WSMO-PA: Towards a generic PA Service Model

Vassilios Peristeras Maciej Zaremba

firstname.lastname@deri.org

European W3C Symposium on eGovernment
Febrauary 1-2, 2007, Gijon, Spain

Overview

- Motivation and Objectives
- Towards a Reference Public Administration Service Model
- WSMO-PA= Using the GEA Service Model to instantiate WSMO
- Conclusion

SemanticGov IST project – 6th Framework

SemanticGov
Services for Public Administration

www.semantic-gov.org

Home | Consortium | Conferences | Links | Contact

Main Menu

- Home
- Overview
- News
- Deliverables
- Publications
- Promo Material
- Consortium
- Contact
- Private

Project full title: Providing Integrated Public Services to Citizens at the National and Pan-European level with the use of Emerging Semantic Web Technologies.

SemanticGov Project FP6-2004-IST-4-027517 is funded by the European Commission within the INFORMATION SOCIETY TECHNOLOGIES (IST) Programme.

SemanticGov is a thirty six month EU-funded research and development project that aims at building the infrastructure (software, models, services, etc) necessary for enabling the offering of semantic web services by public administration (PA).

- **Starting date:** January 1st, 2006
- **Duration:** 36 months
- **Total Budget:** 4,375,000.00 €
- **EU Funding:** 2,720,000.00 €
- **Number of participating organizations:** 11
- **Number of countries:** 7

eGovernment

Information Society Technologies

Latest News

8th MODINIS workshop - Good Practice on Interoperability in Administrative Practice at Local and Regional Level - Key success factors and recommendations on interoperability (Jan 17, 2007)

ORDI v0.4.1 released (Jan 17, 2007)

4th IST Coordinators Day on Project Management (Jan 17, 2007)

IST Event 2006 - Helsinki, Finland (Jan 17, 2007)

The SemanticGov project will be presented

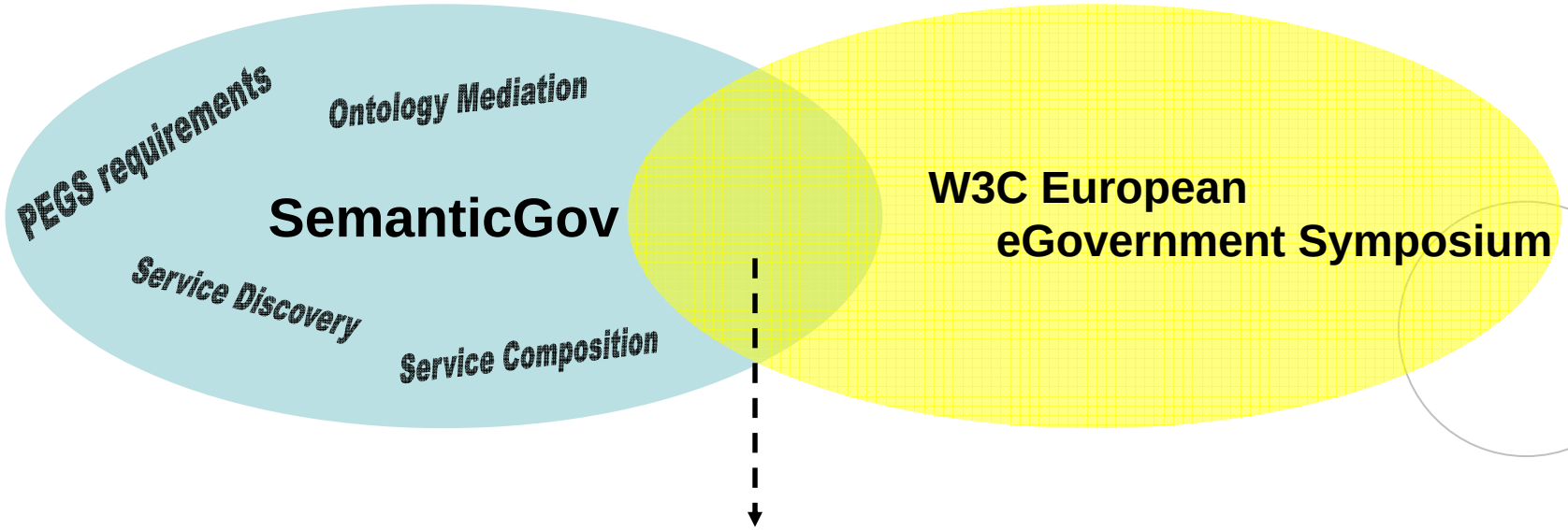
SemanticGov IST project – 6th Framework

www.semantic-gov.org

SemanticGov goal in a nutshell:

- Providing National and PEG eGov Services
- Addressing semantic interoperability issues
- With Semantic Web Service technologies
- By using WSMO and PA domain models

Presentation Focus



- Conceptual PA Service Model
- WSMO-PA specification

Motivation and Objectives

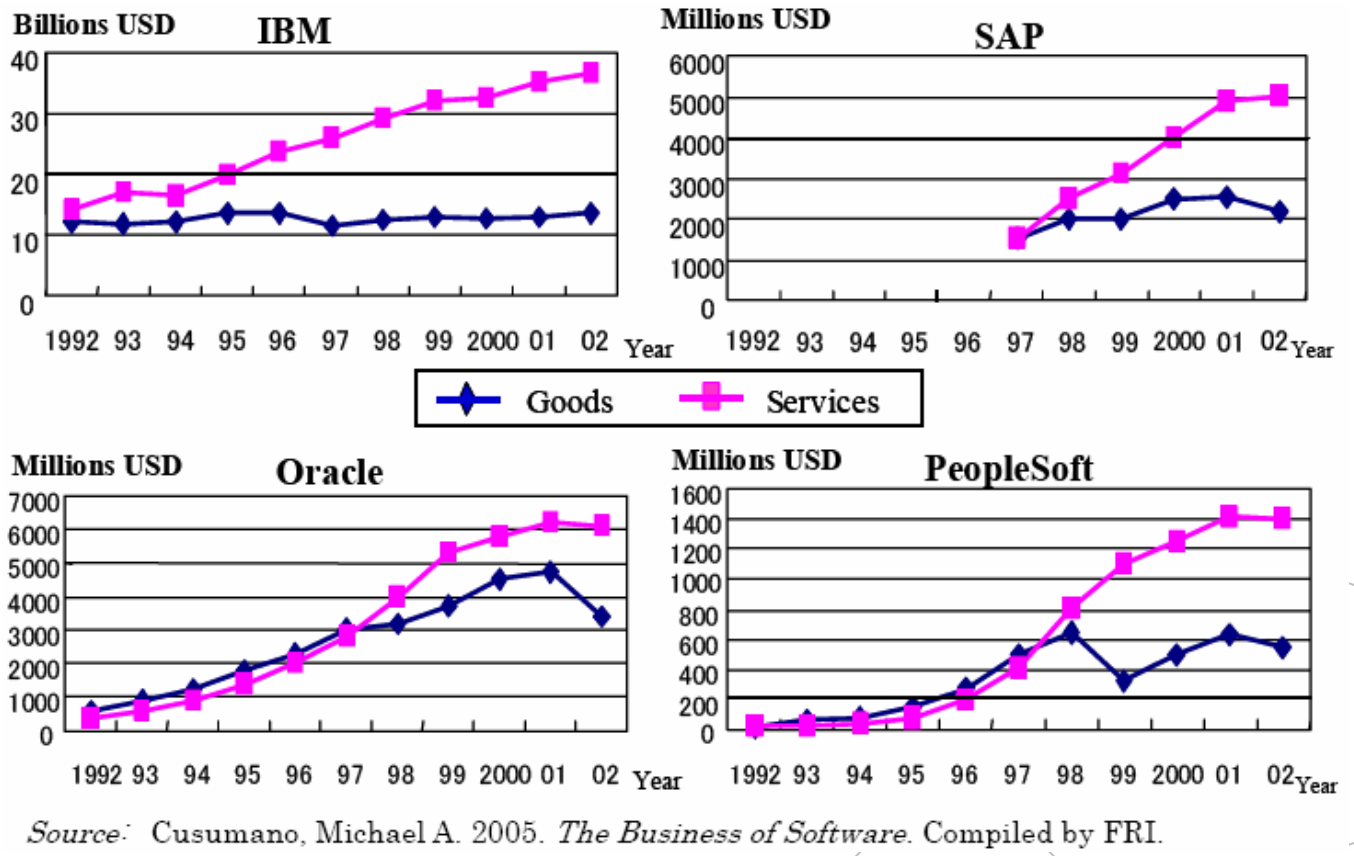
Towards a "Service Science"

IBM Definition: The application of scientific, management, and engineering disciplines to tasks that one organization beneficially performs for and with another ('services').

The concept of service science grew out of the increasing importance of services set against the backdrop of low productivity in the service industry. In response to this, the goal of service science was to promote innovation in services and increase service productivity.

Motivation and Objectives

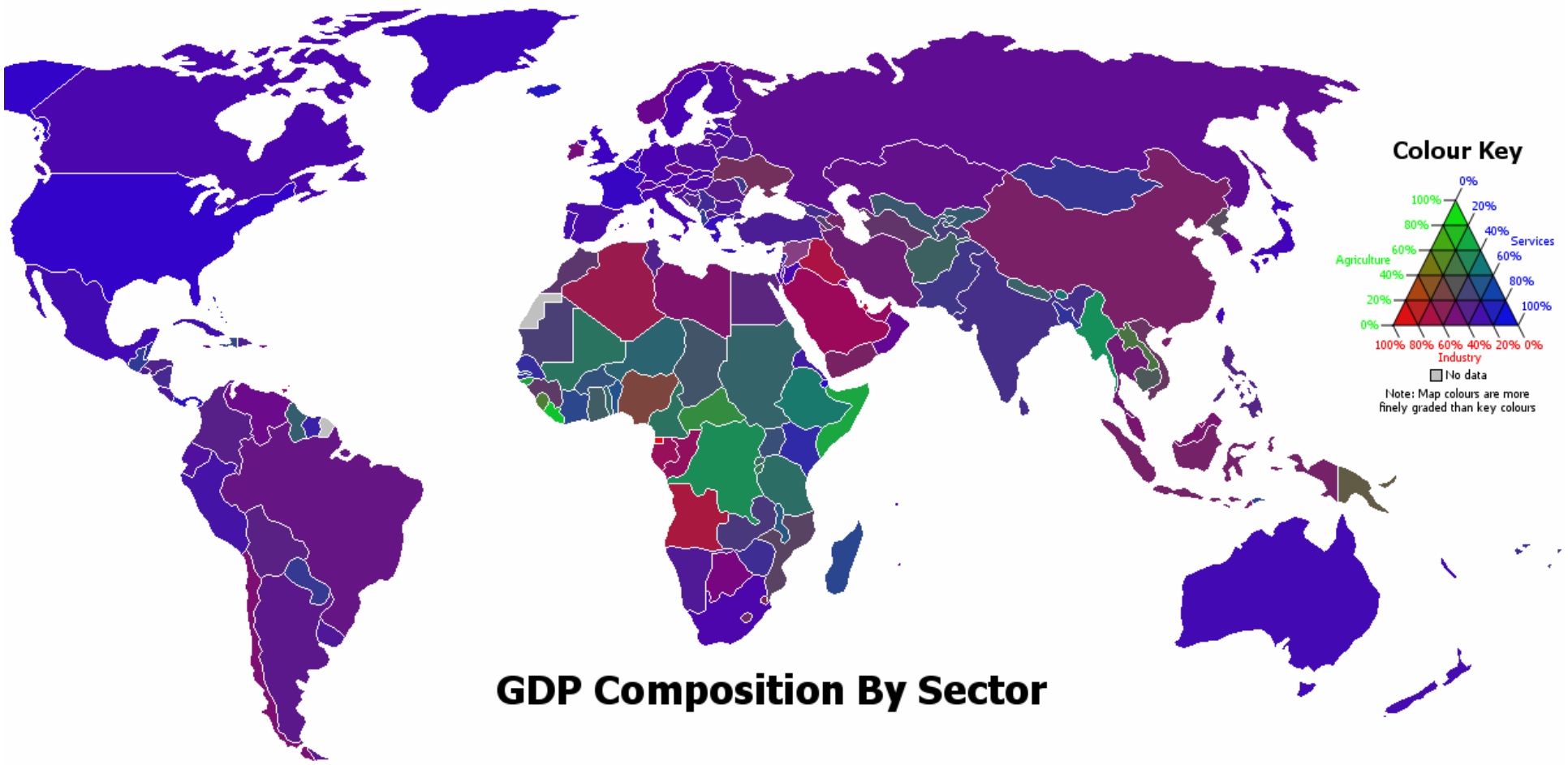
Towards a "Service Science"



Source: Cusumano, Michael A. 2005. *The Business of Software*. Compiled by FRI.

Motivation and Objectives

Towards a “Service Science”



GDP Composition By Sector

Motivation and Objectives

Towards a "Service Science"

Services are important

- Governments as GDP growth depends on it
- Businesses as revenue and profit growth depend on it

A Service Reference Model as a basic conceptual infrastructure towards a "Service Science"

Motivation and Objectives

Towards a Service Reference Model

Motivation and Objectives

Towards a **Service** Reference Model

- Deed, act, or performance (Berry, 1980)
- An activity or series of activities… provided as solution to customer problems (Gronroos, 1990)
- All economic activity whose output is not physical product or construction (Brian et al, 1987)
- Intangible and perishable… created and used simultaneously (Sasser et al, 1978)
- A time-perishable, intangible experience performed for a customer acting in the role of co-producer (Fitzsimmons, 2001)
- A change in condition or state of an economic entity (or thing) caused by another (Hill, 1977)
- Characterized by its nature (type of action and recipient), relationship with customer (type of delivery and relationship), decisions (customization and judgment), economics (demand and capacity), mode of delivery (customer location and nature of physical or virtual space) (Lovelock, 1983)
- Deeds, processes, performances (Zeithaml & Bitner, 1996)

From "The Emergence of Service Science…",
J. Spohrer P. Maglio, IBM Almaden Research Center

Motivation and Objectives

Towards a Service **Reference Model**

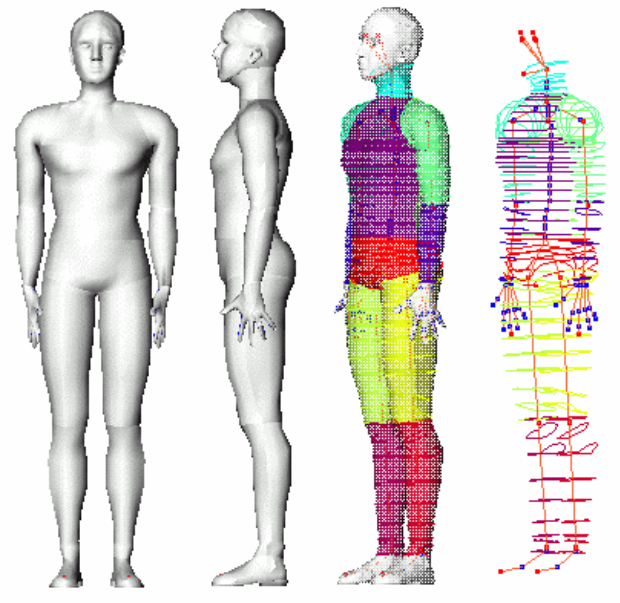
- A reference model is an abstract **framework** for understanding significant relationships among the entities of some environment…
- A reference model consists of a minimal set of unifying concepts, axioms and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations, or other concrete details…
- A reference model is not directly tied to any standards, technologies or other concrete implementation details. It does seek to provide a common semantics that can be used unambiguously across and between different implementations…

(from OASIS SOA RM CS)

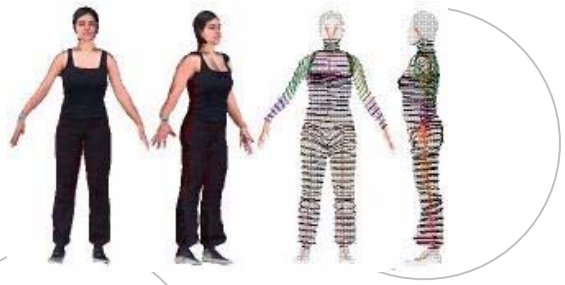
Motivation and Objectives

Towards a Service **Reference Model**

The Reference Model

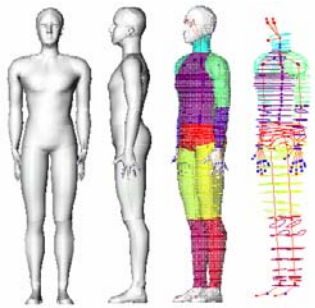


Its Instances

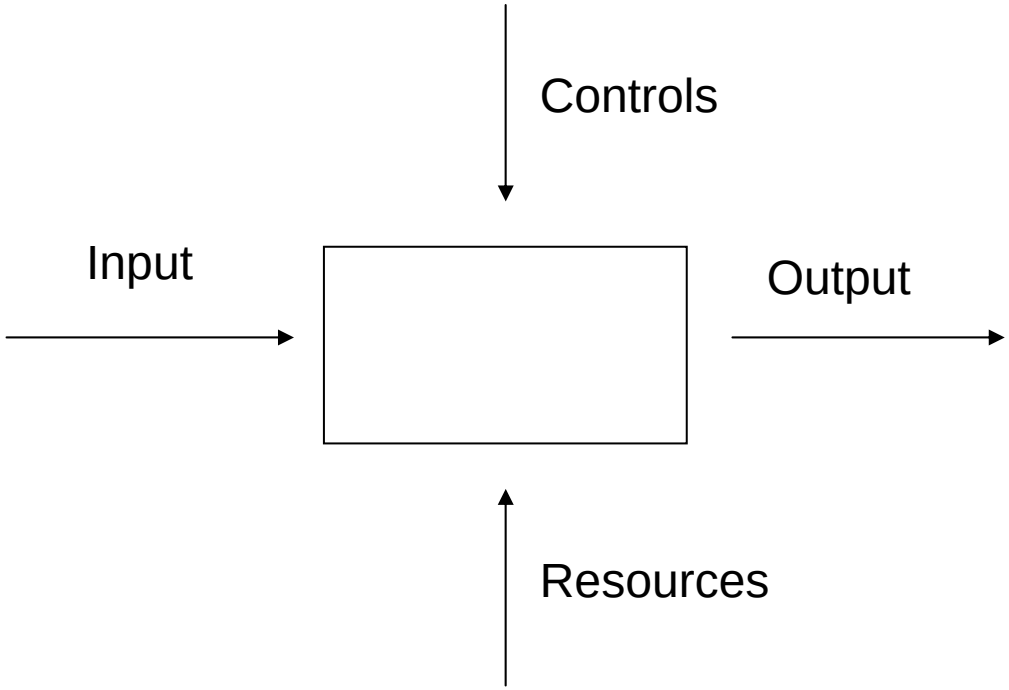


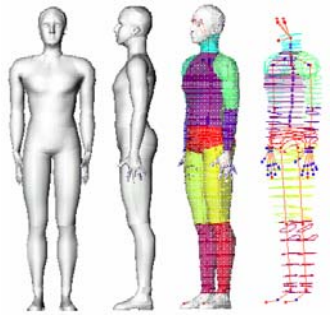
Towards a Reference Public Administration (PA) Service Model

The GEA PA Service Model

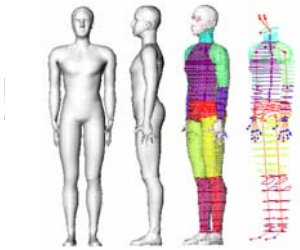


The GEA PA Service Model





GEA PA Service Model

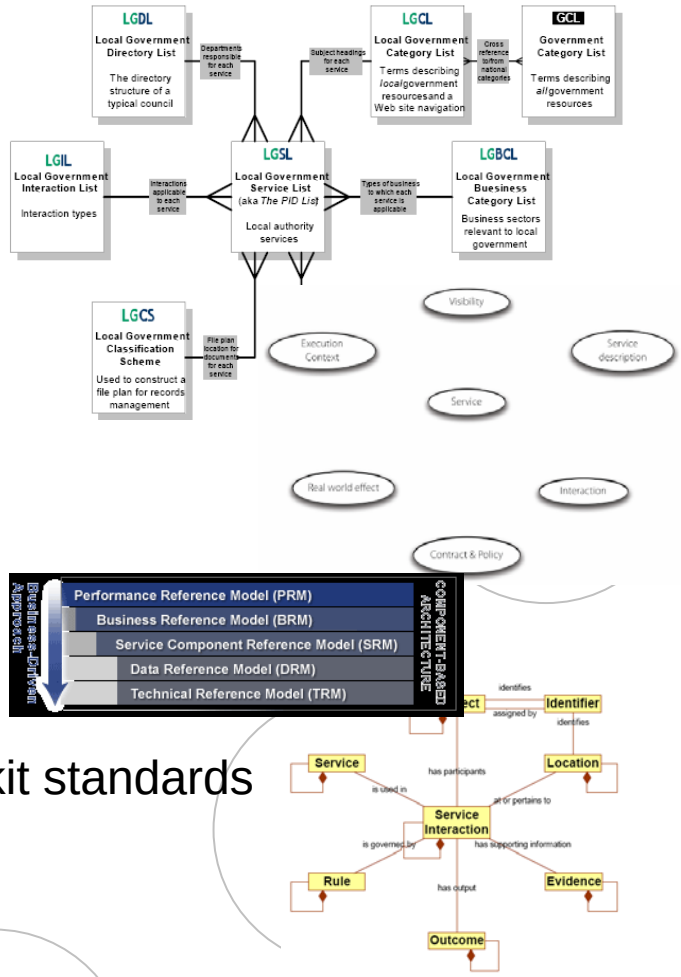


Driving License Service Model

Towards a Reference Public Administration (PA) Service Model

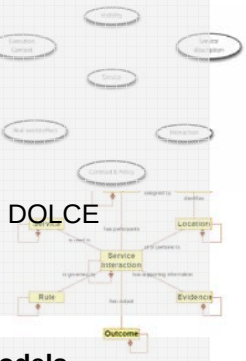
Indicative list of relevant initiatives

- Generic service models explicitly or implicitly described
  - OASIS SOA RM
  - Open Group Service Model
  - WSMO Service Model
  - OWL-S service model
  - Core Ontology of Service from DOLCE
  - …
- PA domain specific service models, for example
  - UK EGov Metadata Standards, GCIM and esd-toolkit standards
  - US Federal Enterprise Architecture
  - GEA PA Service Model
  - …

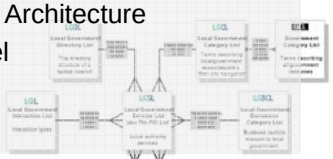


Towards a Reference Public Administration (PA) Service Model

Generic service models
- OASIS SOA RM
- Open Group Service Model
- WSMO Service Model
- OWL-S service model
- Core Ontology of Service from DOLCE
- …



PA domain specific service models
- UK EGov Metadata Standard
- US Federal Enterprise Architecture
- GEA PA Service Model
- …

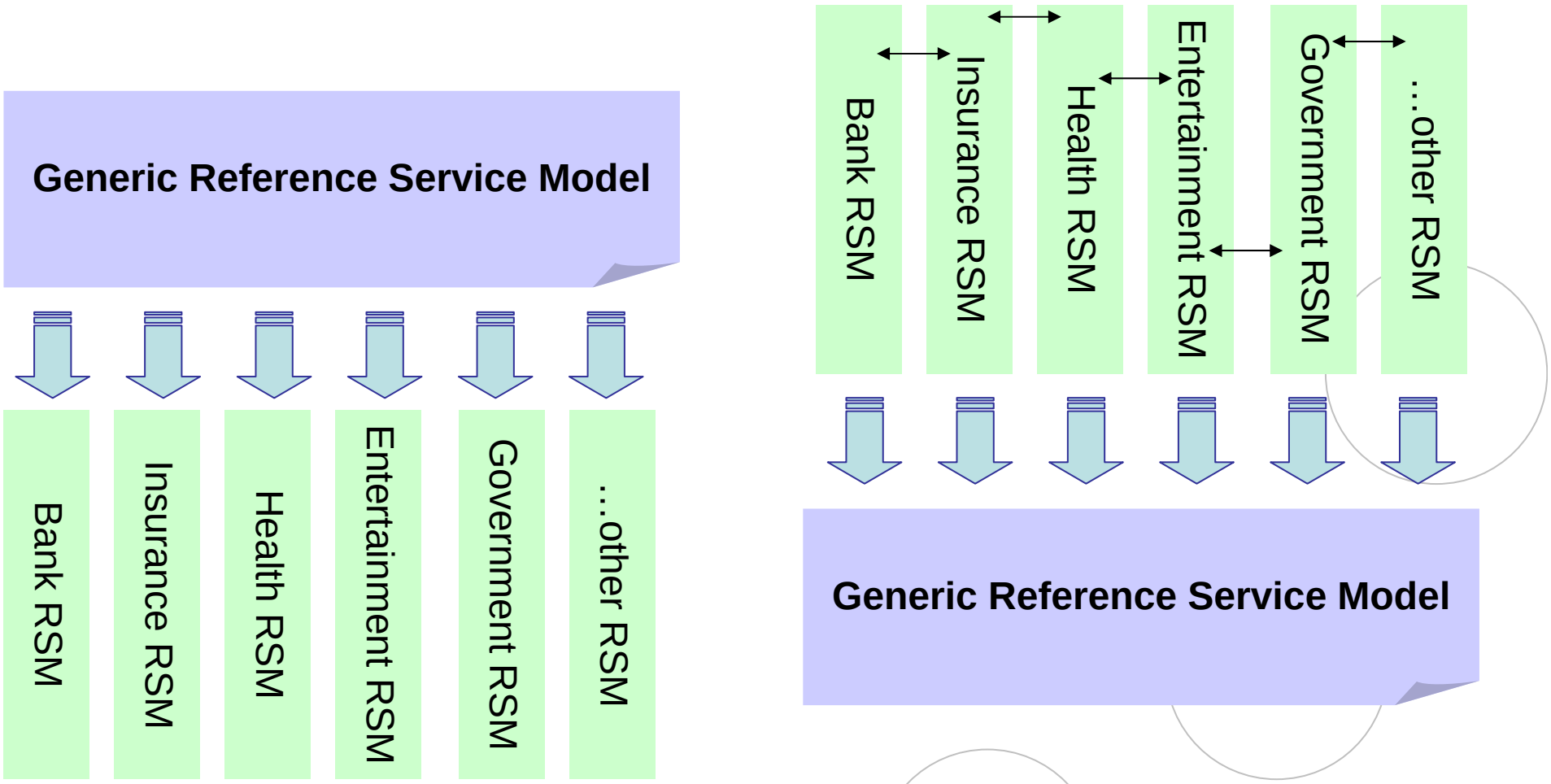


Other relevant experience
- …

Project / Working Group/ (?)

PA Reference Service Model

Towards a Reference Public Administration (PA) Service Model



What to do with a Reference PA Service Model

- Document your PA services (e.g. for providing relevant information to citizens/businesses)
- Better understand your own services (e.g. How many services need the BoD evidence?)
- Create visual representations of your services
- Reuse it as a template to save effort during the systems analysis phase
- Use it as a common language and communication tool, especially bridging the gap between “technical” and “business” staff
- Use it as an example for developing Reference Service Models to other domains
- Use it as an infrastructure to develop Semantic Web and Semantic Web Services – based applications and systems

Use it as an infrastructure

for Semantic Web Services

WSMO-PA:
Using the GEA Service Model to instantiate WSMO

Overview

- WSMO + GEA Service Model = WSMO-PA
  - instantiation of GEA in WSMO
- SemanticGov Architecture
  - reference implementation of WSMO-PA

Objectives and Requirements

- Goal: Develop Integration Architecture for e-Government Services Based on Semantic Technology
  - E-government services are subject of integration
  - Model for e-government services needs to be:
    - **Semantic Aware (formal semantics)**
    - **Public Administration Aware**

- Underlying Concepts:
  - WSMO: Semantic Service Model (led by DERI)
  - GEA: Service Model for Public Administration (led by CERTH)

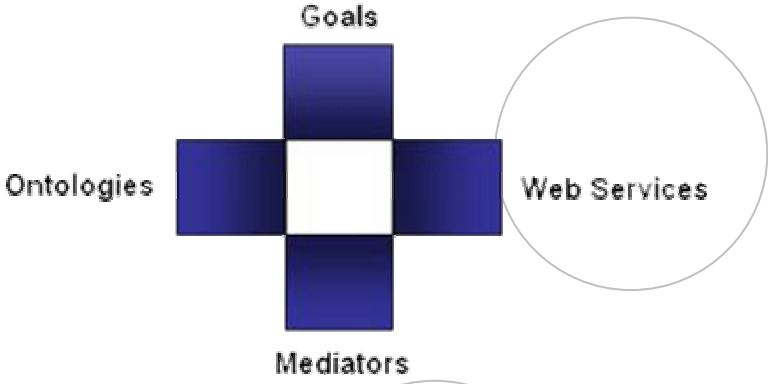
⇒ **WSMO-PA: Semantic and Formal Model for E-Government Services**

Objectives and Requirements

- Benefits of Semantics for e-Government
  - Increasing Automation of Integration of e-government services (both run-time and design-time)
    - E-government service usage process
  - Service Identification
    - Finding approapriate services for clients‘ needs
  - Service Discovery and Composition
    - Which Administrative Levels and which PA provide the service?
  - Service Execution
    - Complex workflows spanning accross multiple PAs to be executed and monitored
  - Service Interoperability
    - Interoperability issues in cross-country or cross-region integration

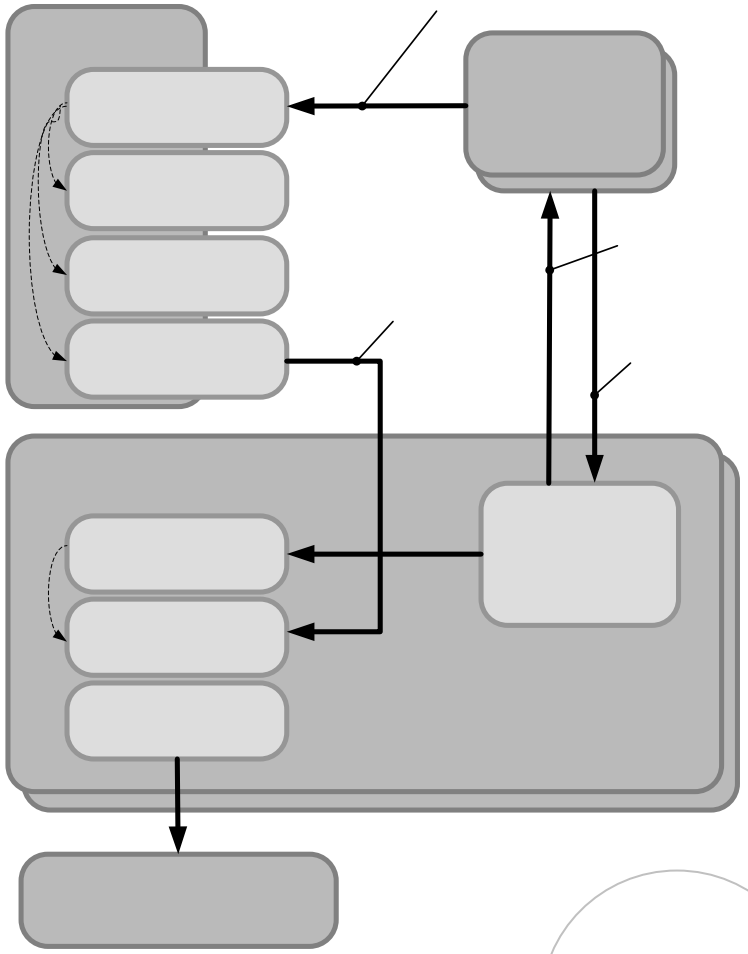
Background Concepts: WSMO, WSML, WSMX

- Semantic Web Services in DERI
  - SWS: WSMO, WSML, WSMX
    - community Effort driven by DERI
    - EU FP6 and national funding



- Web Service Modelling…
- … Ontology -> **WSMO**
  - Conceptual model for SWS: goal, ontologies, mediators, services
- … Language -> **WSML**
  - Ontology Language for SWS
  - WSML Variants: WSML Core, WSML DL, WSML Rule, WSML Full
- … Execution Environment and Architecture -> **WSMX**
  - Middleware platform for SWS
  - Now in OASIS SEE TC

WSMO Service, WSMO Ontology and WSDL



WSMO Service

Ontologies

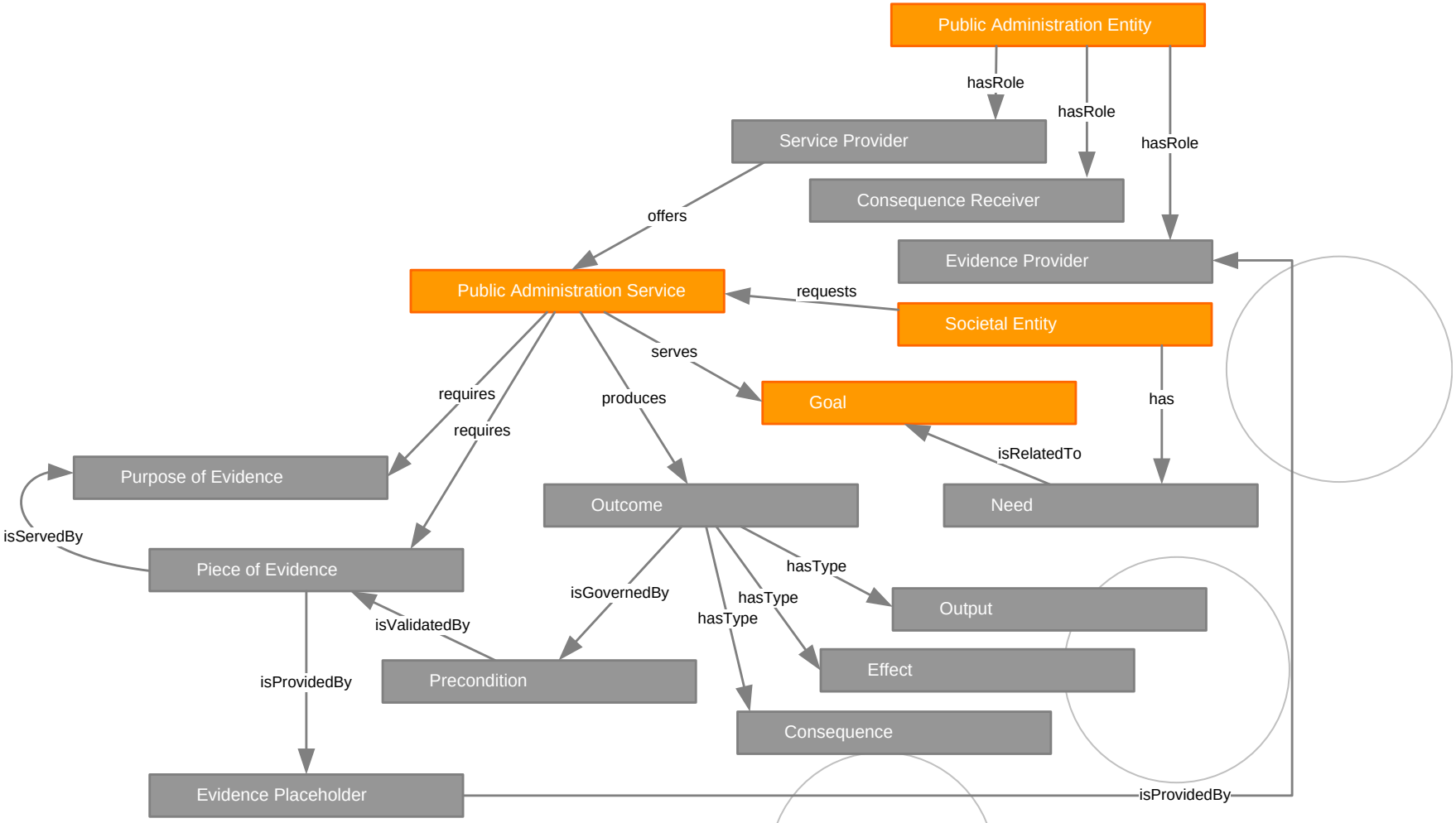
Non-Functional

Functional

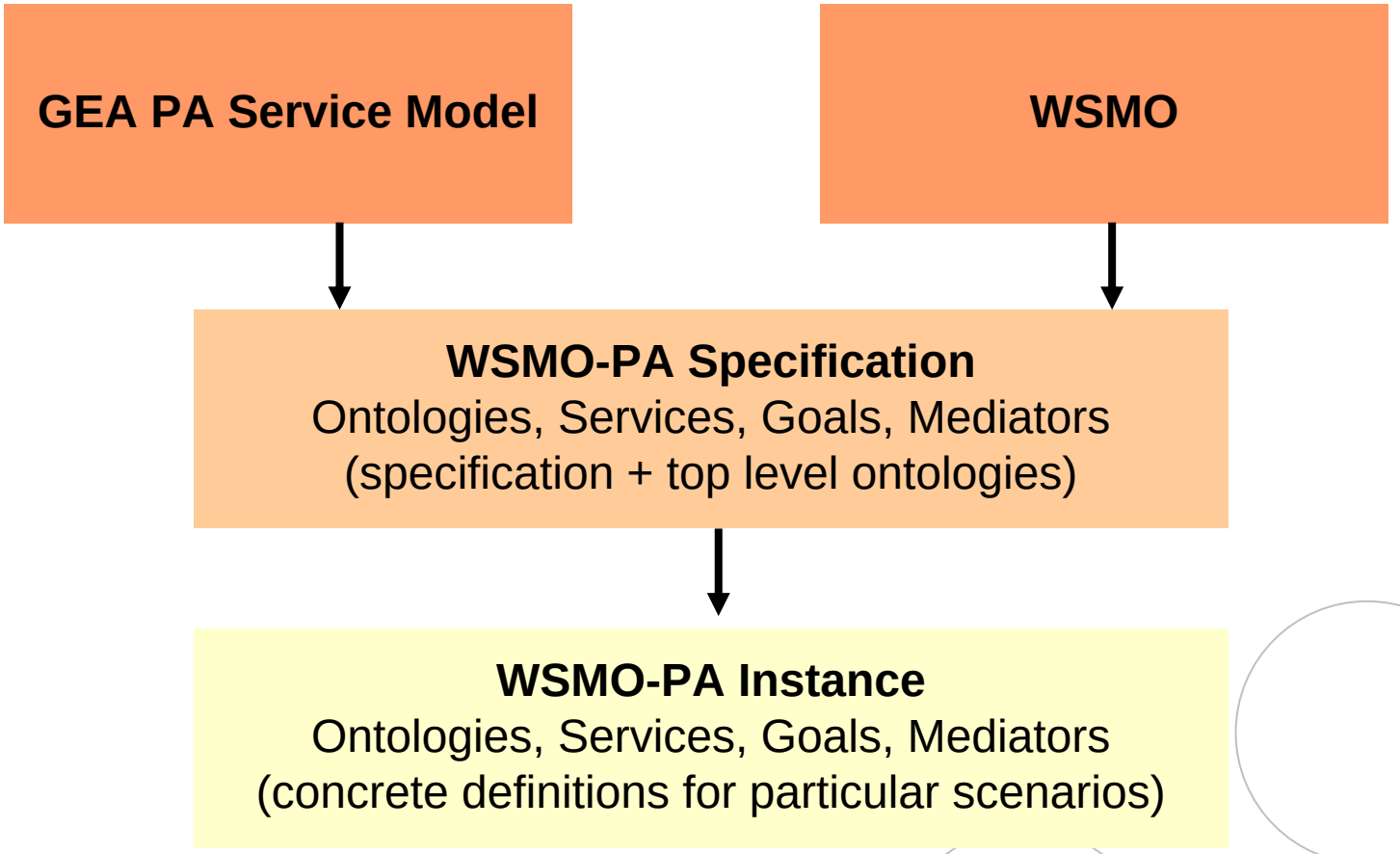
Ontolo

Grounding
(concepts
and messa

Background Concepts: GEA PA Service Model

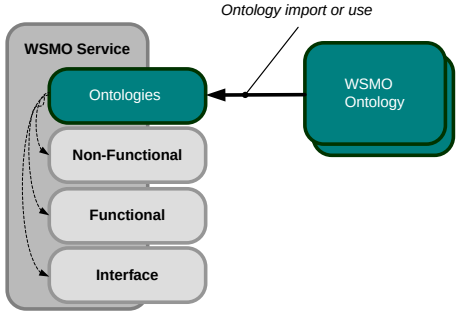


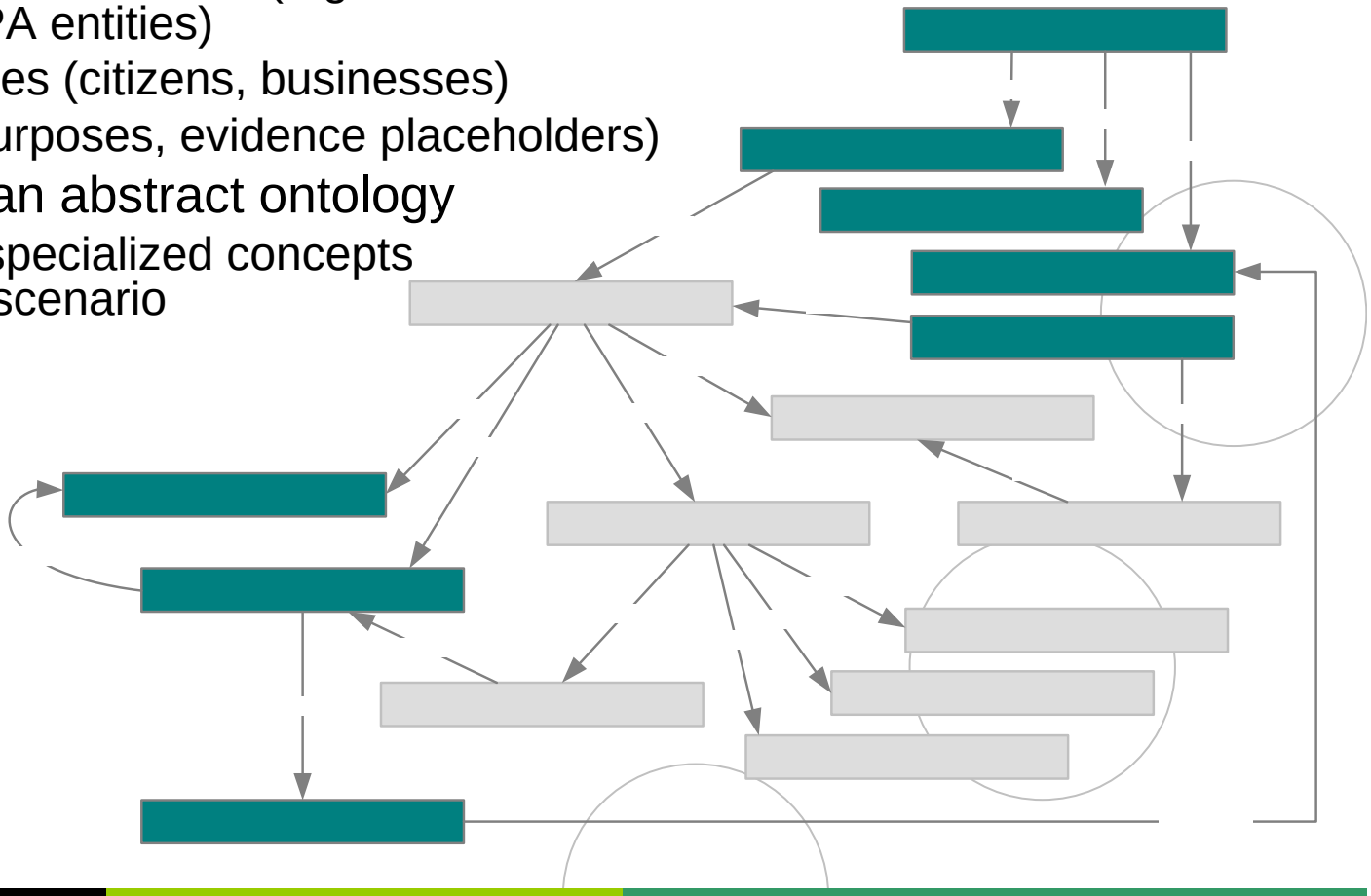
WSMO-PA Overview



WSMO Ontology

- Modelling of…
  - PA Entities and their roles (e.g. classification ontology for PA entities)
  - Societal Entities (citizens, businesses)
  - Evidences (purposes, evidence placeholders)
- Idea is to have an abstract ontology
  - Modelling of specialized concepts for particular scenario





WSMO Ontology – Example

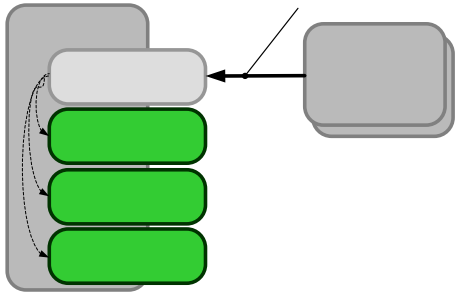
- Example of a Driving Licence Evidence Placeholder Concept

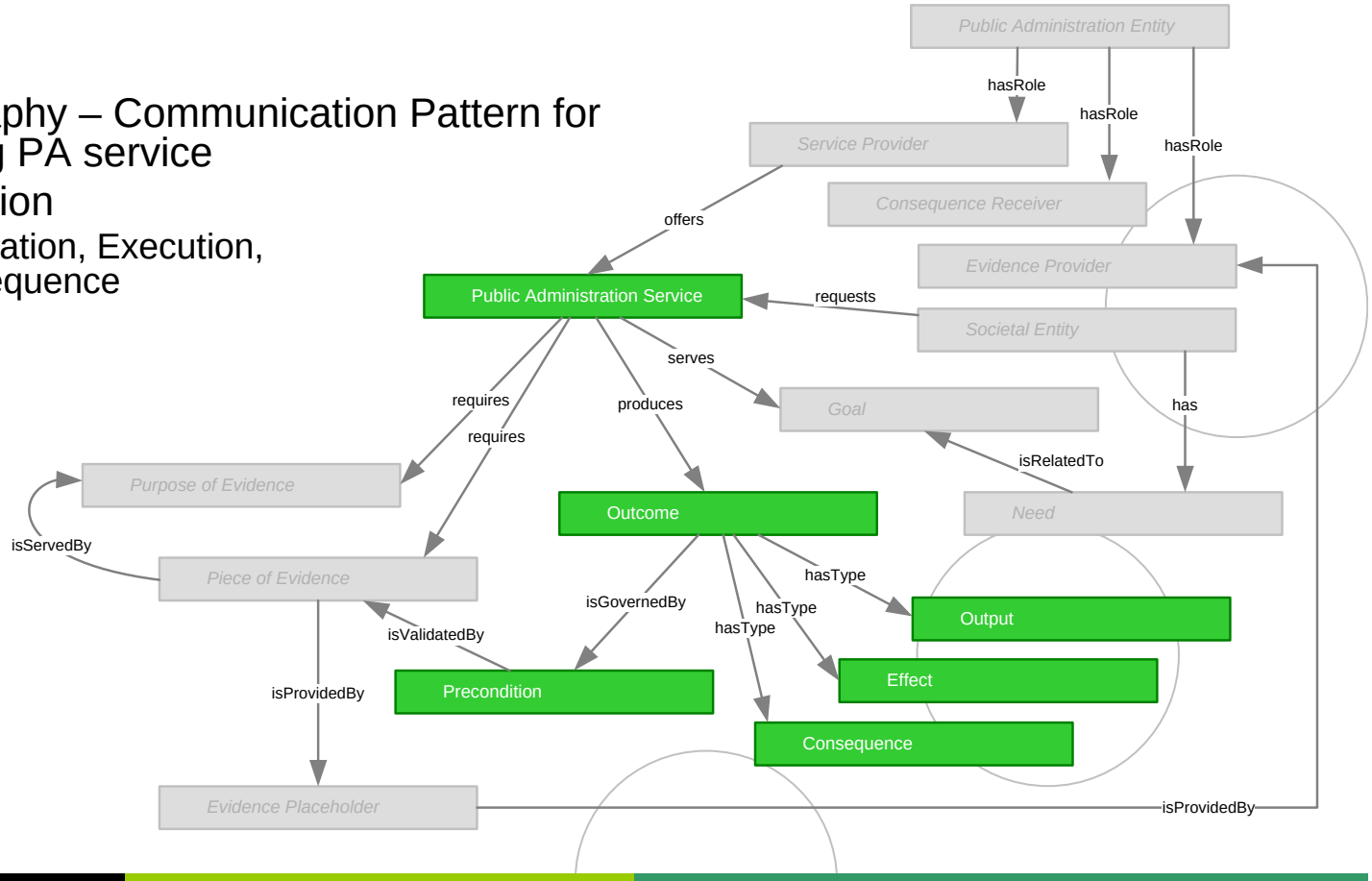
concept DrivingLicense **subConceptOf** *GEA_Evidence_PlaceHolder*

ownerName **ofType** foaf#name
ownerAddress **ofType** (1 1) gk#Address
ownerBirthDate **ofType** (1 1) _date
ownerBirthPlace **ofType** (1 1) gk#Location
issuingPlace **ofType** (1 1) gk#Location
issuingDate **ofType** (1 1) _date
issuingAuthority **ofType** (1 1) LegalEntity
expirationDate **ofType** (1 1) _date
driverLicenseUniqueId **ofType** (1 1) _string
category **ofType** (1) Category
notes **ofType** (1) _string
isValid **ofType** (1 1) _boolean

WSMO Service

- WSMO Service modelled as PA Service
  - Capabilities modelled using preconditions, outputs effects
  - Interfaces
    - Choreography – Communication Pattern for consuming PA service
    - Orchestration
      - Verification, Execution, Consequence

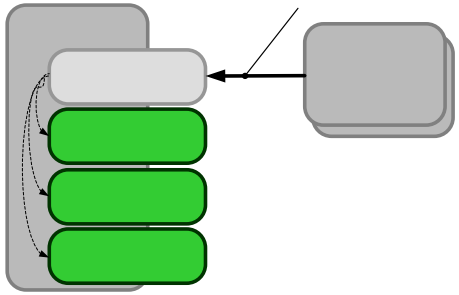


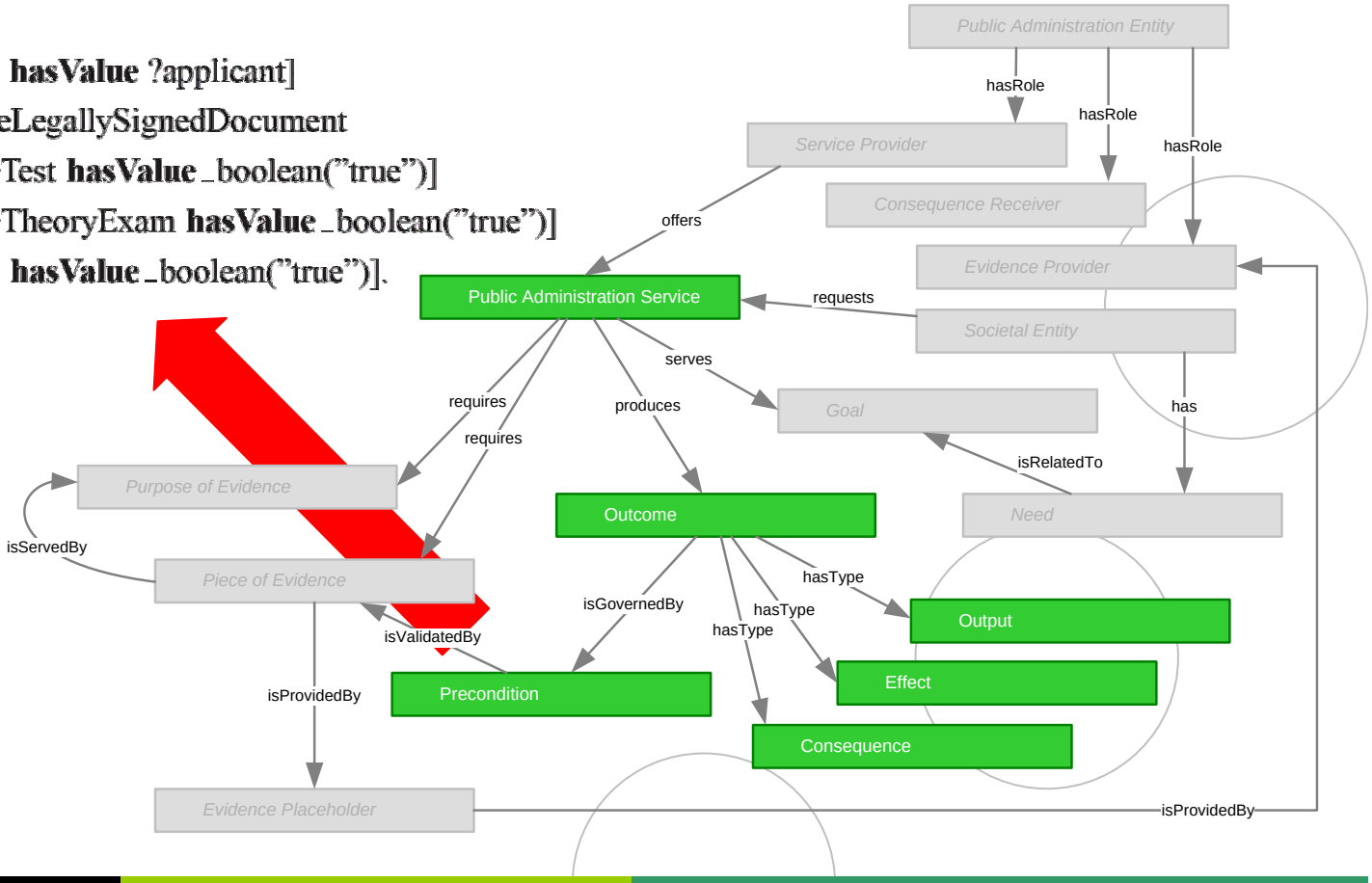


WSMO Service – Example

- Example of a precondition for a Driving License Service

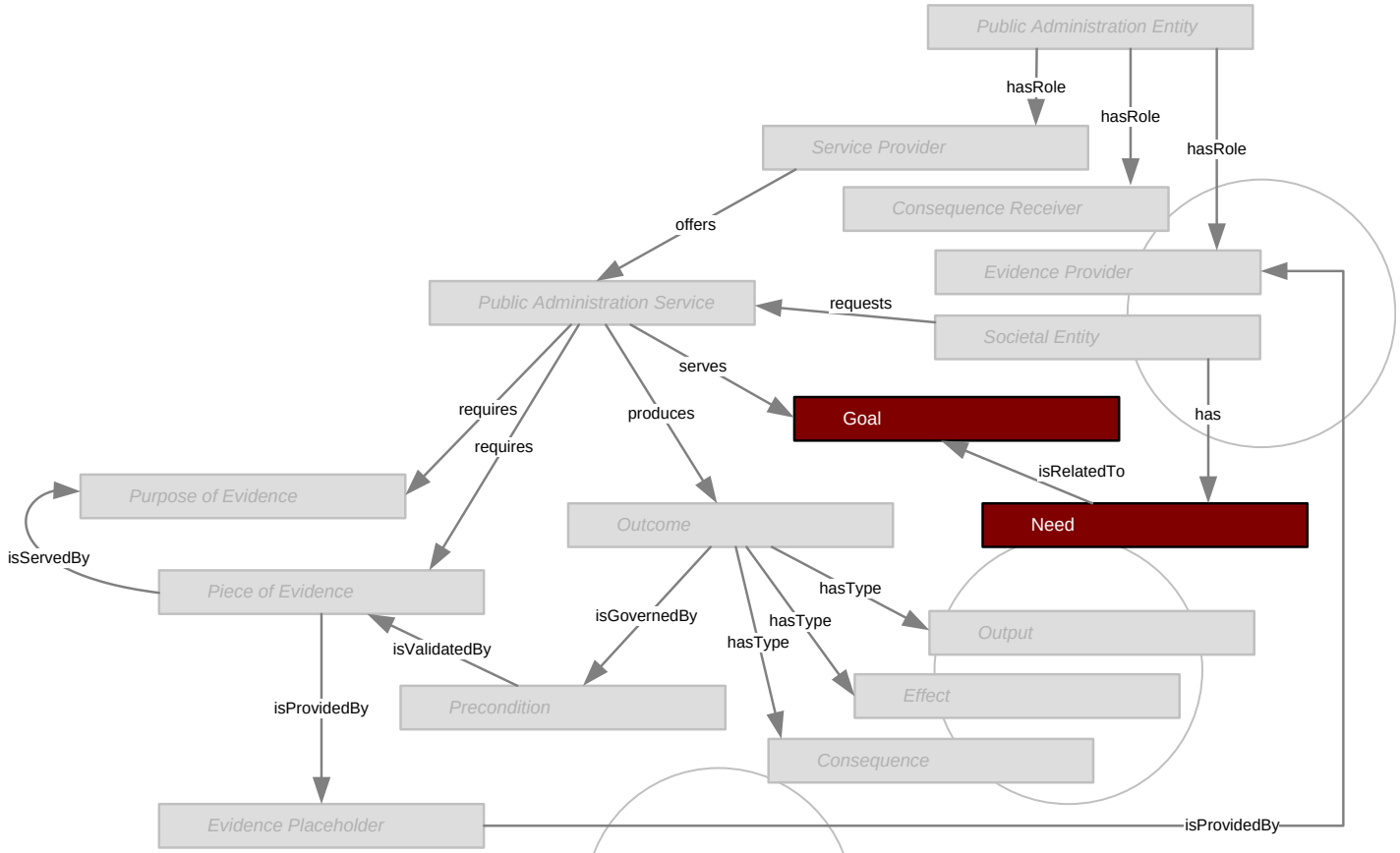
precondition checkPassDriveTests
definedBy
?applicantSignedDoc[signedby **hasValue** ?applicant]
memberOf dlo#DrivingLicenseLegallySignedDocument
and ?applicant[hasPassedDriveTest **hasValue** _boolean("true")]
and ?applicant[hasPassedDriveTheoryExam **hasValue** _boolean("true")]
and ?applicant[hasGoodHealth **hasValue** _boolean("true")].





WSMO Goal

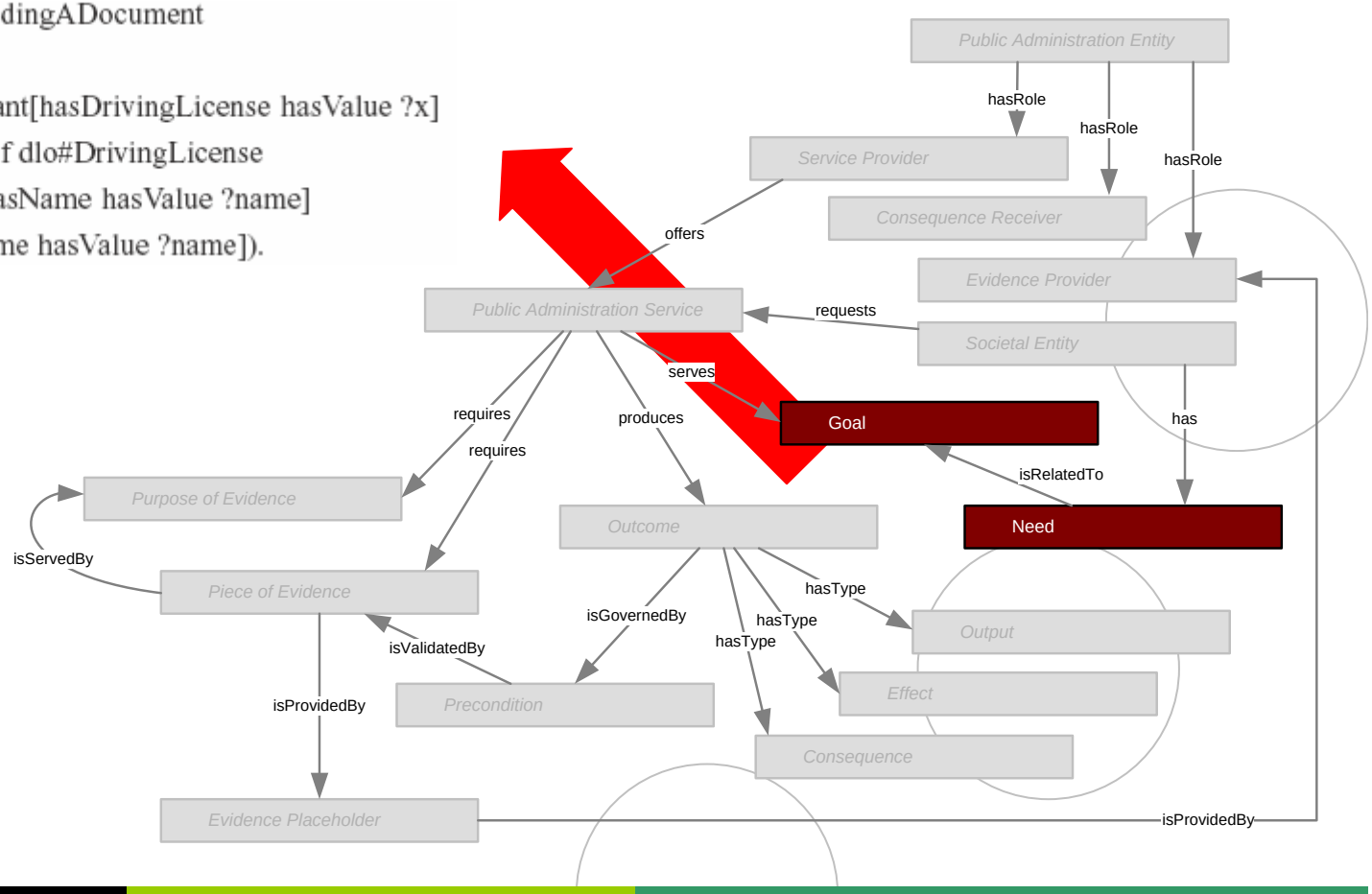
- WSMO Goal modelled as Goal from PA Service Model
  - Informal needs to be transformed to formal WSMO Goals



WSMO Goal - Example

- Example of a postcondition for a Driving License Goal

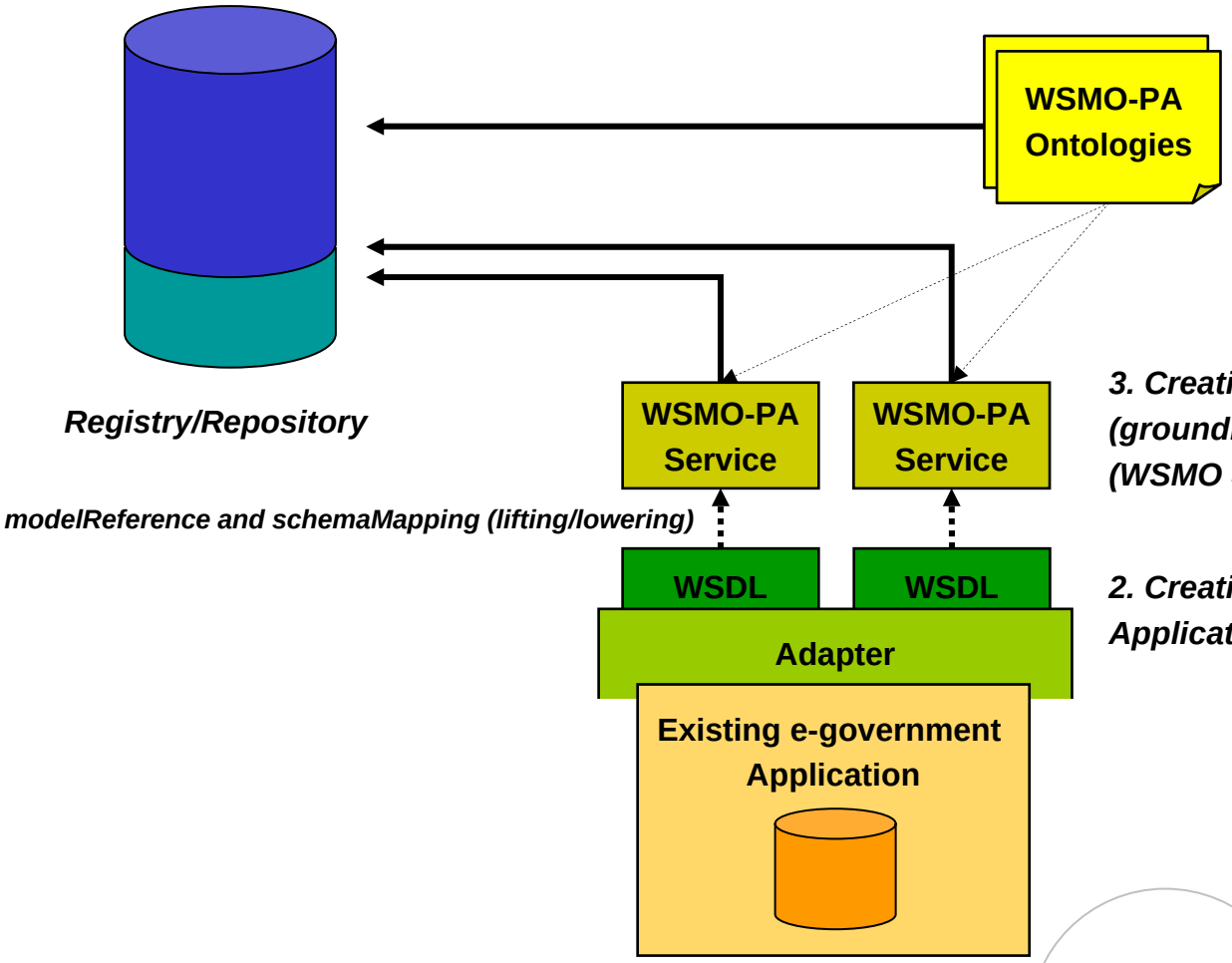
```
postcondition NeedingADocument
 definedBy
  exists ?x(?applicant[hasDrivingLicense hasValue ?x]
  and ?x memberOf dlo#DrivingLicense
  and ?applicant[hasName hasValue ?name]
  and ?x[ownerName hasValue ?name]).
```



WSMO Mediator

- No corresponding concepts in GEA PA Service Model
- Mediators used to overcome interoperability issues
  - Data Interoperability (OOMediator)
  - Process Interoperability (WWMediator)

Semantic E-Government Services Creation

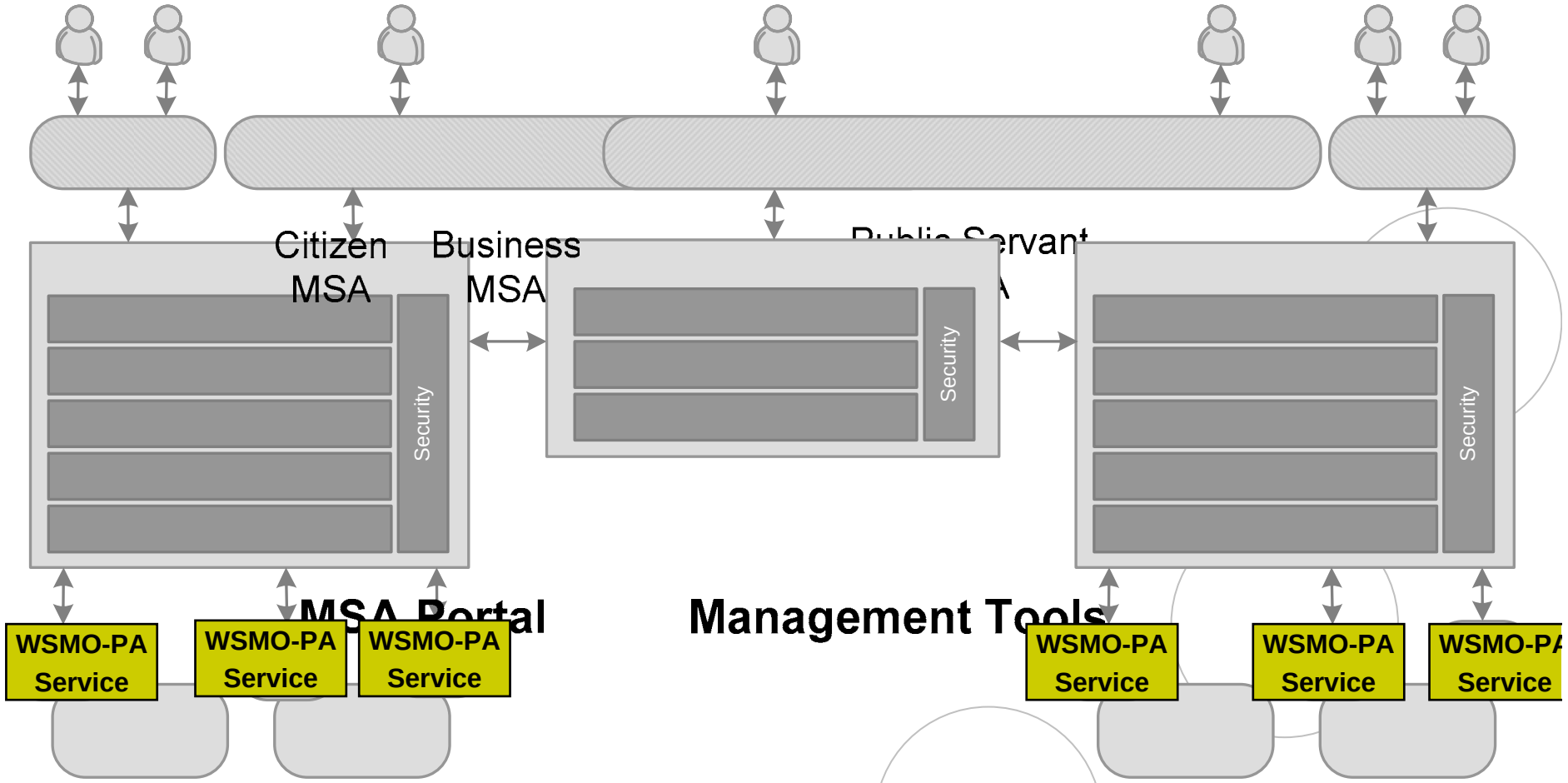


1. Creating PA Ontologies (WSMO Studio, WSMT)

3. Creating WSMO-PA services (grounding WSMO-PA to WSDL) (WSMO Studio, WSMT)

2. Creating WSDL services from existing Applications (Legacy Integrator)

Global View on SemanticGov Architecture



Conclusion and Future Work

- WSMO-PA – underlying specification for the architecture for e-government systems based on semantic technologies
- Based on concepts of GEA PA Service Model and WSMO

- Develop/customize tools for WSMO-PA editors
  - Text, visualization tools (based on WSMT)
- Develop the SemanticGov Architecture

References

- Xia Wang, Goudos S., Peristeras V., Vitvar T., Mocan A., Tarabanis K., *WSMO-PA: Formal Specification of Public Administration Service Model on Semantic Web Service Ontology*, 40th HICSS, 4-10 Jan. 2007, Hawaii
- Peristeras V., Goudos S., Vitvar T., Mocan A., Tarabanis K., *Towards Semantic Web Services for Public Administration based on the Web Service Modeling Ontology (WSMO) and the Governance Enterprise Architecture (GEA)*, 5th EGOV International Conference, DEXA 2006, Krakow, Poland.
- Peristeras V., Loutas N., Tarabanis K., *Semantic Interoperability in Pan-European Public Services*, 40th HICSS, 4-10 Jan. 2007, Hawaii
- Peristeras V., Tarabanis K., *Reengineering the public administration modus operandi through the use of reference domain models and Semantic Web Service technologies*, Proceedings of the 2006 AAAI Spring Symposium on The Semantic Web meets eGovernment (SWEG), Mar. 27-29, 2006, Stanford University, CA, USA
- Peristeras V., Tarabanis K., *The Governance Enterprise Architecture (GEA) Object Model*, in Maria A. Wimmer (Ed.) Knowledge Management in Electronic Government, 5th IFIP International Working Conference, KMGov 2004, Krems, Austria, May 27-29 2004 Proceedings. LNCS 3035, Springer 2004, pp. 101-110

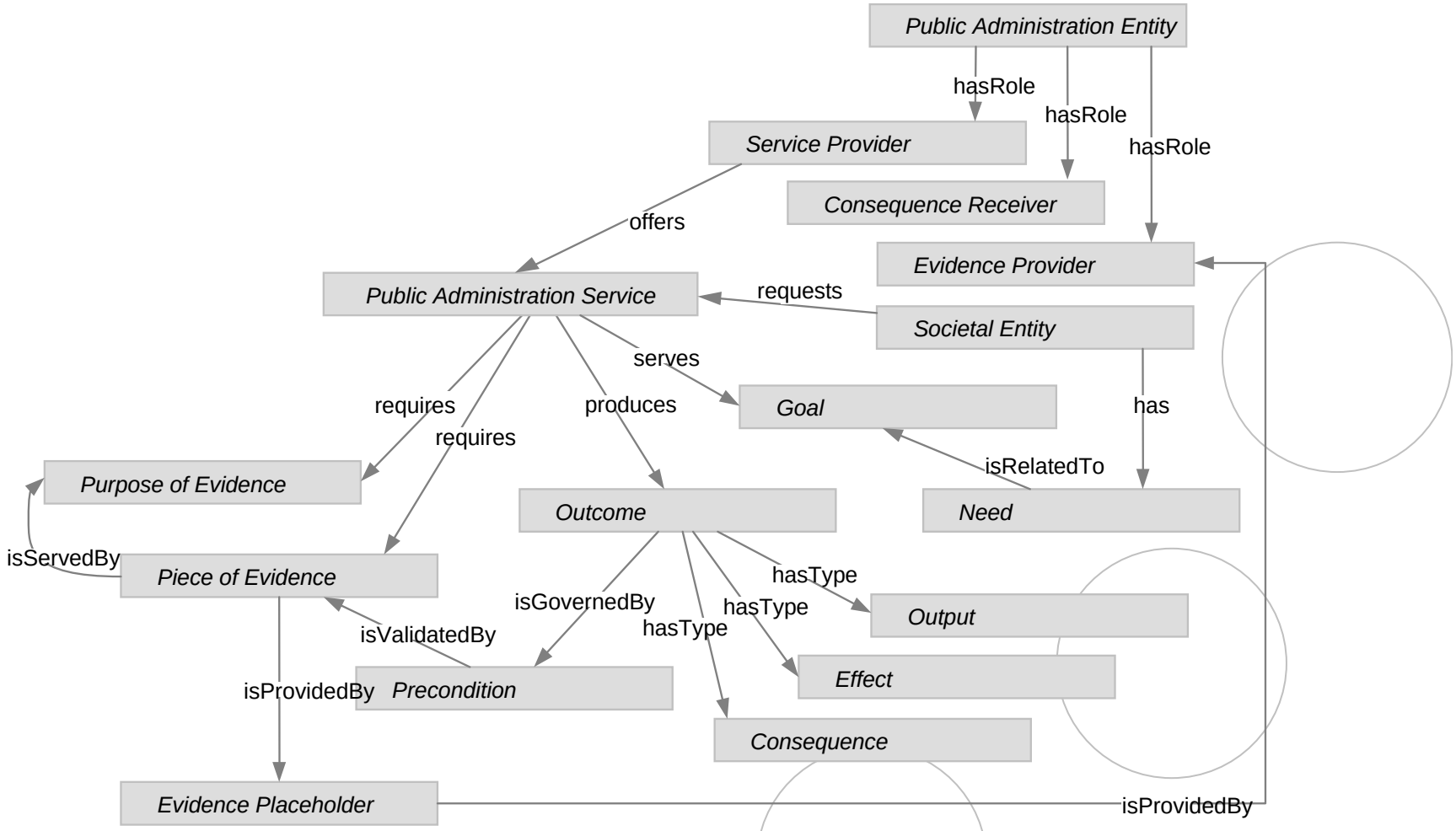
WSMO-PA: Towards a generic PA Service Model

Vassilios Peristeras Maciej Zaremba

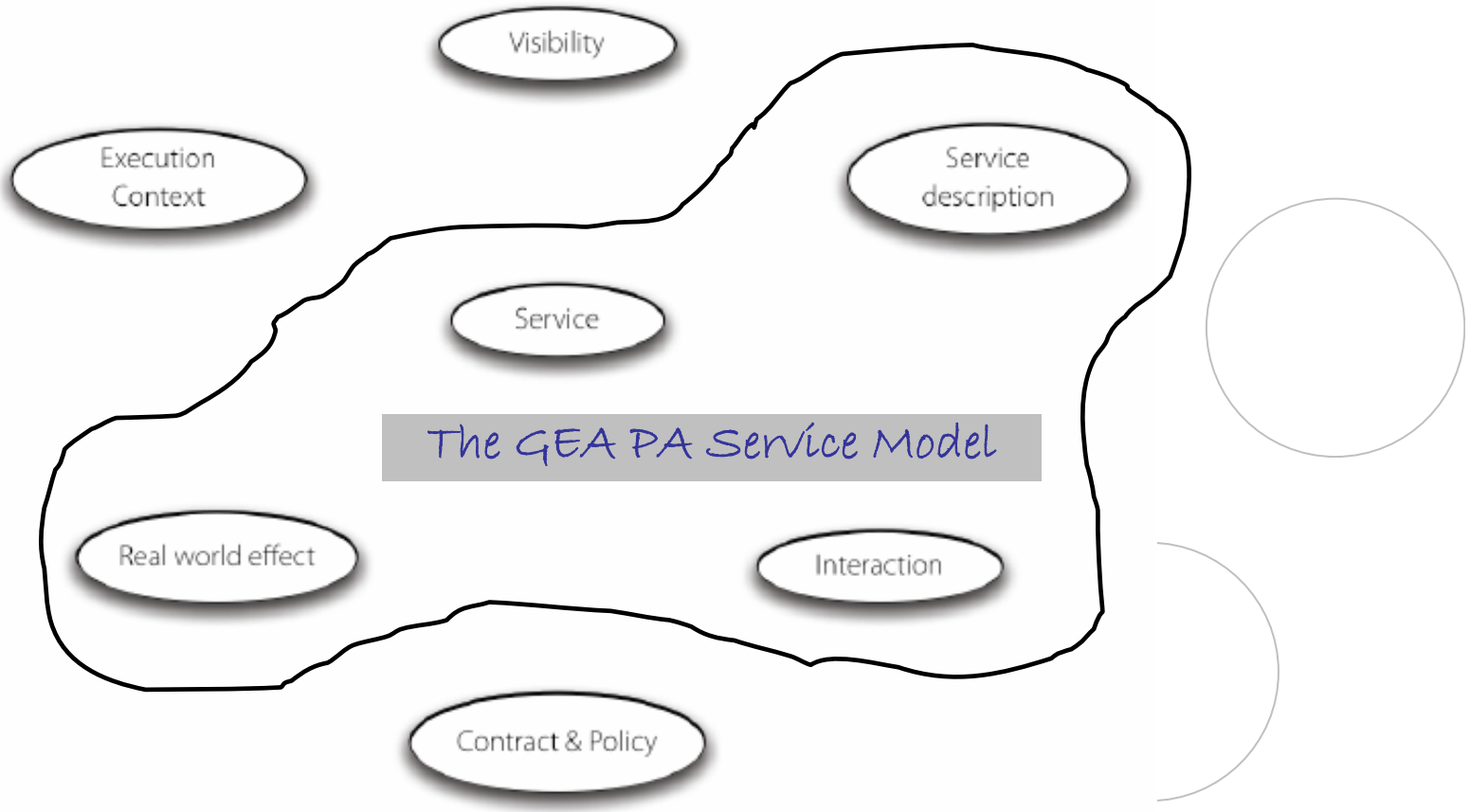
firstname.lastname@deri.org

European W3C Symposium on eGovernment
Febrauary 1-2, 2007, Gijon, Spain

GEA PA Service Model



Motivation and Objectives



PA Service Model