive relationship between 'Lecturer' and 'Professor'.

The interface includes a menu bar (File, Edit, Project, OWL, Code, Window, Tools, Help), a toolbar, and a status bar at the bottom with 'Logic View' and 'Properties View' options.

[Source: Ian Horrocks, University of Manchester]

Example Ontology (Protégé)

university Protégé 3.1 (file:/Users/horrocks/Software/SWOOP/2.3beta3/Demo/university.pprj, OWL Files (.owl or .rdf))

File Edit Project OWL Code Window Tools Help

protégé

● OWLClasses ■ Properties ■ Forms ◆ Individuals ◆ Metadata

SUBCLASS RELATIONSHIP CLASS EDITOR

For Project: ● university For Class: ● AssistantProfessor (instance of owl:Class)

Asserted Hierarchy

- owl:Thing
 - Course
 - Department
 - CS_Department
 - EE_Department
 - FrenchUniversity
 - Library
 - Person
 - Faculty
 - TeachingFaculty
 - AssistantProfessor
 - Lecturer
 - Professor
 - ProfessorInHClorAI
 - Student
 - PhoneBook
 - ResearchArea
 - Schedule
 - University

Name SameAs

AssistantProfessor

rdfs:comment

Annotations

Property	Value	La..
----------	-------	------

Asserted Inferred

Asserted Conditions

- TeachingFaculty
- hasTenure \supset false

NECESSARY & SUFFICIENT

NECESSARY

INHERITED

- \exists hasResearchArea ResearchArea

Properties

- hasResearchArea
 - ResearchArea
- hasTenure (multiple)
 - false [from Lecturer]

Disjoints

- Lecturer
- Professor

Logic View Properties View

[Source: Ian Horrocks, University of Manchester]

Example Ontology (Protégé)

The screenshot shows the Protégé 3.1 ontology editor interface. The main window displays the 'CLASS EDITOR' for the class 'AssistantProfessor' (instance of owl:Class). The interface is divided into several panes:

- Subclass Relationship:** Shows the asserted hierarchy for the project 'university'. The hierarchy includes: owl:Thing, Course, Department (with sub-classes CS_Department and EE_Department), FrenchUniversity, Library, Person (with sub-classes Faculty, TeachingFaculty, and Professor), Student, PhoneBook, ResearchArea, Schedule, and University. The 'AssistantProfessor' class is highlighted under the 'TeachingFaculty' class.
- Class Editor:** Shows the 'Name' field set to 'AssistantProfessor' and the 'SameAs' field set to 'rdfs:comment'. The 'Annotations' table is empty.
- Asserted Conditions:** Shows the 'Asserted' tab with the following conditions:
 - TeachingFaculty (NECESSARY & SUFFICIENT)
 - hasTenure \supseteq false (NECESSARY)
 - \exists hasResearchArea ResearchArea (INHERITED)
- Properties:** Shows the 'hasResearchArea' property with a sub-property 'ResearchArea'. The 'hasTenure' property is also shown with a value of 'false [from Lecturer]'. Below this, the 'Disjoints' section lists 'Lecturer' and 'Professor'.

The interface also includes a menu bar (File, Edit, Project, OWL, Code, Window, Tools, Help), a toolbar, and a status bar at the bottom with 'Logic View' and 'Properties View' options.

[Source: Ian Horrocks, University of Manchester]

Example Ontology (Protégé)

The screenshot shows the Protégé 3.1 interface with the following components:

- Menu Bar:** File, Edit, Project, OWL, Code, Window, Tools, Help.
- Toolbar:** Standard file and editing icons.
- Navigation Tabs:** OWLClasses, Properties, Forms, Individuals, Metadata.
- Left Panel (SUBCLASS RELATIONSHIP):**
 - For Project: university
 - Asserted Hierarchy icons
 - Tree view showing classes: owl:Thing, Course, Department (CS_Department, EE_Department), FrenchUniversity, Library, Person (Faculty: TeachingFaculty (AssistantProfessor, Lecturer), Professor (ProfessorInHClorAI)), Student, PhoneBook, ResearchArea, Schedule, University.
- Center Panel (CLASS EDITOR):**
 - For Class: AssistantProfessor (instance of owl:Class)
 - Name: AssistantProfessor
 - SameAs: (empty)
 - rdfs:comment: (empty)
 - Annotations table: (empty)
 - Asserted/Inferred tabs
 - Asserted Conditions:
 - TeachingFaculty (NECESSARY & SUFFICIENT)
 - hasTenure \supset false (NECESSARY)
 - \exists hasResearchArea ResearchArea (INFERRED)** (circled in red)
- Right Panel (Properties):**
 - hasResearchArea: ResearchArea
 - hasTenure (multiple): false [from Lecturer]
 - Disjoints: Lecturer, Professor
- Bottom Right:** Logic View (selected), Properties View.

[Source: Ian Horrocks, University of Manchester]

Example Ontology (Protégé)

The screenshot shows the Protégé 3.1 ontology editor interface. The main window displays the ontology structure and the class editor for the `AssistantProfessor` class.

Subclass Relationship (Left Panel):

- owl:Thing
 - Course
 - Department
 - CS_Department
 - EE_Department
 - FrenchUniversity
 - Library
 - Person
 - Faculty
 - TeachingFaculty
 - AssistantProfessor
 - Lecturer
 - Professor
 - ProfessorInHClorAI
 - Student
 - PhoneBook
 - ResearchArea
 - Schedule
 - University

Class Editor (Right Panel):

For Class: `AssistantProfessor` (instance of owl:Class)

Name SameAs:

- AssistantProfessor
- rdfs:comment

Annotations:

Property	Value	La..

Asserted Conditions:

- TeachingFaculty (NECESSARY & SUFFICIENT)
- hasTenure \ni false (NECESSARY)
- \exists hasResearchArea ResearchArea (INHERITED)

Properties View (Bottom Right):

- hasResearchArea
 - ResearchArea
- hasTenure (multiple)
 - false [from Lecturer]
- Disjoints
 - Lecturer
 - Professor

Logic View Properties View

[Source: Ian Horrocks, University of Manchester]

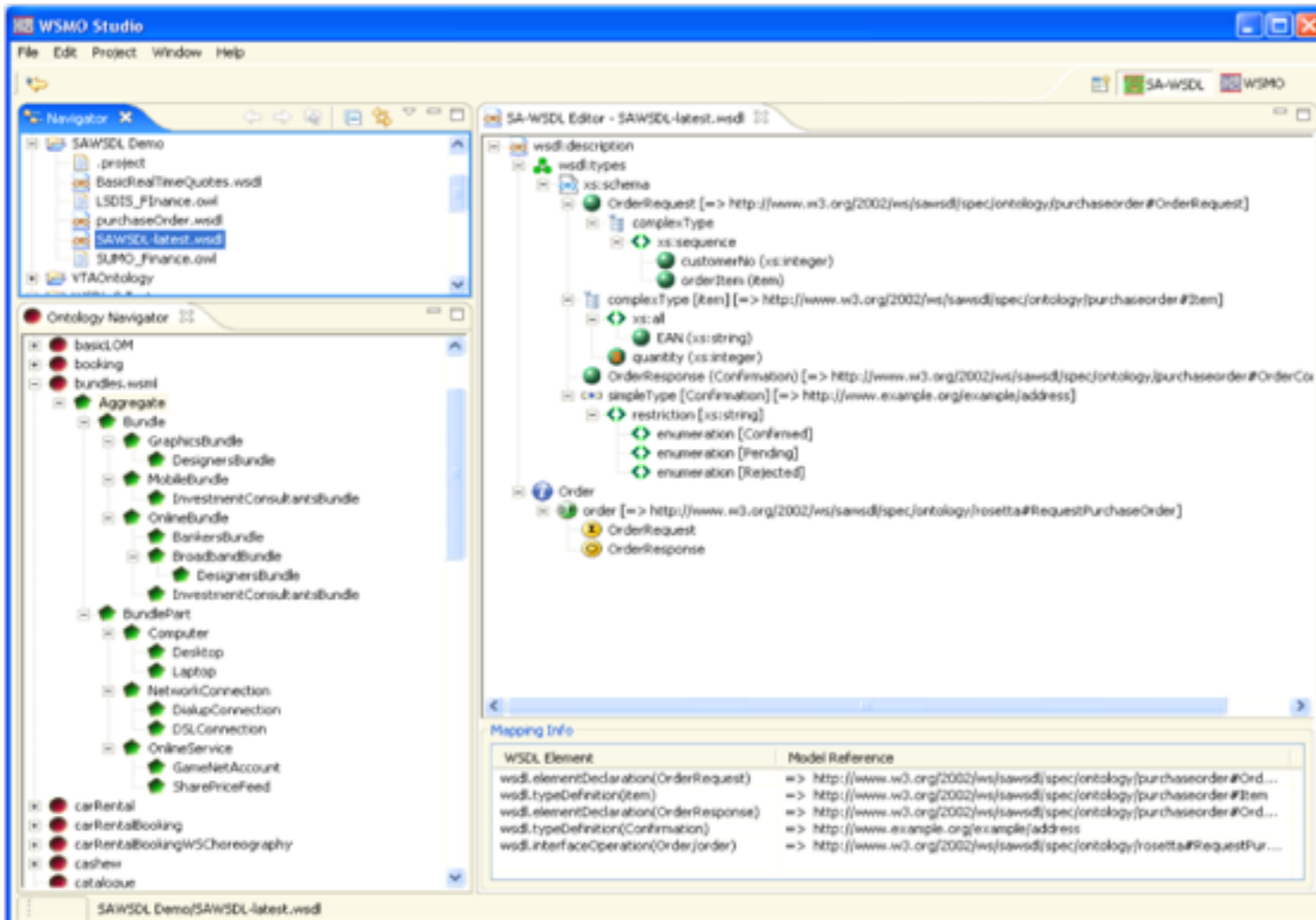
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- Asserted Conditions:**
 - TeachingFaculty (NECESSARY & SUFFICIENT)
 - hasTenure \ni false (NECESSARY)
 - \exists hasResearchArea ResearchArea (INHERITED)
- Disjoints:** A list of classes that are disjoint with AssistantProfessor, including Lecturer and Professor. This list is circled in red in the image.

[Source: Ian Horrocks, University of Manchester]



The screenshot shows the WSMO Studio interface. On the left, the 'Navigator' pane displays a project tree for 'SAWSDL Demo' and an 'Ontology Navigator' showing a hierarchy of bundles and parts. The main 'SAWSDL Editor' pane shows a tree view of the WSDL description, including types like 'OrderRequest', 'OrderResponse', and 'Order'. A 'Mapping Info' table is visible at the bottom of the editor.

WSDL Element	Model Reference
wSDL:elementDeclaration(OrderRequest)	=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderRequest
wSDL:typeDefinition(item)	=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#item
wSDL:elementDeclaration(OrderResponse)	=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderResponse
wSDL:typeDefinition(Confirmation)	=> http://www.example.org/example/address
wSDL:interfaceOperation(Order/order)	=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/rosetta#RequestPurchaseOrder

```

SAWSDL Demo
  .project
  BasicRealTimeQuotes.wsdl
  LSDIS_Finance.owl
  purchaseOrder.wsdl
  SAWSDL-latest.wsdl
  SUMO_Finance.owl
  YTAOntology

Ontology Navigator
  basicLOM
  booking
  bundles.wsdl
  Aggregate
  Bundle
  GraphicsBundle
  DesignerBundle
  MobileBundle
  InvestmentConsultantsBundle
  OnlineBundle
  BankersBundle
  BroadbandBundle
  DesignersBundle
  InvestmentConsultantsBundle
  BundlePart
  Computer
  Desktop
  Laptop
  NetworkConnection
  DiskupConnection
  DSLConnection
  OnlineService
  GameNetAccount
  SharePriceFeed
  carRental
  carRentalBooking
  carRentalBookingWSChoreography
  cashew
  catalogue

SAWSDL Demo\SAWSDL-latest.wsdl

SAWSDL Editor - SAWSDL-latest.wsdl
  wsdl:description
  xs:schema
  OrderRequest [=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderRequest]
  complexType
  xs:sequence
  customerNo (xs:integer)
  orderItem (item)
  xs:all
  EAN (xs:string)
  quantity (xs:integer)
  OrderResponse [Confirmation] [=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderCo
  simpleType [Confirmation] [=> http://www.example.org/example/address]
  restriction [xs:string]
  enumeration [Confirmed]
  enumeration [Pending]
  enumeration [Rejected]
  Order
  order [=> http://www.w3.org/2002/ws/sawSDL/spec/ontology/rosetta#RequestPurchaseOrder]
  OrderRequest
  OrderResponse

Mapping Info
  WSDL Element      Model Reference
  wSDL:elementDeclaration(OrderRequest) => http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderRequest
  wSDL:typeDefinition(item)            => http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#item
  wSDL:elementDeclaration(OrderResponse) => http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderResponse
  wSDL:typeDefinition(Confirmation)    => http://www.example.org/example/address
  wSDL:interfaceOperation(Order/order) => http://www.w3.org/2002/ws/sawSDL/spec/ontology/rosetta#RequestPurchaseOrder

SAWSDL Editor - test.wsdl
  xml version="1.0" encoding="UTF-8"?>
  <?xml-stylesheet type="text/xsl" href="SAWSDL.xsl" />
  <wSDL:definitions targetNamespace="http://www.w3.org/2002/ws/sawSDL/spec/wadl/order#"
  xmlns="http://www.w3.org/2002/ws/sawSDL/spec/wadl/order#"
  xmlns:wadl="http://www.w3.org/2003/03/wadl/wadl12.xsd"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:sawSDL="http://www.w3.org/2002/ws/sawSDL/spec/sawSDL#"
  xmlns:xsd="http://example.org/order#">
  <wSDL:types>
  <xs:schema targetNamespace="http://example.org/order#" elementFormDefault="qualified">
  <xs:element name="OrderRequest"
  sawSDL:modelReference="http://www.w3.org/2002/ws/sawSDL/spec/ontology/purchaseorder#OrderRequest"
  sawSDL:liftingSchemaMapping="http://www.w3.org/2002/ws/sawSDL/spec/mapping/Request2Ont.xslt">
  <xs:complexType>
  <xs:sequence>
  <xs:element name="customerNo" type="xs:integer" />
  <xs:element name="orderItem" type="item" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
  </xs:complexType>
  </xs:element>
  <xs:complexType name="item" sawSDL:modelReference="http://www.w3.org/2002/ws/sawSDL/spec/ontology
  <xs:all>
  <xs:element name="EAN" type="xs:string"/>
  </xs:all>
  <xs:attribute name="quantity" type="xs:integer"/>
  </xs:complexType>
  </xs:schema>
  </wSDL:types>
  <wSDL:message name="OrderRequestMessage">
  <wSDL:part name="OrderRequest" type="xsd:OrderRequest"/>
  </wSDL:message>
  
```

OWL Experiences and Directions

[Source: Ian Horrocks, University of Manchester]

OWL Experiences and Directions

- Workshop at ESWC'07 (Innsbruck, Austria)

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OWL Experiences and Directions

- Workshop at ESWC'07 (Innsbruck, Austria)
- Brings together users, implementors and researchers

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OWL Experiences and Directions

- Workshop at ESWC'07 (Innsbruck, Austria)
- Brings together users, implementors and researchers
- Submissions include:
 - Enterprise Integration (Mitre)
 - Product development (Lockheed Martin)
 - Role based access control (NASA)
 - Healthcare (SNOMED)
 - Agriculture and fisheries (UN Food & Agriculture Organization)
 - Oral Medicine (Chalmers)
 - ...

[Source: Ian Horrocks, University of Manchester]

Which Ontologies to use?

- **WSDL-S**
 - Extends WSDL files with semantic, no ontology definition
 - Limited usage “all must agree on the same”
- **OWL-S**
 - Uses Web Ontology Language (OWL), and only that one
 - Reasonable tools are available
- **WSMO**
 - Uses WSML, advanced concepts for a.o. mediation of ontologies
 - Tools not mature
- **SWSF**
 - Extension of OWL features
 - Developed for service platforms, not for inclusion of external services

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And then
came
SAWSDL

Semantic Web Services

- Rich research history– too much to review here
- SWS related submissions to W3C
 - OWL-S: <http://www.w3.org/Submission/OWL-S/>
 - WSMO: <http://www.w3.org/Submission/2005/06/>
 - SWSF: <http://www.w3.org/Submission/SWSF/>
 - WSDL-S: <http://www.w3.org/Submission/WSDL-S/>
- W3C Workshop at Innsbruck, leading to community agreement to focus on limited scope and evolutionary approach championed by WSDL-S, leading to SAWSDL WG
 - Build on existing Web Services standards using only extensibility elements
 - Mechanism independent of the semantic representation language (though OWL is supported well)



Why use SAWSDL

- Build on existing Web Services standards using only extensibility elements
- Mechanism independent of the semantic representation language (though OWL is supported well)
- SAWSDL provides an elegant solution
 - Help integration by providing mapping to agreed upon domain models (ontologies, standards like Rosetta Net, ebXML)
 - Better documentation by adding functional annotation
- Ease in tool upgrades
 - e.g. wsif / axis invocation

Semantic Tools

http://www.mkbergman.com/?page_id=346



AI3

Adaptive Information
Adaptive Innovation
Adaptive Infrastructure

a·dap·tive *adj.* Showing or having a capacity to make fit for new or special situations; flexible; a successful adjustment.















Blogasbörd by
Michael K. Bergman 
s)O(

Sweet Tools (Sem Web) - Simple Version



This is the simple version of the **Sweet Tools** listing, provided to those who want to see all listings on a single page. For more complete listings and to filter and sort results, see this **comprehensive Sweet Tools** listing.

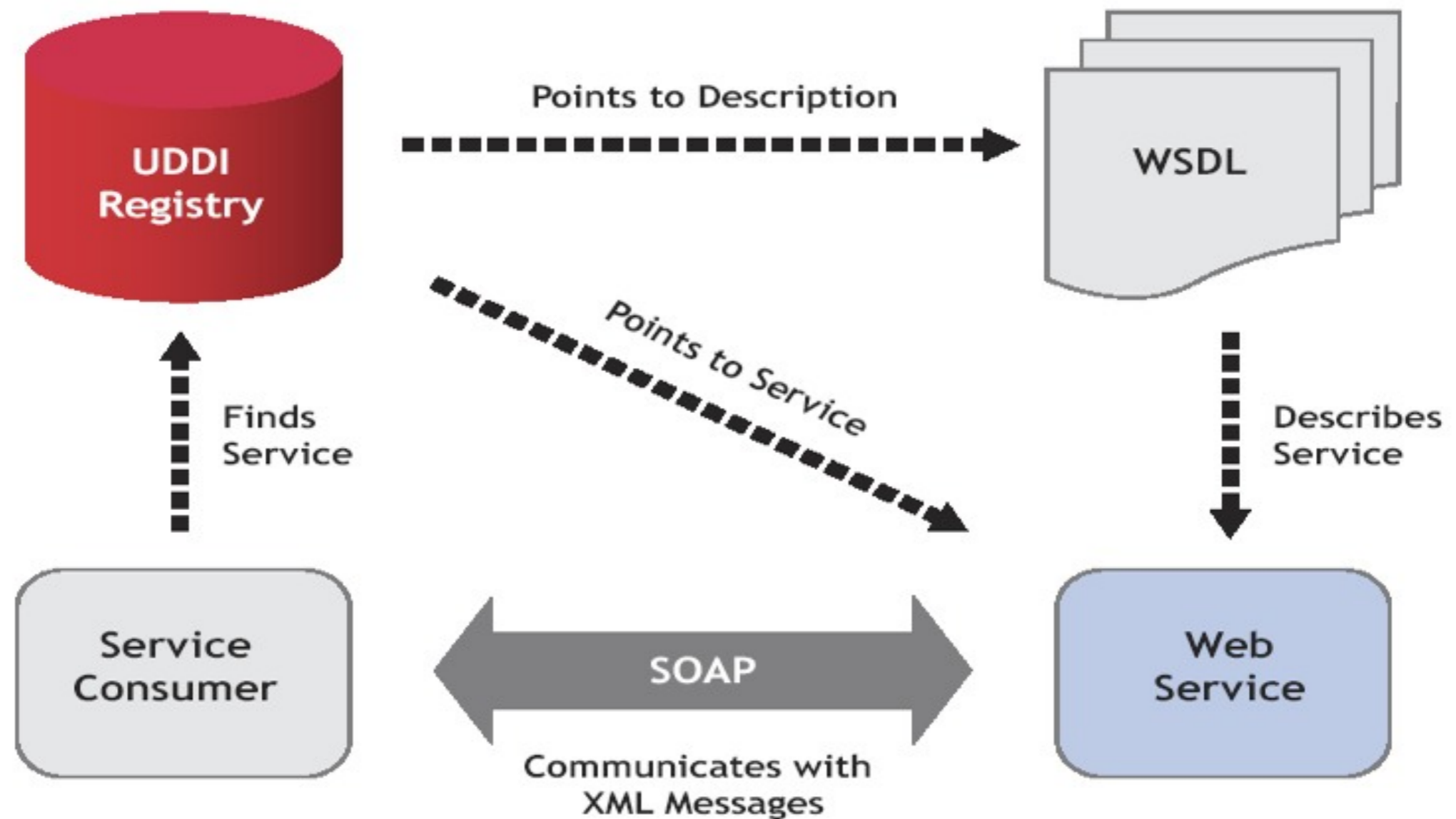
NOTE: This posting of **Sweet Tools** — semantic Web and related tools — is now in version **8**, with **500 tools**, an addition of 80 newly listed tools since the previous version. It was last updated on **3/11/07**. New tools or update suggestions are welcomed.

Name/URL	Category	Name/URL	Category
3store 	Database/Datastore	ONTOCOPI 	Miscellaneous
4Suite 4RDF 	Programming Environment	Ontodella 	Ontology (general)
ACE Annotation Toolkit 	Information Extraction	OntoEdit/OntoStudio 	Ontology (general)
ActiveOntology 	Programming Environment	OntoEngine 	Ontology Mapper/Mediator
ActiveRDF 	Programming Environment	Ontogator 	Search Engine
Adaptiva 	Ontology Editor	OntoGloss 	Annotator
Aduna Metadata Server 	Database/Datastore	Ontology Organizer 	Ontology Editor

Business example: Eclipse plug-ins for IBM WebSphere Integration Developer (WID)

The Promise of Web Services

web-based SOA as new system design paradigm



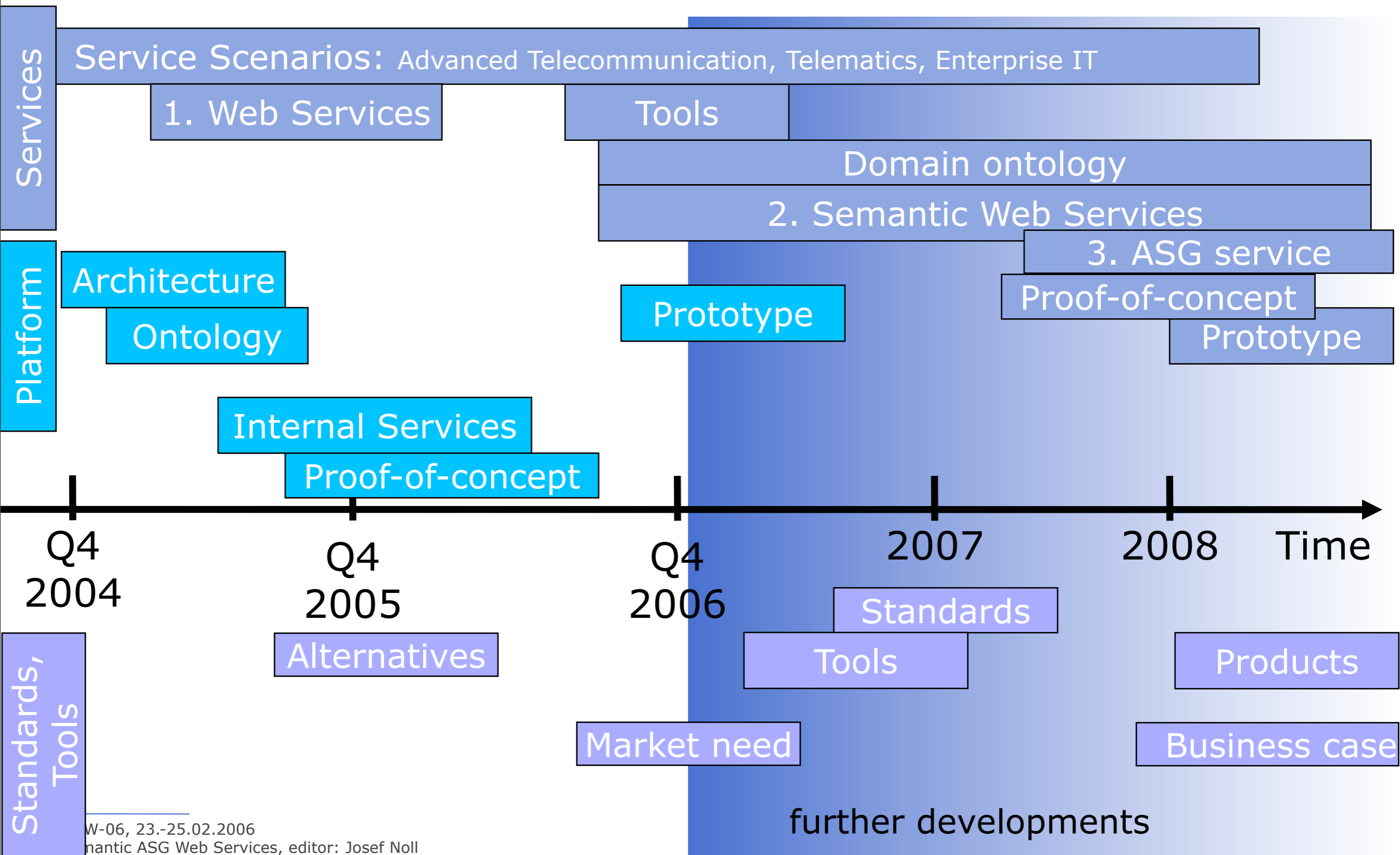
- Semantic Web Services
 - Experiences
 - Challenges

- And the whole story about personalisation and **privacy**



Roadmap - Expectations

Expectations for ASG based services



W-06, 23.-25.02.2006
 Semantic ASG Web Services, editor: Josef Noll

Location service – estimated effort

Conventional service delivery

Service: Service description,
Requirements, Design and
Implementation of service

- Semantic Service description
- Service testing
- Registration of service

Domain: In conventional Web
services no domain
ontology required

App: End-user Application

Location service – estimated effort

Conventional service delivery

Semantic Web Service (SWS) delivery

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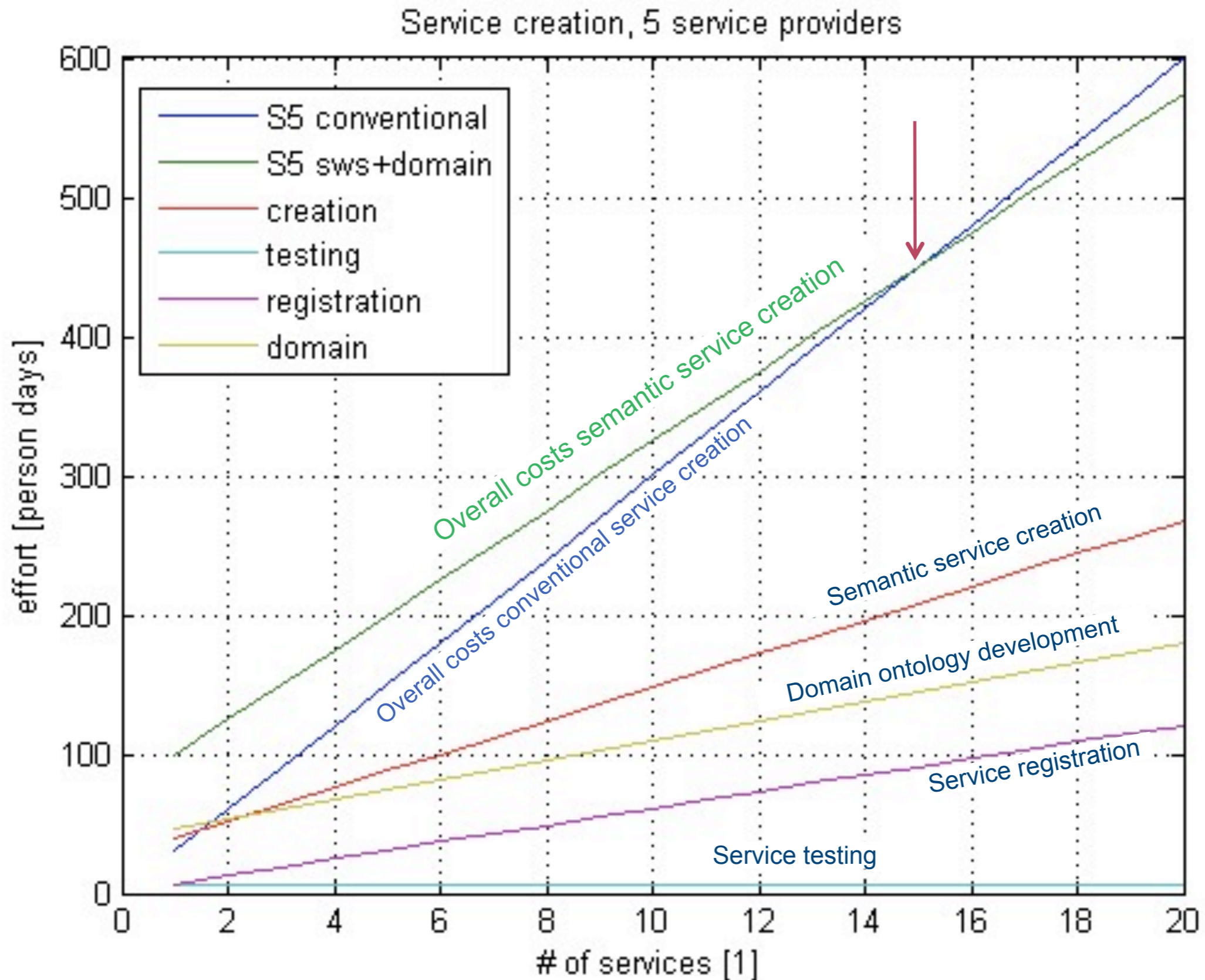
Service: assume that service is available as Web service (.wsdl)

- New for Semantic Services
- Easier
- Similar effort

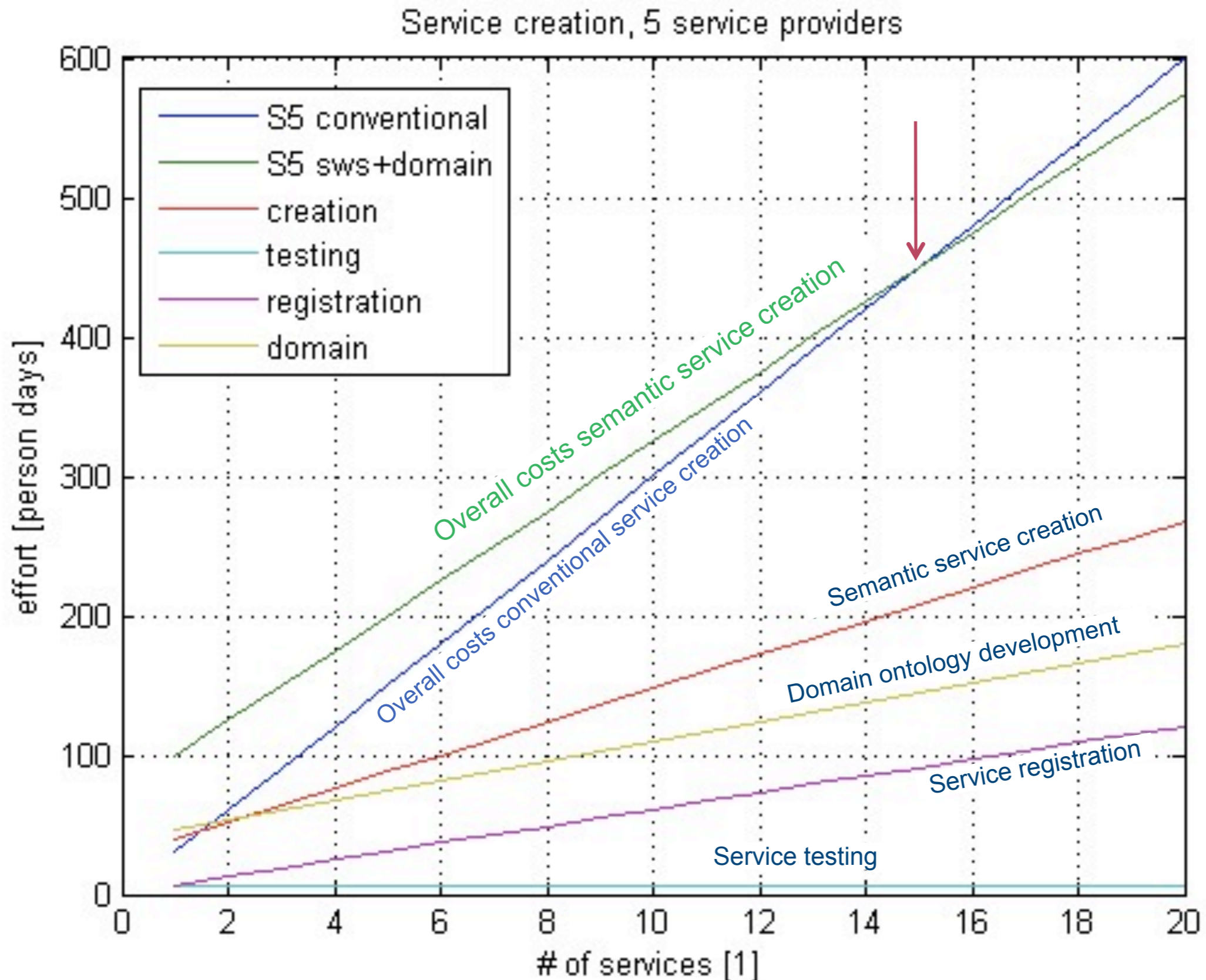
Domain: One-time effort to create Domain Ontology

App: not considered

Break even in Semantic Services



Break even in Semantic Services



• Domain and service ontology creation are cost drivers for SWS

Current service provision is too costly for maintenance and service upgrade

Semantic Service provision

- Increases initial costs for service development
- Reduces drastically maintenance costs
- Reduces substantially upgrade costs
- Is the most promising way to go for service provision

Requirements for Service Representation

OWL-S

- Represent **capabilities of the service**
 - The function that the service computes
 - Features of the service provided
- **Decidable** (& Effectively Computable) logics: OWL DL

What we need

- Represent **service requirements**
 - Resources requirements
 - CPU, Screen size, Memory size, Network type and bandwidth
 - CC/PP, UAProf
 - Policies and Privacy requirements
 - Cost models
 - Communication Channel
 - Contextual information:
 - where/when can the service be used

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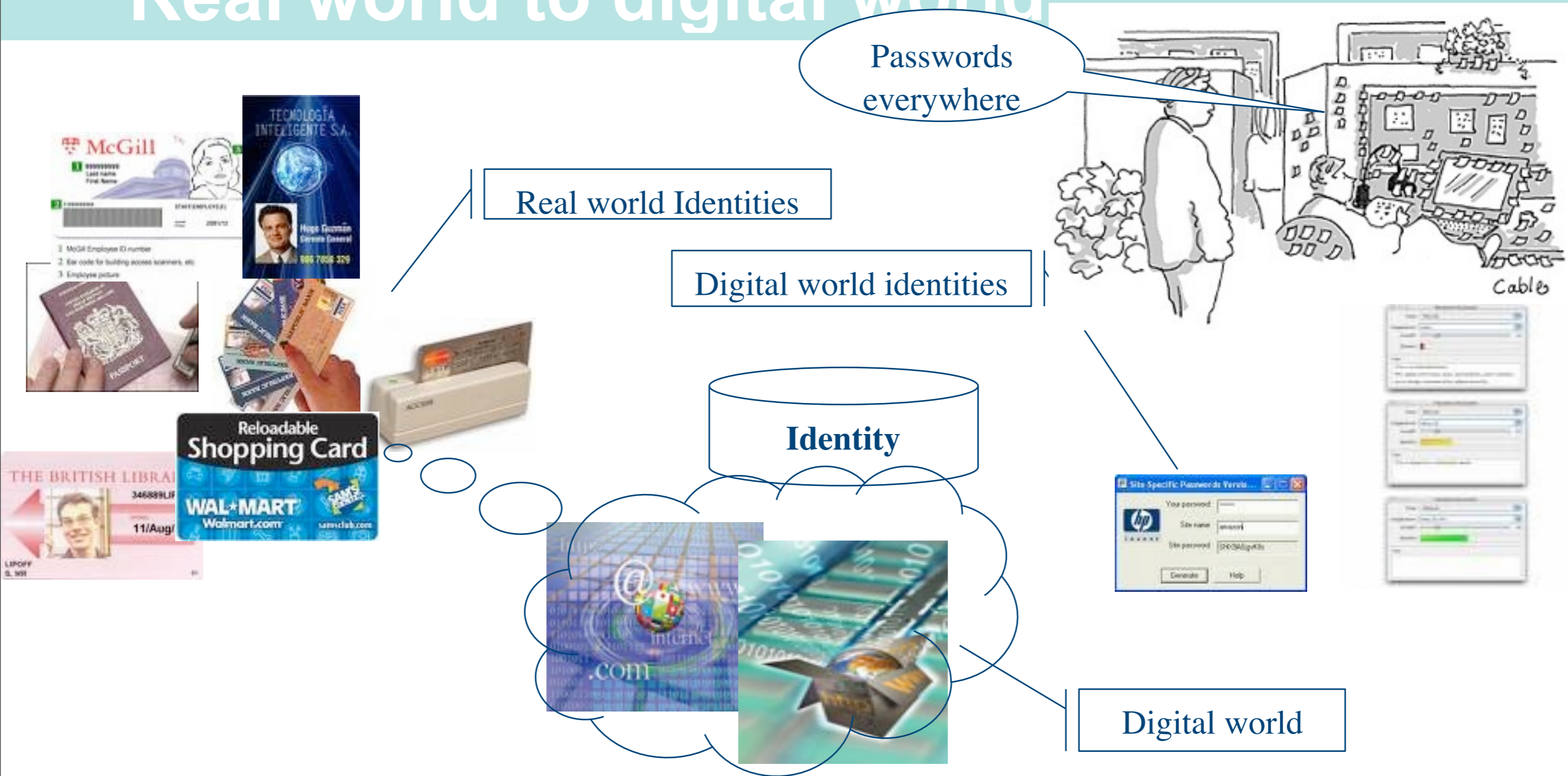
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Challenges

For Lecture 4: Roles and Identities

Identity: Real world to digital world



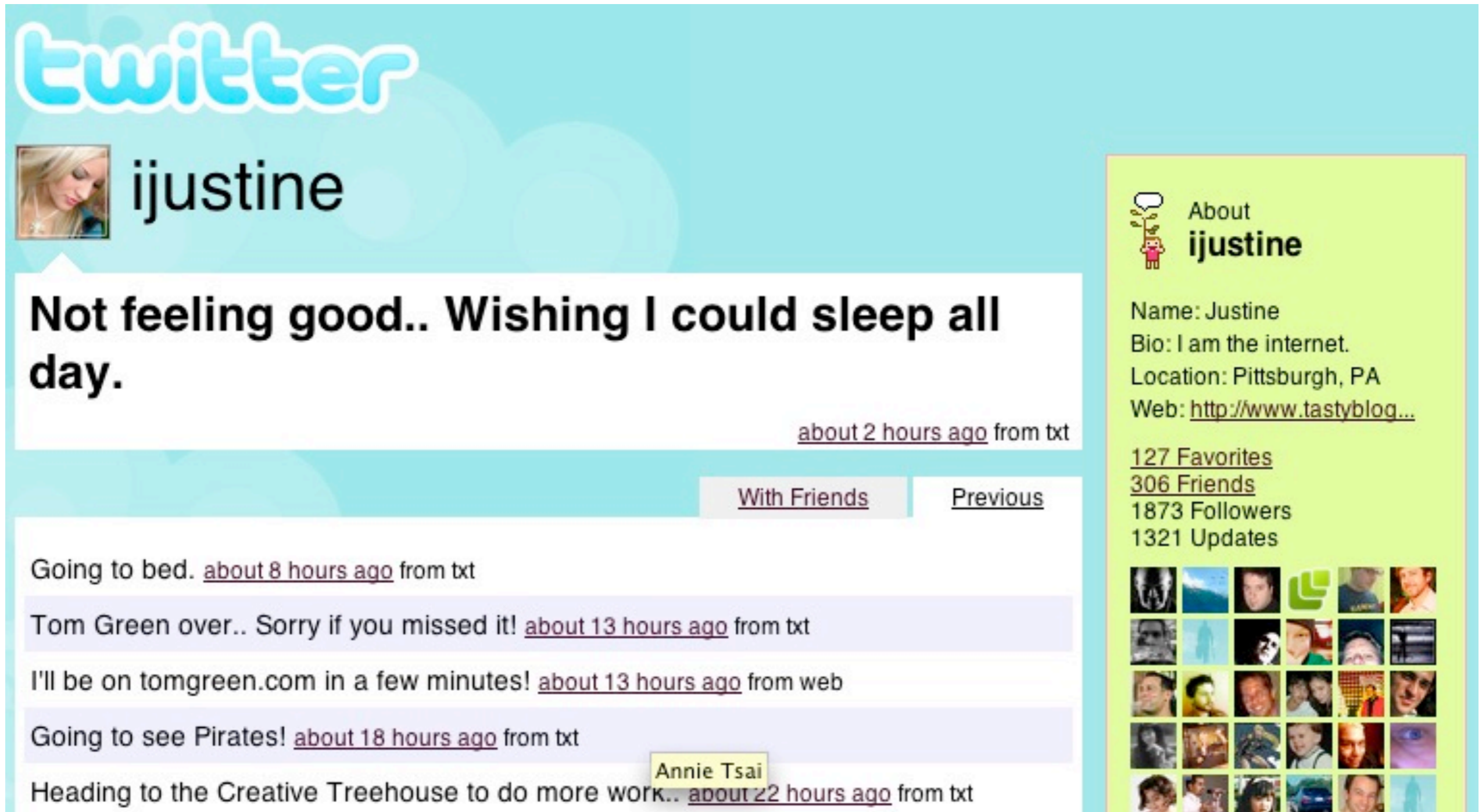
- Gartner says (annual IT security summit 2005) 80% of organisations will reach a password breaking point by 2007.

Identity handling

- Identity is an attributes of you
 - Social, Corporate and Private IDs
- Internet was built without an identity layer
 - Identity 2.0
 - People, information and software
 - More user-oriented (wikis, comments, tags)
- Service related security
 - Provide just the information which is necessary


Identity handling

- Identity is an attributes of you
 - Social, Corporate and Private IDs



The image shows a screenshot of a Twitter profile for the user 'ijustine'. The profile header includes the Twitter logo, a profile picture of a woman, and the name 'ijustine'. The main content area displays a tweet: 'Not feeling good.. Wishing I could sleep all day.' with a timestamp of 'about 2 hours ago from txt'. Below this, there are navigation buttons for 'With Friends' and 'Previous'. A list of recent tweets follows, including 'Going to bed.', 'Tom Green over.. Sorry if you missed it!', 'I'll be on tomgreen.com in a few minutes!', 'Going to see Pirates!', and 'Heading to the Creative Treehouse to do more work..'. A yellow callout box highlights the name 'Annie Tsai' next to the last tweet. On the right side, there is a green sidebar with the text 'About ijustine' and a list of statistics: 'Name: Justine', 'Bio: I am the internet.', 'Location: Pittsburgh, PA', 'Web: http://www.tastyblog...', '127 Favorites', '306 Friends', '1873 Followers', and '1321 Updates'. Below the statistics is a grid of small profile pictures of users who interacted with the profile.

twitter

 ijustine

Not feeling good.. Wishing I could sleep all day.

about 2 hours ago from txt

[With Friends](#) [Previous](#)

Going to bed. [about 8 hours ago](#) from txt

Tom Green over.. Sorry if you missed it! [about 13 hours ago](#) from txt

I'll be on tomgreen.com in a few minutes! [about 13 hours ago](#) from web

Going to see Pirates! [about 18 hours ago](#) from txt

Heading to the Creative Treehouse to do more work.. [about 22 hours ago](#) from txt

Annie Tsai

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Identity handling

- Identity
- S
- Interaction
- I
- P
- M
- Services
- P



Your Conversation.

Welcome to Jaiku!

-  **Create your mini-blog**
Post Jaikus, add icons, customize your design, share your Web feeds
-  **Follow your friends**
Get their updates, see their presence, add comments
-  **Get Jaiku on your phone**
Text Jaikus from any phone. Share your availability, location, and calendar from your smartphone

[> Take the tour](#)

What are Jaiku members up to right now?

[> See more updates](#)



SannaB: Totally drained of strength and energy
From Finland 10 minutes ago.

christopheCapelli: Seems that there is a little Jaiku revival in the French blogolaxy
From France 10 minutes ago.

Mourneblade: When I bought a camera at the store, the place made me regret I didn't do it online.
From Vienna, USA 13 minutes ago.

Jaiku Mobile Beta for Nokia S60 phones!
[Take a look](#)



[Join Now!](#)

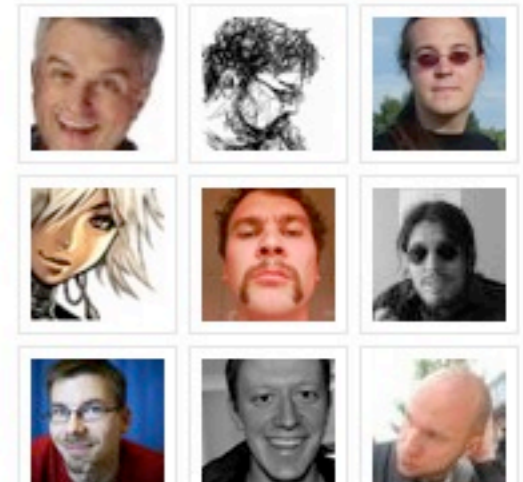
[...and create your free account](#)

Jaiku Channels Alpha



[> More](#)

Featured Members



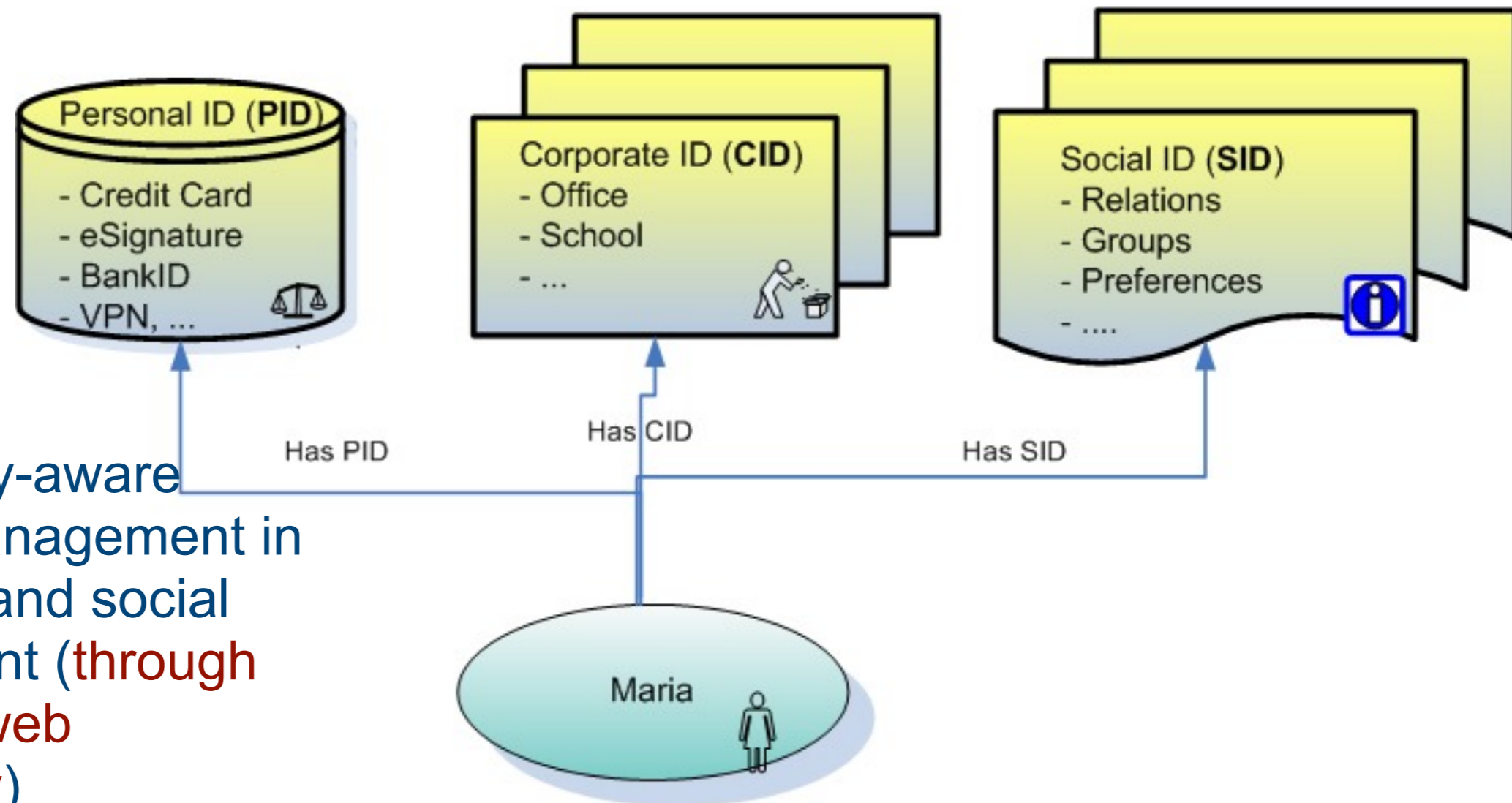
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- Service related security
 - Provide just the information which is necessary
- Mobile challenges
 - Traceability
 - 24/7 availability



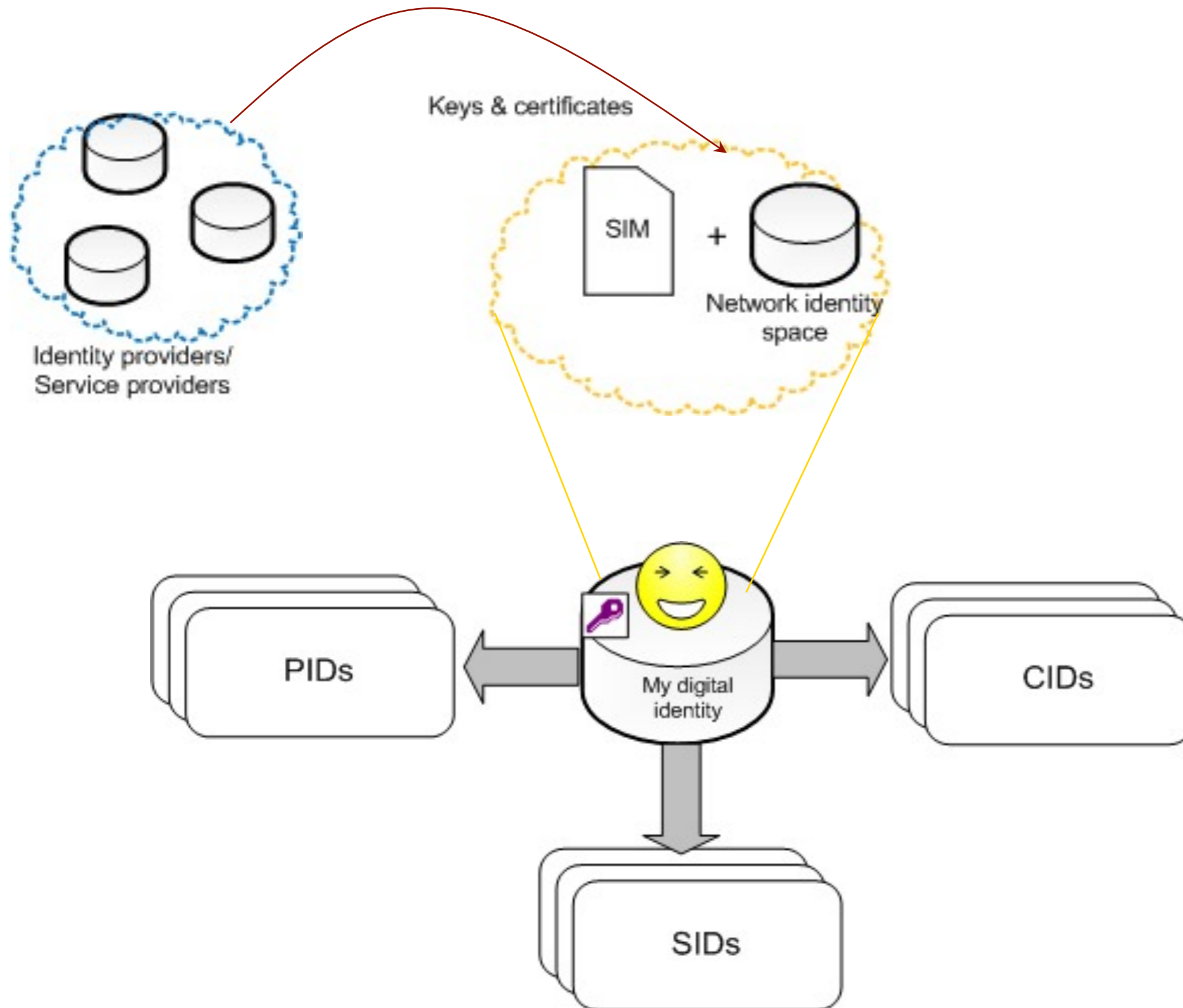
Our objectives

- How to represent user's identity (**role-based identity**) and where to store user's identity (**SIM card + secure identity space in the network**)
- Integrated identity mechanism to interact with both remote and proximity services



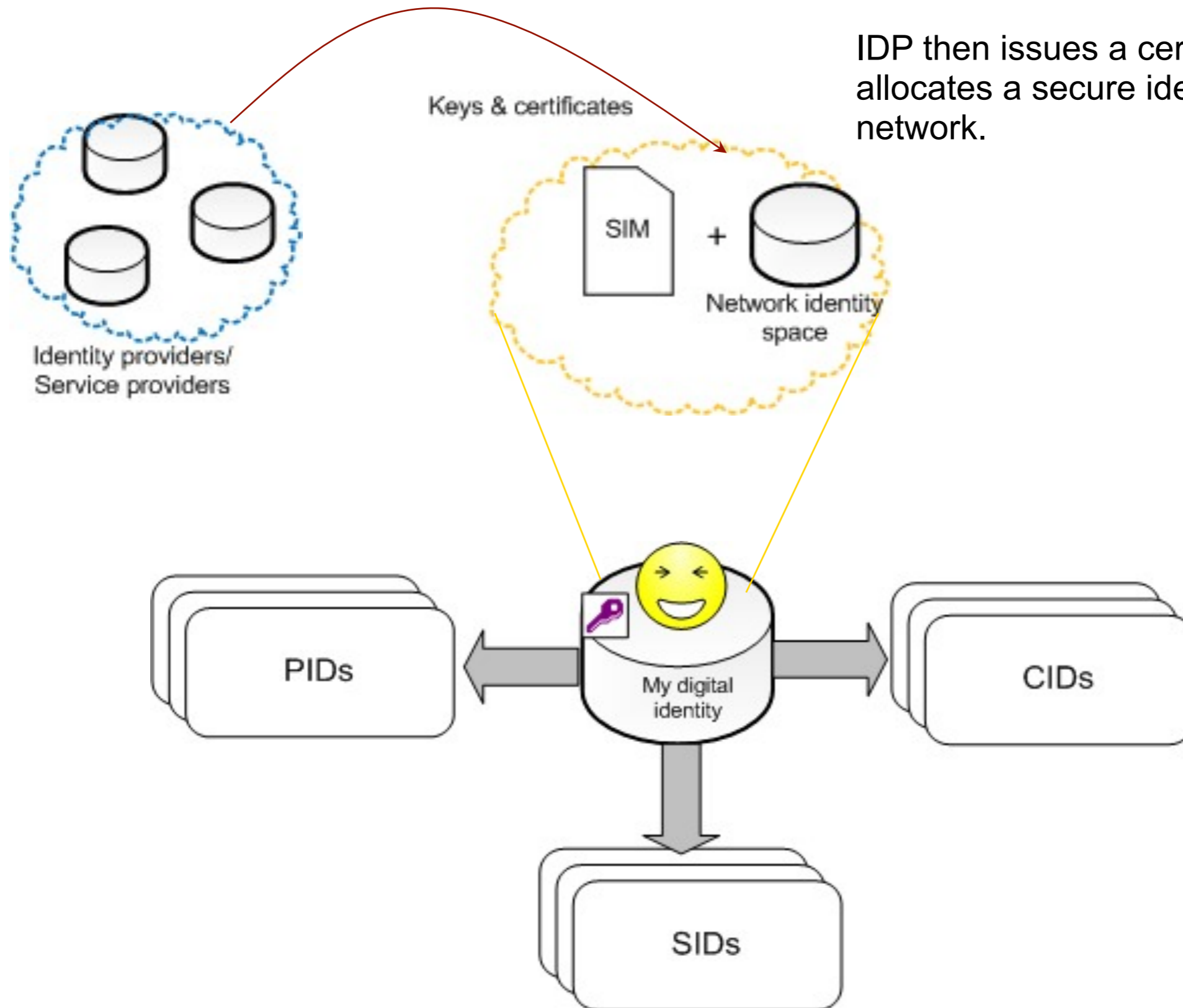
- Community-aware identity management in corporate and social environment (**through semantic web technology**)

Distributed Identities and ID Provider



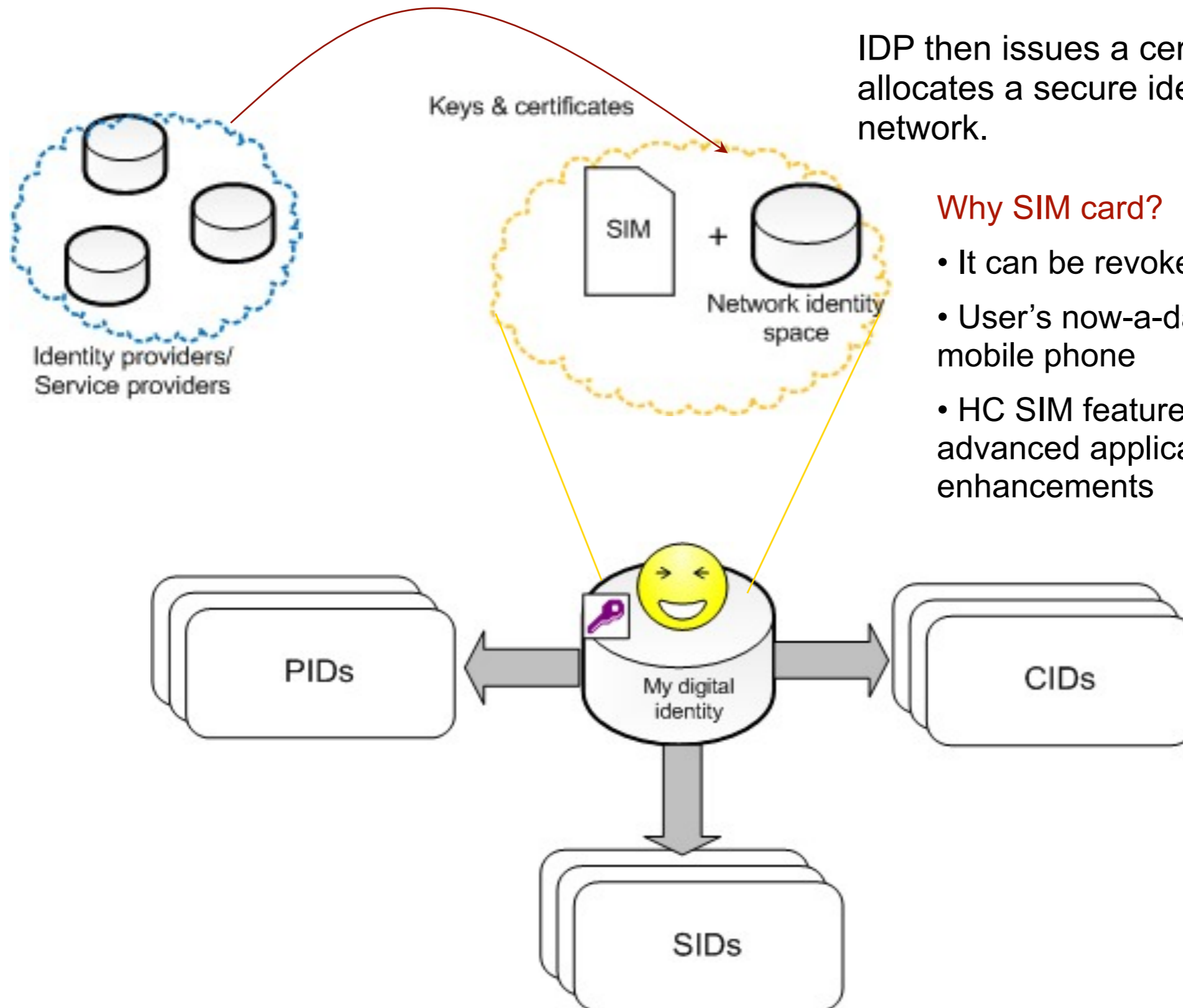
Distributed Identities and ID Provider

IDP then issues a certificate to the user and allocates a secure identity space in the network.



Distributed Identities and ID Provider

IDP then issues a certificate to the user and allocates a secure identity space in the network.



Why SIM card?

- It can be revoked
- User's now-a-days rarely found without mobile phone
- HC SIM features more storage, advanced applications, further security enhancements

Social Networks

Social Networks

- Who knows and talks to whom?
- Formal (company, colleagues, society) and informal (friends, interest groups)

"Social software" - Internet

- Synchronous/asynchronous co-operation
- Personal networking - LinkedIn, ..
- Personal publications - Blogg, Wiki, ..
- Feedback and reputation - Amazon, ..

Convergence between social networks, social software and semantic technologies

- FoaF (Friend-of-a-Friend) - computer readable (RDF) information about people based on ontologies
- Implicit ontologies in search engines (Google, FAST,...)
- Semantically supported communities (myOpera,...)

adopted from: Roar Fjellheim, Computas

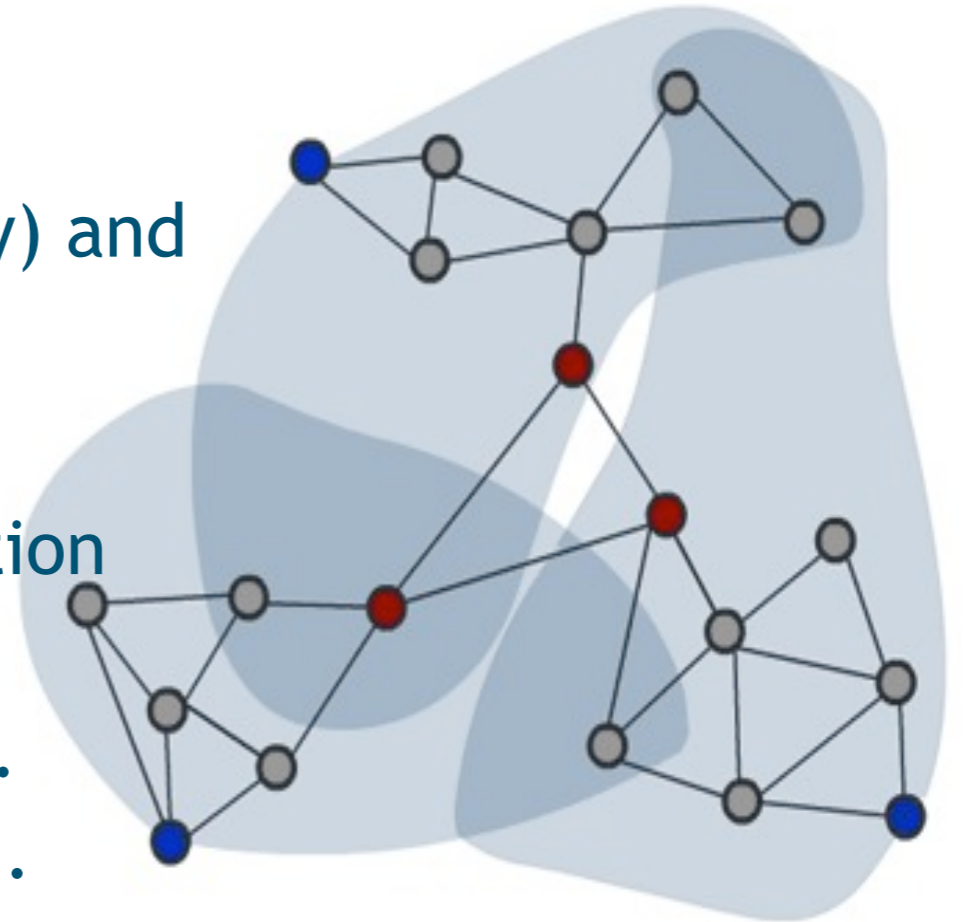
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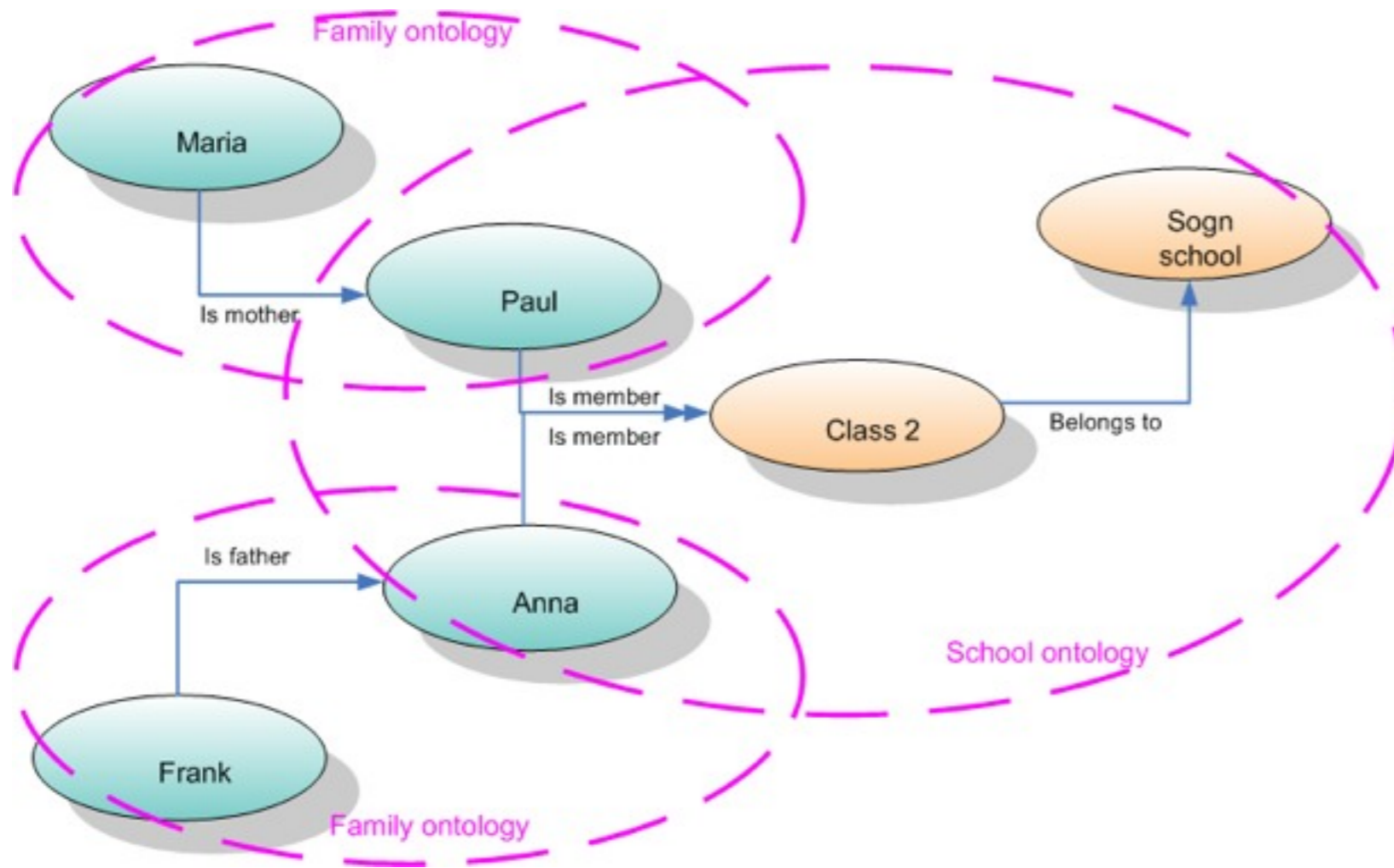
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Social scenario - school pictures

- Define the relationship through “social” ontologies

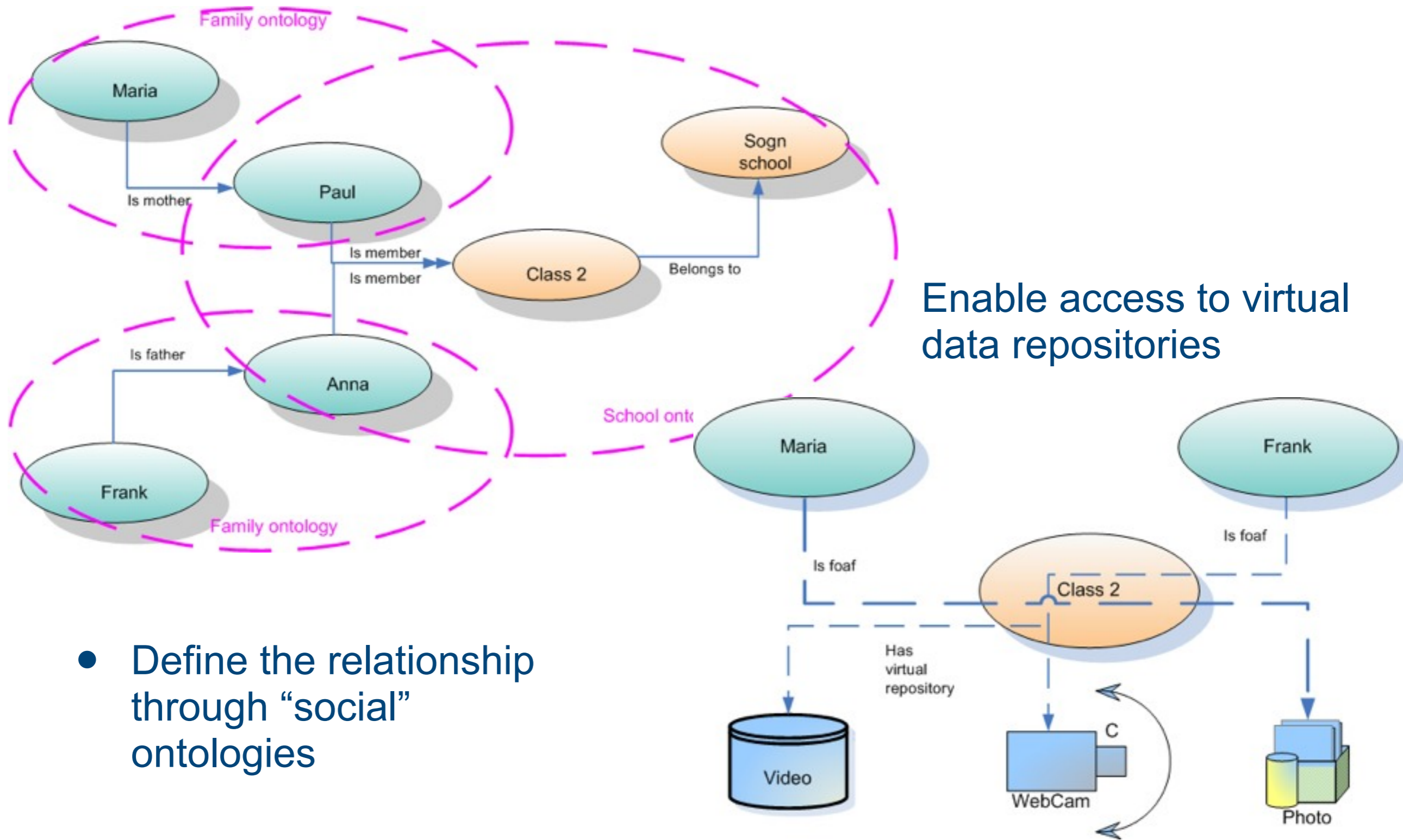
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- Define the relationship through “social” ontologies

Access resources based on relationships (corporate identity)

Social scenario - school pictures

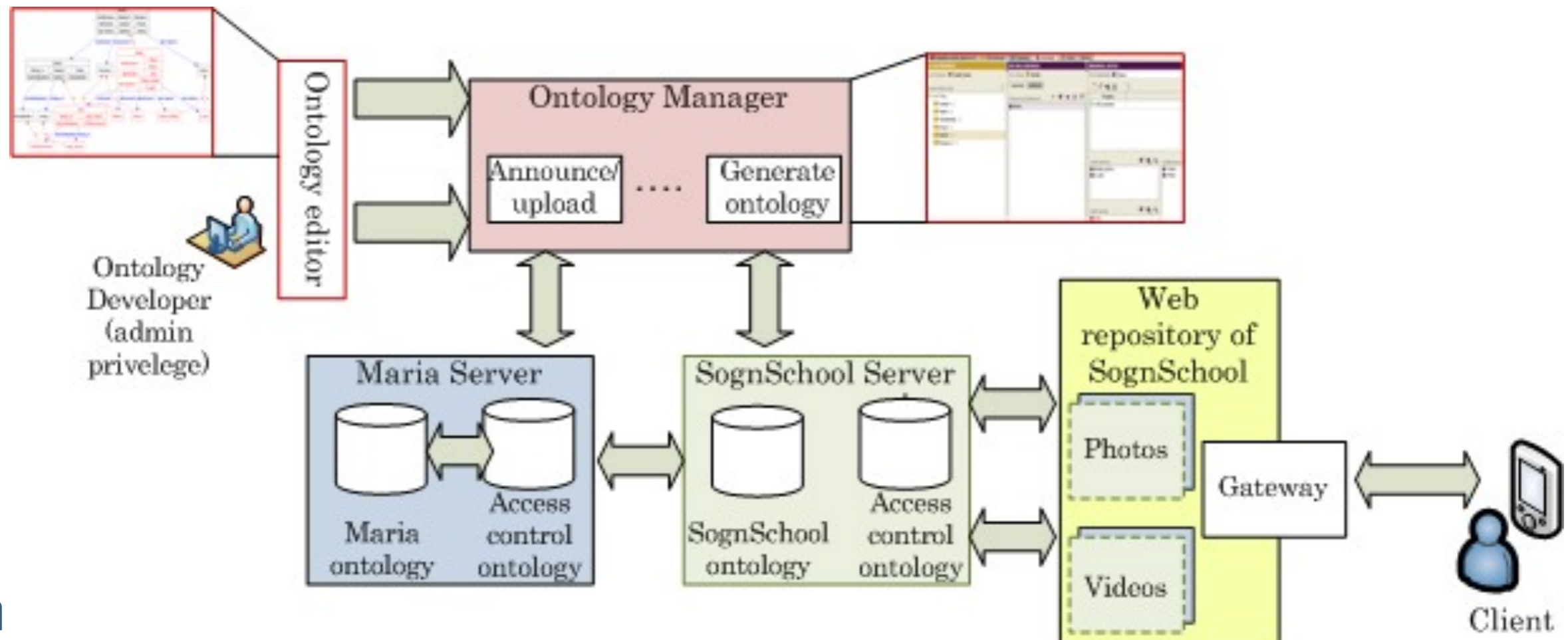


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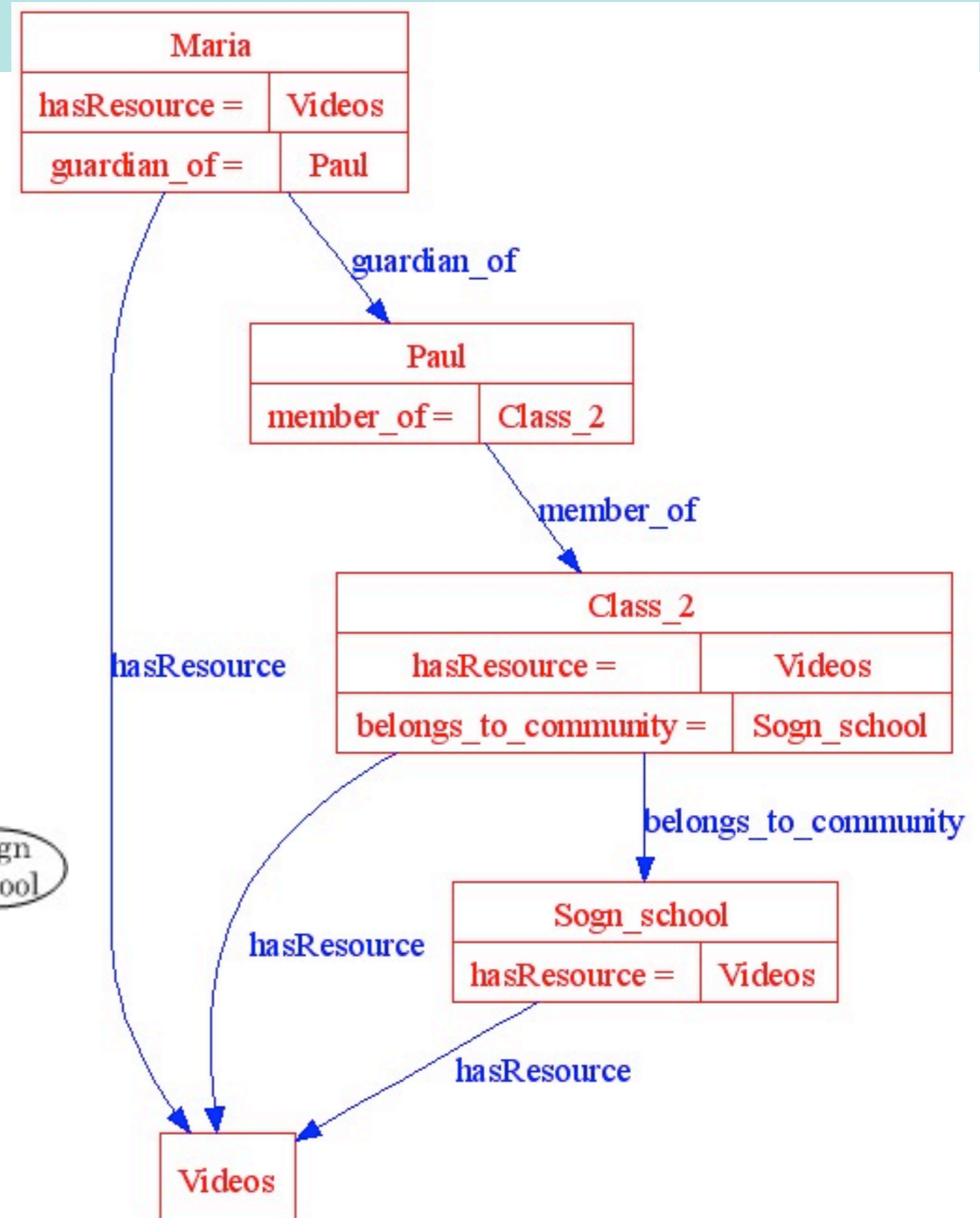
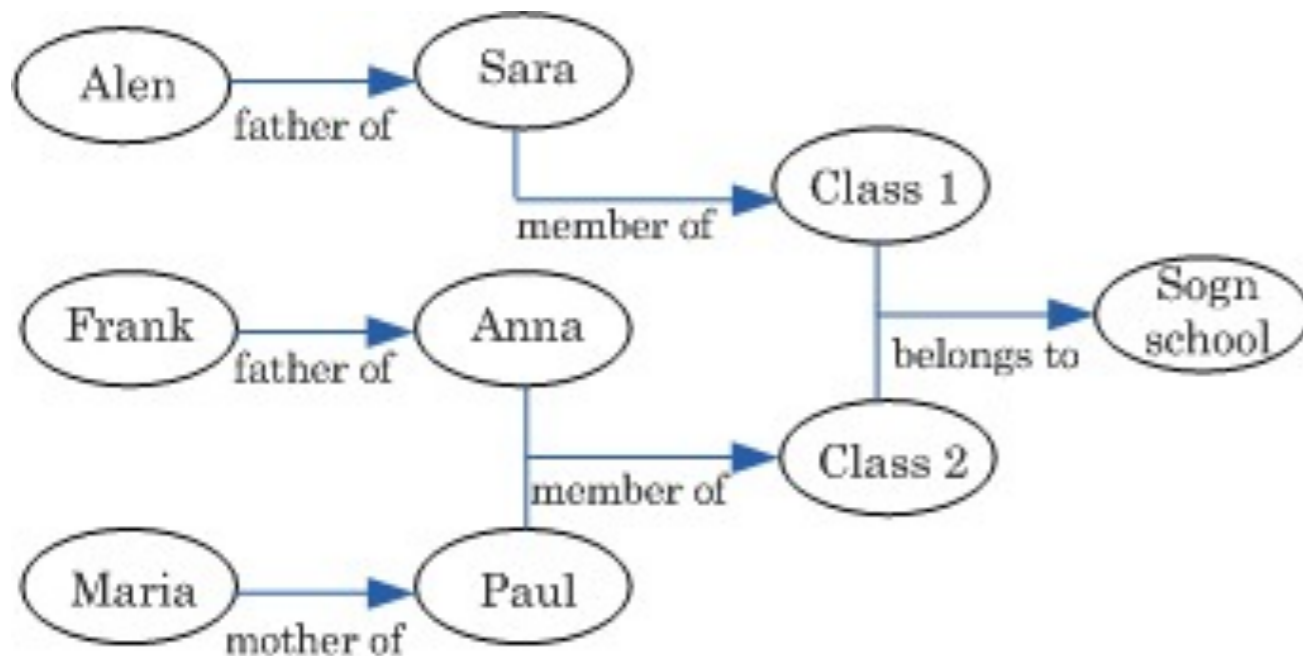
Access resources based on relationships (corporate identity)

Semantic Web based implementation

- We propose **SemID.org (Semantic Identity)** where OWL, Web Ontology Language is used to formalise and define the proposed identity management domain.
- OWL is chosen because it facilitates greater machine interpretability of Web content than that supported by XML, RDF, and RDF Schema (RDF-S) by providing additional vocabulary along with a formal semantics.
- Ontology with foaf is public so cannot support privacy requirements.



- Provide role-based access control and privacy assurance service
- Access control and privacy goals are achieved through policies and rules using OWL DL
- **USE CASE:**



Screen shots of SemID ontology

- We model the ontology of the use USE CASE scenario using protégé-OWL ontology editor platform.

CLASS BROWSER
For Project: ● SemID_SID

Class Hierarchy

- owl:Thing
 - Community (1)
 - Group (2)
 - Guardian (3)
 - Member (3)
 - Resource (2)

INSTANCE BROWSER
For Class: ● Community

Asserted Inferred

Asserted Instances

- ◆ Sogn_school

OWLClasses | Properties | Individuals

INSTANCE BROWSER
For Class: ● Policy

Asserted Inferred

Asserted Instances

- ◆ DifferentGroup
- ◆ NotMember
- ◆ RepeatRequest
- ◆ SameGroup

- Action (3)
- Community (1)
- Group (2)
- Guardian (3)
- Member (3)
- MobileIdentifier (4)
- Policy (4)
- Resource (3)
- Rule (3)
- SoCG (3)
- SoG (4)

Screen Shots of the Access Control

Screen Shots of the Access Control

Faceted filter

You can add restrictions to your filter. Here you could see the whole filter criteria and delete any or all the restrictions if you want.

Your filter contains 1 restriction:

- Group: Rel9 Project ([delete](#))

Empty filter

3 matched individuals

Gyorgy Kalman

Gyorgy Kalman is a Visiting Professor at the Computer Science Department in the Carlos III University. He holds a PhD in Computer Science from the Digital Enterprise Research Institute at Ireland, Galway.

Josef Noll

Josef Noll is the Head of the SofLab Group at the Computer Science Department in the Carlos III University and the Head of the Institute for promotion of Innovation Pedro Juan de Lastanosa, Madrid.

Erik Swansson

Session

User: administrator

Date: 2007.06.04

Filter the results with facets

Use the faceted filter to add restrictions to the listed results.

Properties and values:

- Properties:
 - [has group](#)
 - [has role](#)
 - [has policy](#)

Available values for Group:

- Telenor RnI
- Rel9 Project
- Ericsson
- Telenor Pakistan

Add

Applied Policies

Resources attached to Erik Swansson

Document: Management.doc

Policy: Read and write
Open the [document](#)

Document: Detailed_design.doc

Policy: Read
Open the [document](#)

Session

User: eswansson
Date: 2007.06.04

Description of the identity in this group

- Project leader:
 - Policy: Final decision
 - Policy: Read and write
- Other Groups:
 - Rel9 Project (current)
 - [Ericsson](#)

```
<Role rdf:ID="Project_Leader">
  <hasVisibilityOfGroup rdf:resource="#Rel9_Project"/>
  <hasPolicy rdf:resource="#Administrator"/>
  <hasPolicy rdf:resource="#FinalDecision"/>
  <hasPolicy rdf:resource="#ReadWrite"/>
</Role>
<Role rdf:ID="Project_Member">
  <hasVisibilityOfGroup rdf:resource="#Rel9_Project"/>
  <hasPolicy rdf:resource="#ReadWrite"/>
</Role>
<Role rdf:ID="Visitor">
  <hasVisibilityOfGroup rdf:resource="#Empty"/>
  <hasPolicy rdf:resource="#Read"/>
</Role>
```

SIRE | University Carlos III of Madrid,

Created by [Damaris Fuentes Lorenzo](#) | Initial design by [Gerhard Studer](#)

Conclusions

- The user is always connected to services using multiple networks
- Service related information
 - privacy (just what is needed)
 - application security
- Personalisation is based on Identity management
 - Identity provision from public authorities, banks, mobile operators, ...
 - using preferences, keys and certificates
- Semantic service delivery provides
 - Role-based policies
 - Document protection and access

Thanks to

- Ian Horrocks (University of Manchester)
- Kunal Verma, (Accenture) and Amit Sheth, (Wright State University)
- Michael Stollberg, Armin Haller, Dumitru Roman (DERI)
- Mohammad M.R. Chowdhury, Erik Lillevold, Marianne Rustad (UniK)
- Juan Miguel Gomez (Universidad Carlos III de Madrid)
- Elin Melby, Frode Kileng (Telenor)
- Marcin Pilarski, Bogdan Banasiak (TP)
- Longin Brzeziński (PTC), Mirosław Brzozowy (PTC),
- Ville Törmälä, Virpi Lyytikäinen, Pasi Tiitinen (JYU)
- Bernhard Peissl, Alexander Wahler (Hanival)
- Tomasz Pieciukiewicz (Marketplanet)
- Ralf Hinz, Helmut Jorke (DaimlerChrysler)
- Klaus Jank (Siemens)

Task:

Create summer school access ontology

- Develop membersite with documents on server
- Use Protége:
<http://protege.stanford.edu/download/release/full/>
- Develop ontology for role based access
 - list of members (admin by Jari),
 - presentations (read access all members, edit access for presenters and admin),
 - public: Agenda, CV of presenters
- Send your ontology to:
josef@unik.no

:-)