Center for Advanced Studies of Rome

SPCoop: Semantic Integration of Italian eGovernment Services

Guido Vetere, IBM Center for Advanced Studies of Rome

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Outline

- **Background: services interoperability in Europe and Italy**
- **Italian Public Application Cooperation System (SPCoop)**
- **SPCoop Issues and Evolution**

Background: Europe

- **European Union**
  - 2003: **interoperability** recognized as the key condition to developing pan-European eGovernment services by the European Commission (under Italian Presidency)
  - Interoperable Delivery of European eGovernment Services to public Administrations, Business and Citizens (IDABC) EC Work Programme underway (2005-2009)
  - A **European Interoperability Framework** (EIF) recognized as a necessary condition
  - EIF focuses on recommendations and defining generic standards with regard to **organizational, semantic and technical aspects of interoperability**
  - EIF requires each Member State to define a **Government Interoperability Framework** (GIF).

Background: Italy

- **1997 RUPA (Rete Unitaria della Pubblica Amministrazione)**
  - Transport layer
  - Functions
    - Mail
    - File transfer
    - Security
    - Monitoring
  - Interoperability: CORBA \ DCOM
- **2005 SPC (Sistema Pubblico di Connettività)**
  - As above
  - Interoperability: Web Services
    - eGov SOAP envelop
- **2005 SPCoop (Sistema Pubblico di Cooperazione)**
  - Application Cooperation Layer on SPC
  - Functions
    - Federated Identity
    - Personnel and Organizations directories
  - Semantic Interoperability

Italian eGovernment: the Semantic Turn

- **1997**
  - Central Government (CNIPA) starts designing RUPA
  - Operational an functional Interoperability
  - Focus on middleware
- **2002**
  - Local Government: PEOPLE project
  - Local services standardization
  - Focus on models (UML)
- **2005**
  - SPC set to replace RUPA
  - More focus on semantics (after EU recommendations)
  - Central Government: CNIPA issues the document ‘Naming Conventions and Semantics for SPC’
- **2006**
  - Italian Minister for Innovation and Public Administration recommends (semantic) data integration
  - CNIPA-ASSINFORM Work Group: ‘Ontologies and Semantics for Public Administration’
  - SPCoop Requirements include semantic annotations and semantic search on WS registry (SICA)
- **2007**
  - SPCoop SICA public tender won by IBM
  - First release on February 2008

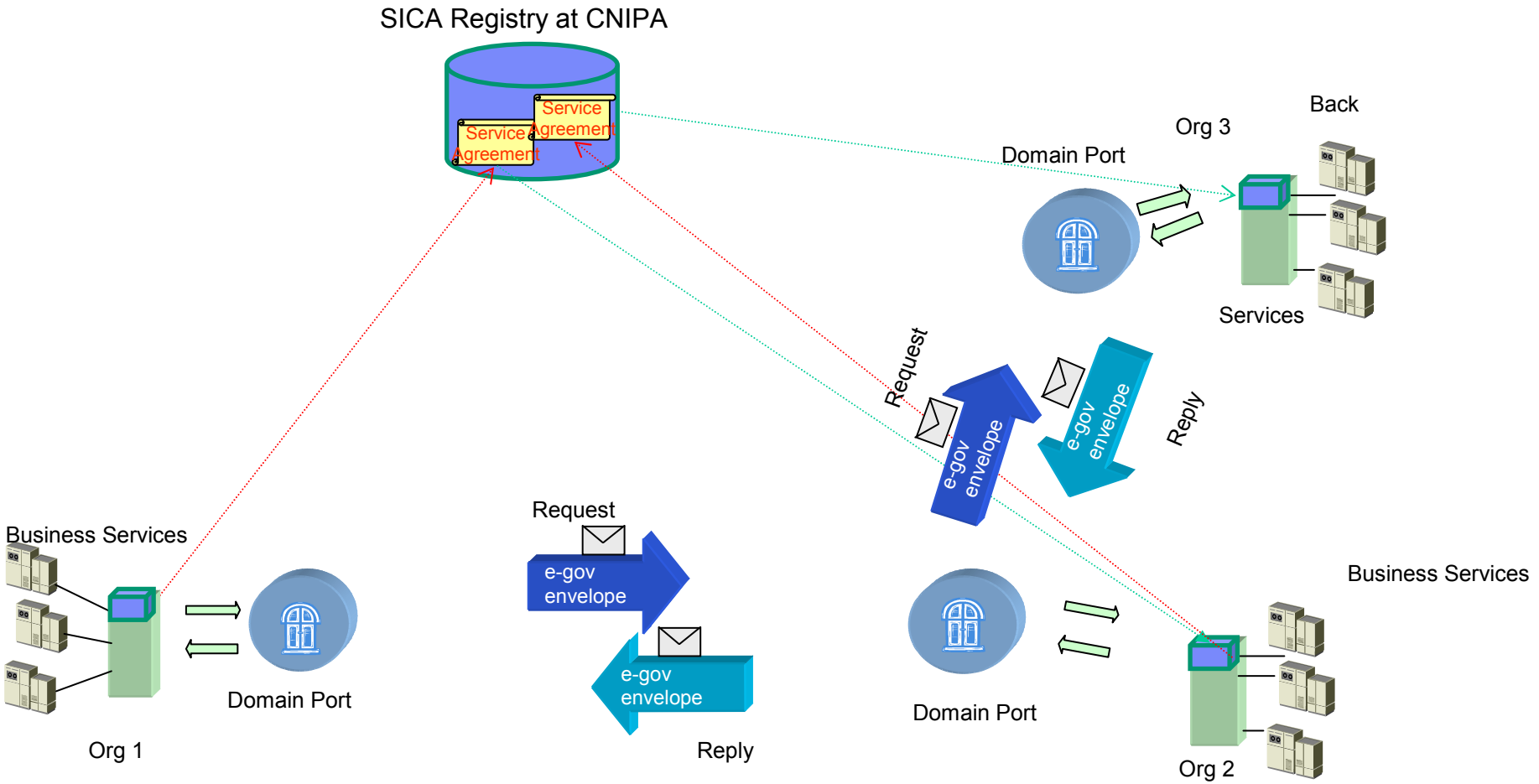
Semantic Turn – Expected Benefits

- **Short term**
  - Featured services repository (beyond UDDI)
  - Support semantic annotation
- **Medium term**
  - Support semantic integration
  - Reuse of conceptual schemas
  - Harmonization of conceptual schemas
- **Long term**
  - Reduction of cross-organization cooperation costs
  - Increase of quality and number of public services
  - Reduction of administrative burdens
  - Integrated access to public data

SPCoop Basics

- **Principles**
  - Organizational independency
  - Backward compatibility
  - Local responsibility for services and data
- **Elements**
  - WS Qualified Endpoints (eGov SOAP envelope)
  - Central Registry
- **Service agreements (accordo di servizio)**
  - SLAs
  - (Annotated) WSDL-XSD Schemes
  - Semantic Specs (Ontologies)
  - Service Behavior Specs
  - Documentation (Text)

SPCoop Service Oriented Architecture



Support for Semantic Annotations in SPCoop

- **Service Agreements (as for semantics is concerned)**
  - Each org specify service semantics by annotating schemes with respect to some (arbitrary) ontology
  - Annotated schemes are managed and searched centrally by way of a semantic enabled registry (SICA)
- **Ontologies**
  - No ‘semantic standards’ available yet
  - Working Group ‘Ontology & Semantics’ at CNIPA underway
- **SICA Registry & Repository**
  - IBM to develop a management\query system for SAWSDL (W3C) annotated schemes
  - OWL and (fragment of) UML supported as ontology languages
  - Basic semantic search functions to be delivered shortly
  - A Scientific Committee to envisage evolutionary scenarios

<xsd:simpleType name=“CodiceFiscale”>
sawsdl:modelReference="http://cnipa.it/ontologies/Fisco#CF">
<xsd:restriction base="xsd:string"/>

</xsd:simpleType>

<wsdl:interface name=“CodiceFiscaleLookupService”>

<wsdl:operation name=“CFLookup"
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sawsdl:modelReference="http://cnipa.it/ontologies/Utilities#LookupServices">

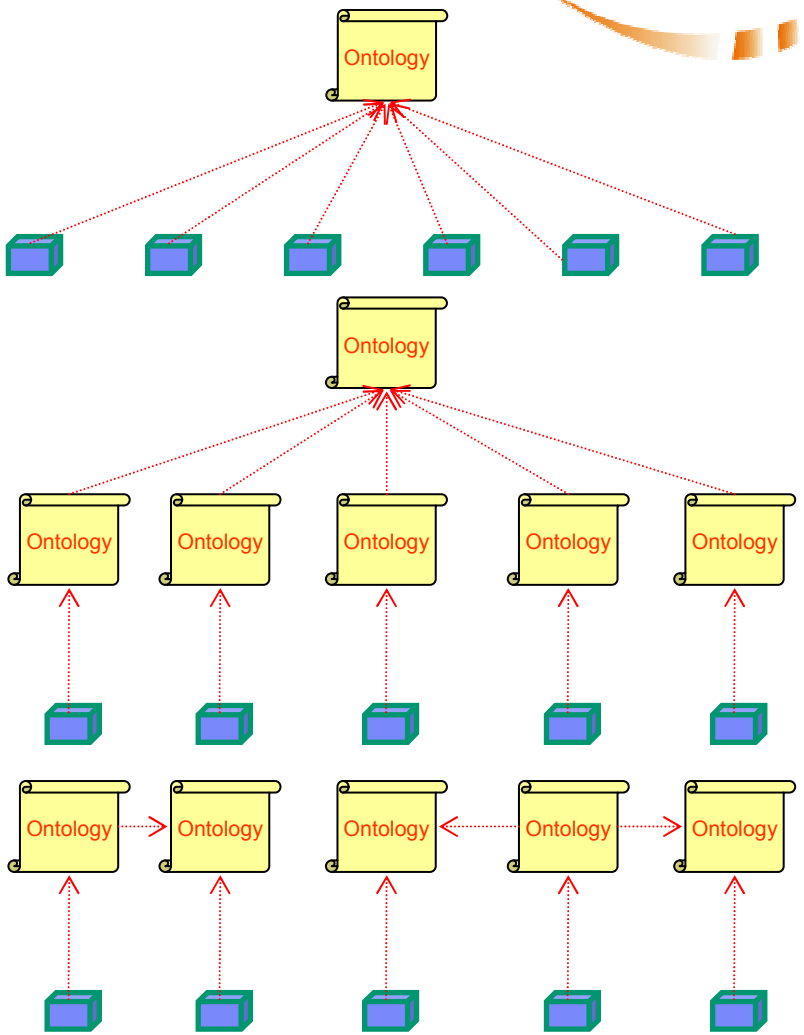
<wsdl:input element="CFLookupServiceRequest"/> <wsdl:output element=“CFLookupServiceResponse"/>

</wsdl:operation>

</wsdl:interface>

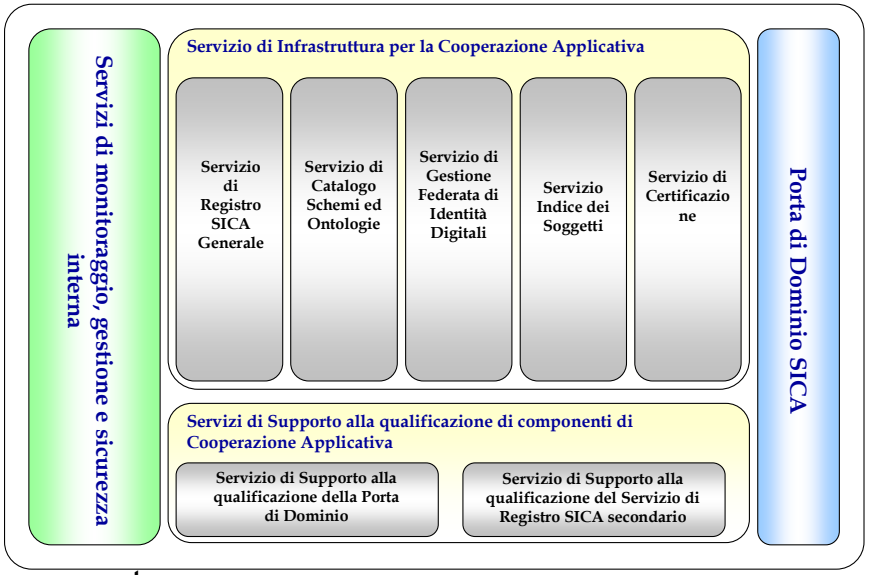
Ontologies in SPCoop

- **SPCoop 'agnosticism'**
  - Does not enforce any service-to-ontology mapping geometry
  - Does not require standard ontologies
  - Does not tell how ontologies could be mapped the one another, if they are mapped at all



The SICA Registry

- **Crawl, Walk, Run approach**
- **February 2008**
  - Service Agreement Lifecycle
    - Activation
    - Subscription
    - Dismission
  - Basic semantics
    - Declared inclusion dependencies
  - Ontology versioning
    - Deprecation (fine grained)
  - Ontology browsing
    - Concept retrieval
    - Inclusion\Role navigation
  - Basic semantic query functionalities
    - Retrieve services\data-types related to a concept
    - Atomic queries



Semantics in SPCoop - Issues

- **Modeling \ Annotation**
  - Modeling felt as overhead
  - Skill shortage
  - Lack of immediate rewarding
- **Central \ Local Governance**
  - No regulatory ontologies available so far (need of both political and technical guidelines to build them)
  - ‘Bottom up’ attitude (existing XML Schemas promoted at the rank of ontologies)
  - No reasonably viable automatic ontology mapping (need to take semantics seriously)
- **Slow adoption**
  - Few real services available so far
  - Need of dissemination and education programs

SPCoop Evolution

- **A Scientific Committee will drive SPCoop evolution**
  - Advisory Board
  - Support dissemination and education
  - Depict future scenarios
- **Possible directions**
  - eGov Top Level Ontology
    - People, Geopolitical Entities, Organizations, Roles, Processes, Services, Administrative Acts, etc
    - Ontologies reconciliation
    - Specify semantic constraints for annotations
      - E.g. Operations ✦ Process, Data Type ✦ Entity, etc
  - Support ontology-to-ontology mapping (beyond OWL)
  - Support schema-level queries
    - E.g. select all the (classes of) services that people with roles $R^1 \ldots R^n$ can access
  - Data Exchange
    - Generate, test, deploy transformation code
  - Data Integration
    - Map existing directories with eGov Ontology and get concept-based access to them
    - Integrate data services
  - Implement mediation services (e.g. service bus)

Conclusion

- **Semantic Turn driven by political institutions**
  - European Commission
  - Italian Central and Local Government
- **Formal standards for semantics (almost) in place**
  - Industrial and Open Source Tools available
  - SPCoop in synch with state of the art
- **Ontological analysis about to start**
  - 'Authoritative' Top Level Ontology to be delivered
  - Extensive conceptualizations could be built incrementally on solid foundations
  - Semantic standardization
- **Adoption is an issue**
  - Disseminate, educate, encourage
  - Promote local actions
- **Research needed to get more value out of SPCoop**
  - Generate transformation code
  - Provide support to services composition \ orchestration
  - Integrate data-oriented services
  - …

Thanks

Backup

SAWSDL

- **Semantic Annotation on WSDL (SAWSDL) is a recent (8/07) W3C standard**
- **SAWSDL "*focuses on semantically annotating the abstract definition of a service to enable dynamic discovery, composition and invocation of services*"**
- **Two extension attributes for WSDL and XML schemes**
  - **Model Reference** *to specify the association between a WSDL or XML Schema component and a concept in some semantic model*
    - Interfaces and Data Types mapped to concepts
  - **Schema Mapping** *that are added to XML Schema element declarations and type definitions for specifying mappings between semantic data and XML*
    - lifting schema mappings *lift* data from XML to a semantic model
    - lowering schema mappings *lower* data from a semantic model into an XML structure

WSMO Editor