



# Enterprise **C**ollaboration & **I**nteroperability



***COIN Workshop: Collaboration and Interoperability Services in the  
COIN system: a scientific approach***

***The COIN Generic Service Platforms Federation for Enterprise  
Interoperability / Collaboration service provision***

**Aachen, June 21<sup>st</sup> 2010**

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# The COIN Vision & Motto



**COIN VISION:** *“By 2020 enterprise collaboration and interoperability services will become an invisible, pervasive and self-adaptive knowledge and business utility at disposal of the European networked enterprises from any industrial sector and domain in order to rapidly set-up, efficiently manage and effectively operate different forms of business collaborations, from the most traditional supply chains to the most advanced and dynamic business ecosystems.”*

**COIN MOTTO:** *“Enterprise Interoperability and Enterprise Collaboration are the two sides of the same COIN”*



# The COIN Integrated Project

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<b>Project No:</b>	216256
<b>Project Full Name:</b>	Collaboration & Interoperability for Networked Enterprises
<b>Duration:</b>	48 months
<b>Start date:</b>	January 1 <sup>st</sup> 2008
<b>Partnership:</b>	27 partners, 16 countries
<b>Strategic Objectives:</b>	FP7 ICT-2007.1.3 - ICT in support of the networked enterprise FP7 ICT 2009.9.5 Supplements to strengthen cooperation in ICT R&D in an enlarged European Union
<b>Total Eligible Cost:</b>	16M EURO
<b>EC Contribution:</b>	11M EURO



# The COIN Consortium & Funnel Model

## Industrial Partners



## Academic & Research Partners



## User Partners



Filas



Finanziaria laziale di sviluppo



## EEU Partners





# The COIN Metaphore

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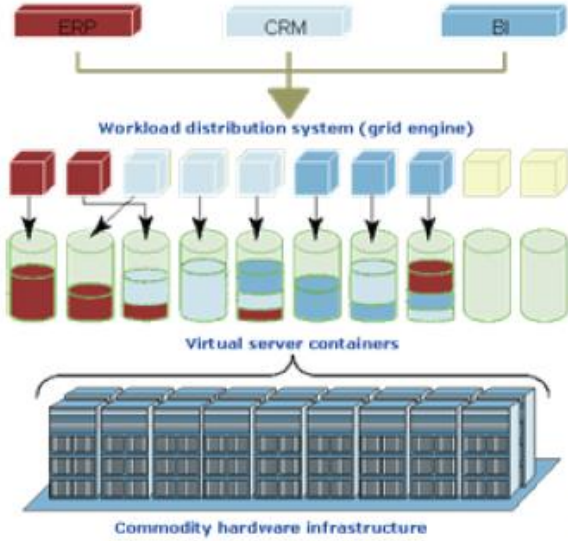
## **COIN MOTTO:**

***“Enterprise Interoperability and Enterprise Collaboration are the two sides of the same COIN”***

- The SIDE A of the COIN: Enterprise Interoperability***
- The SIDE B of the COIN: Enterprise Collaboration***
- The Substrate of the COIN: Service Platform***
- The Value of the COIN: Software as a Service-Utility SaaS-U***
- The Market of the COIN: Enterprise Networks (mainly SMEs)***

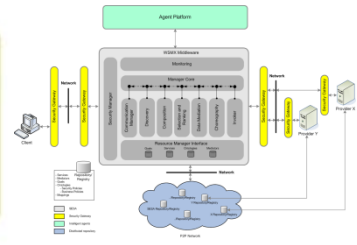


# COIN General Architecture



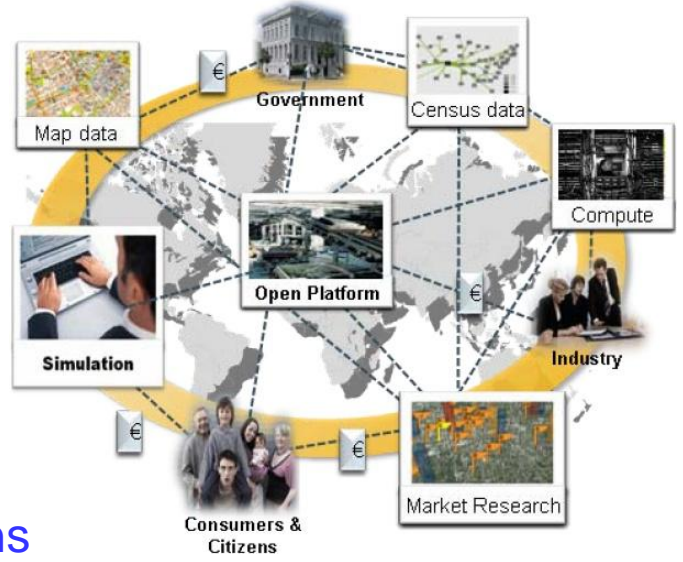
Service Parks  
(Cloud Computing)

Workload management, reporting and billing  
\$/CPUhr  
\$/GB  
\$/Gbps



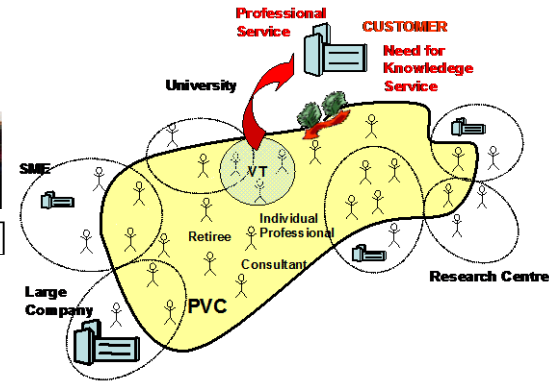
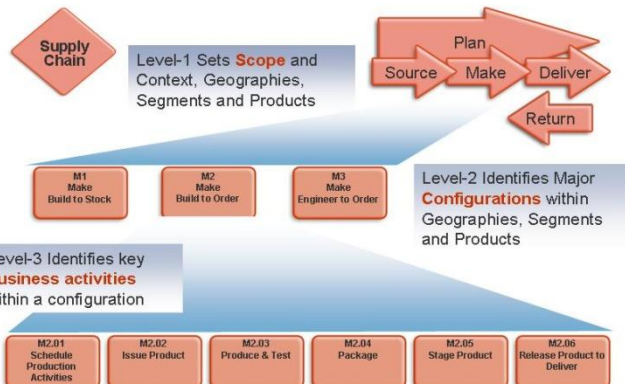
COIN  
E/EC Platform

Service Federations  
(incl. E/EC Service Platforms)  
INTERNET OF SERVICES



Service Galaxies  
(Billions of Services)

## ENTERPRISE COLLABORATIVE ENVIRONMENTS





# COIN and Cloud Computing IoS

## Data Storage

Utilize servers, storage, or network infrastructure via an Internet connection.

*"Infrastructure as a Service"*

Example: Amazon S3 Storage



Windows Azure Platform

## App Development

Design, develop, test, deploy and host applications on Web-based platforms.

*"Platform as a Service"*

Example: Google App Engine



## Applications

Use a Web browser as a platform from which to run Web-based applications and services.

*"Software as a Service"*

Example: Zoho.com



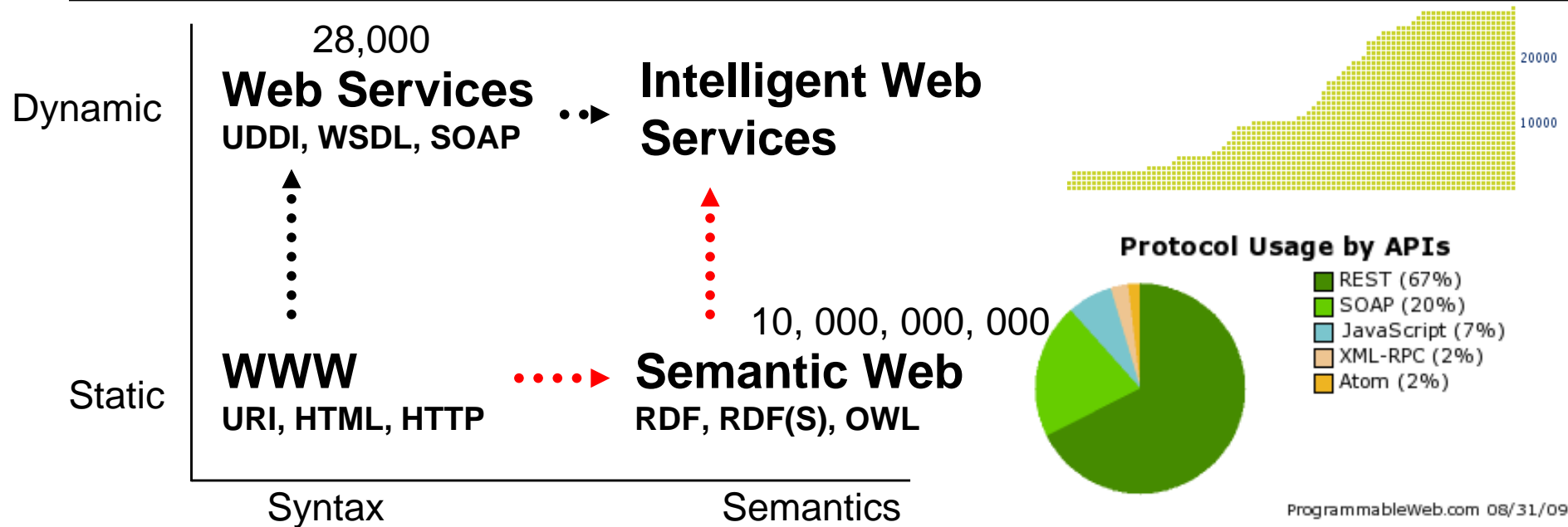
Source: Sebastian Muller, Google EU Policy Manager. The Future of Cloud Computing, DG INFSO D3, Bruxelles Jan 26th 2010

## COIN related Research Issues:

- ICT Commoditization: from Applications to Platforms, from Platforms to Infrastructure
- EI & EC services/platforms Value Added & Utility Services/Platforms (SaaS-U BModel)
- Platforms federations: IaaS & SaaS are already here, what about PaaS? In the FI?
- Service Delivery / Development Platforms / Platforms Interoperability



# COIN and Service Web IoS



## COIN related Research Issues:

- More powerful/expressive Service Description languages
- Semantic crawling & search engines for providers
- Need for easy-to-use development platforms (beyond delivery): Front-End, pro-sumers
- Long-lasting Service Level Agreements for Enterprises and Business Processes

### Tuesday 15 September 2009 PM welcomes Sir Tim Berners-Lee to Downing Street

The Prime Minister welcomed the creator of the World Wide Web, Sir Tim Berners-Lee, and Professor of Artificial Intelligence at the University of Southampton, Nigel Shadbolt, to Downing Street this morning.

Mr Berners-Lee and Mr Shadbolt presented an update to Cabinet on their work advising the Government on how to make data more accessible to the public.

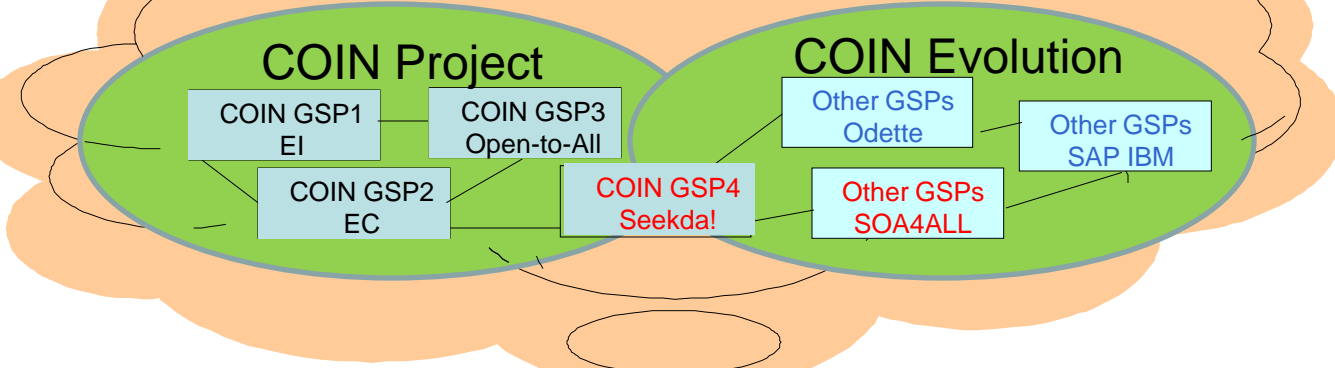
Gordon Brown has already spoken publicly about his aim of making the UK a world leader in opening up government information on the internet, an important element of [Building Britain's Future](#).







# The GSP Federation

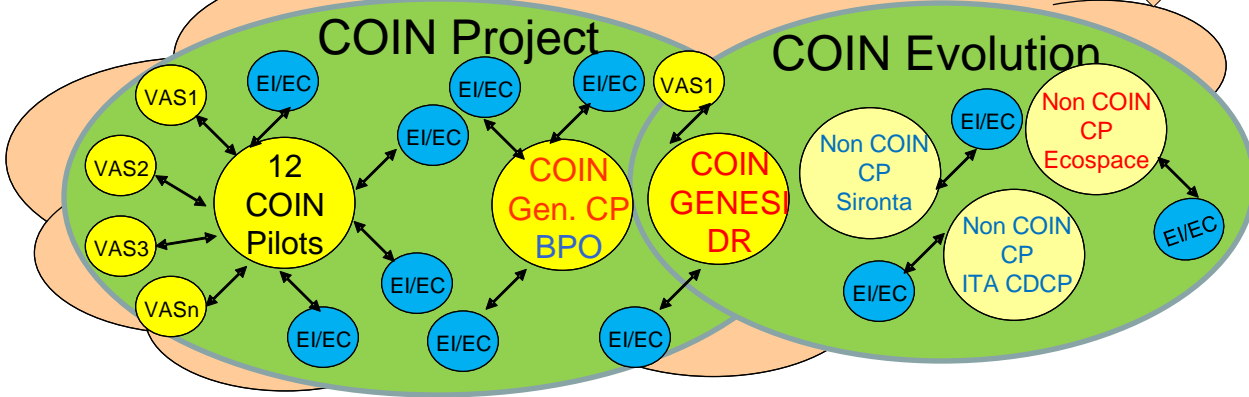


Individual & IT Users

COIN Front End

Industrial Users

# The CP Federation





# COIN Upper Cloud

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- **Core Topics**

- Provide the mechanisms to populate and make the federation evolve
- Broadcast of a service request and merging of the answers
- A model of the nodes for intelligent forwarding, goal decomposition
- Including federation and composition issues in the GSP Cube

- **Nodes Typology**

- COIN Nodes (COIN Platform & COIN Services)
- GSP Nodes (COIN Platform): Service Providers + Platform Providers
- EI/EC Nodes: service request & service orchestration interoperability

- **Further Collaborations**

- EI/EC Service Discovery in the Open Internet (EI/EC Crawler)
- Bundling EI/EC with FinES Value-Added services
- Bundling EI/EC with Public Services (e.g. ISA), COM(2010) 744 final, Towards interoperability for European public services
- Bundling EI/EC with FI PPP Core Platform & Unit D3 R&D (CC LOS)



# COIN Lower Cloud

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- **Core Topics**

- A more loosely coupled cloud of Collaboration Platforms
- A first set of 6 CPs + additional 6 CPs from Enlarged EU Countries
- 8 of them using the COIN CP, 4 of them using their own platform
- Three COIN collaboration forms extended with Living Labs (BG CZ)
- COIN EEU provide additional EI/EC services to COIN GSP federation
- CPs provide a BPM (BPO) functionality, diverse integration degrees

- **Nodes Typology**

- COIN nodes (COIN CP): social, knowledge and business services
- CP nodes: nodes created by networked enterprises (or IT providers)
- Non-CP nodes: using their own CP with KSB models and IT services

- **Further Collaborations**

- Manufacturing FoF PPP, obj. 7.3 Virtual Factories and Enterprises
- FI PPP Use Cases (objective 1.8) of the FI Core Platform



# COIN Front End

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- **Core Topics**

- Web Interfaces for human users accessing the COIN System
- APIs to interoperate upper and lower cloud (in GSP and CP)

- **Front End Typology**

- **Web Interfaces** for 4 categories of human users
  - ✓ Generic Users (registered or not) with browsing, search, try me
  - ✓ IT Users (registered) service and/or GSP platform providers
  - ✓ Business Users (registered) CP platform providers, businessmen
  - ✓ System Admin managing the COIN system and nodes evolution
- **APIs Interfaces for 3 levels of interoperability (step-1,2,3)**
  - ✓ Manual: implemented by the above Business Users interface
  - ✓ Semi-automatic: generated by the BPM facility inside the CP
  - ✓ Automatic: intelligent reasoning embedded in CP BPM & GSP

- **Further Collaborations**

- Web Interfaces: the EI/EC Google
- API: COIN BPO service with embedded EI/EC functions



# GSP Evolution Scenarios

## ***“Emergent” scenario***

- **Different authorities**
- Different GSP instances established **independently**, then federated
- Platform instances may be specialised to some extent, but not by design
- Federation may not be transparent to users

## ***“Planned” scenario***

- **Single authority**
- Different GSP instances deployed as a distributed architecture
- **Specialisation** of instances can be by design
- Distributed architecture is transparent to users (logically a single entity)



# GSP Evolution Approach

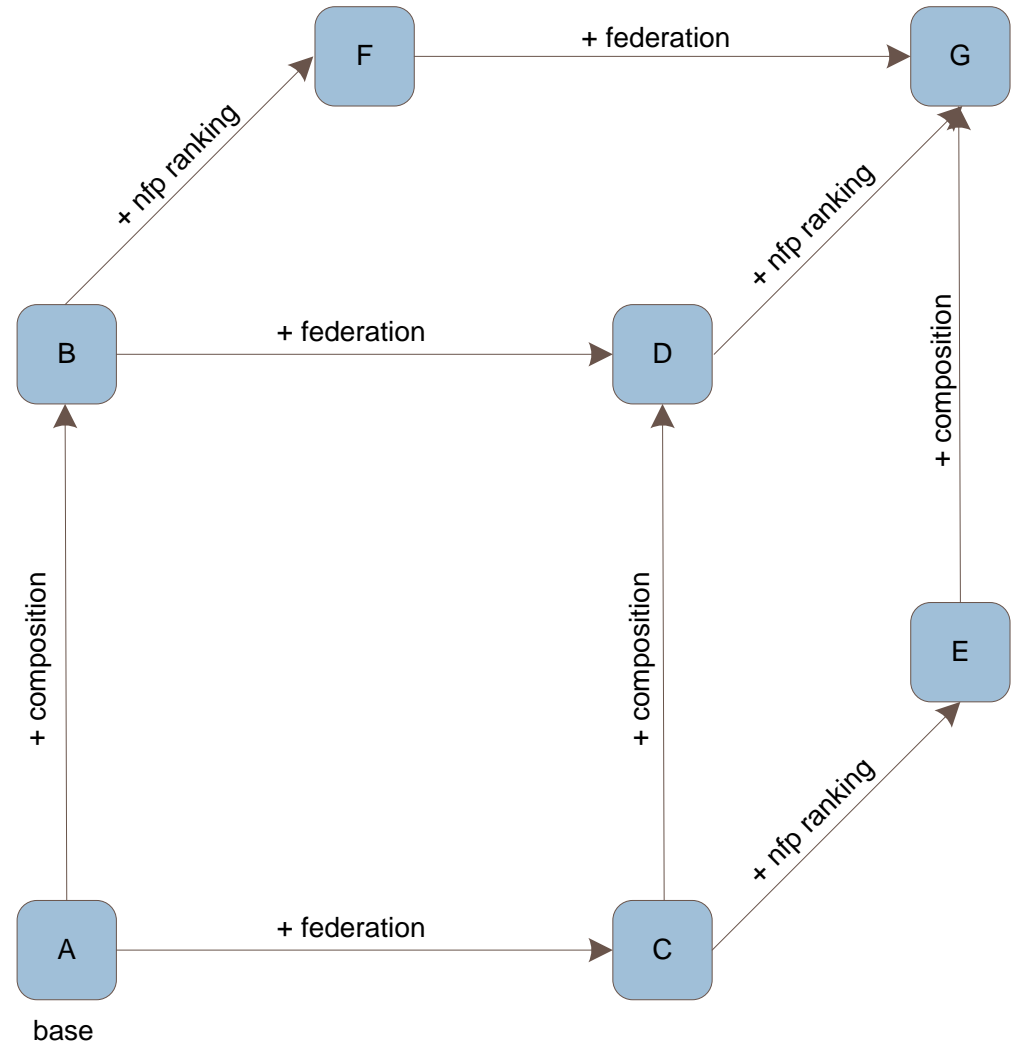
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- The “emergent” and “planned” scenarios can be complementary, but are different both from a technical and a business perspective
  - We mostly **focus on the “emergent” scenario**
- We chose a “***local knowledge***” approach
  - Each GSP instance is independent
  - Each GSP instance has its own repository
    - Ontologies, service descriptions, policies, etc.
  - Knowledge can be accessed through GSP services
  - Some knowledge is shared across the federation (to describe instances)



# GSP Evolution Hypercube

- Incremental scenarios
- Three dimensions:
  - service composition
  - federation
  - NFP-based ranking

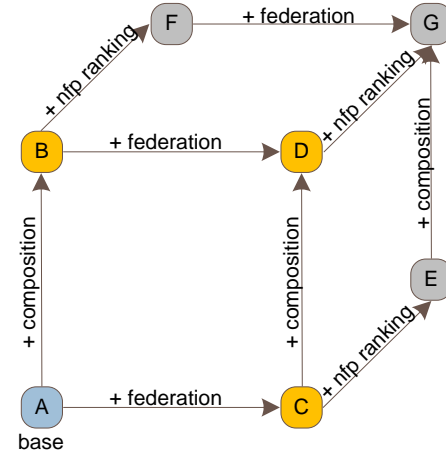


GSP Evolution "cube"



# GSP – Primary Scenarios

- Single instance with service composition (B)
  - A match composed of *multiple services* can be identified
  - Decomposition of goals and service composition
- Federation (C)
  - A match given by a service registered at a *different GSP instance* can be identified
  - GSP instances can forward goals and matches to other instances
- Federation with service composition (D)
  - A match composed of *multiple services* registered at *different GSP instances* can be identified
  - Composition of scenarios B and C

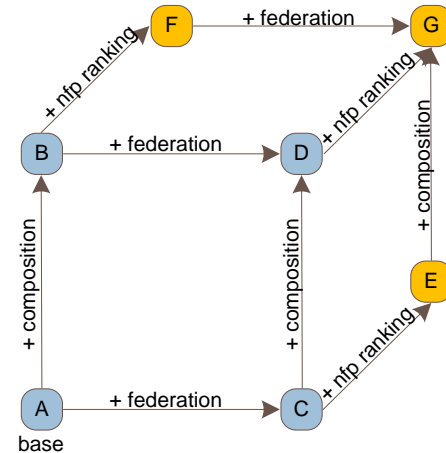






# GSP Further Scenarios

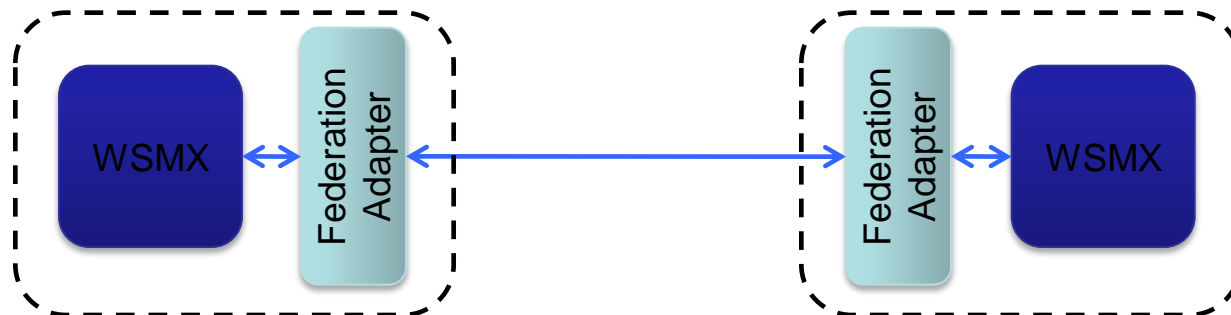
- Federation with NFP ranking (E)
  - *NFP-based ranking of results coming from different GSP instances*
  - Trust with respect to GSP instances can influence ranking
- Single instance with composition and NFP ranking (F)
  - *NFP-based ranking of composed services*
  - NFP composition
- Federation with composition and NFP ranking (G)
  - *NFP-based ranking of composed services coming from different GSP instances*
  - Composition of scenarios E and F, with additional issues because composition can happen at different instances





# Basic GSP Federation

- We are now targeting scenario “C” (simple federation)
- **Basic support for federation has been designed and implemented**
  - GSP nodes can forward goals and responses among them
  - With federated discovery all nodes receive the request
  - The **new “Federation Adapter” component** of the GSP takes care of inter-node communication
    - It may be used to integrate in the federation **any WSMO-based discovery engine**, not just WSMX





# Conclusions & Future Work

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- **Achievements**

- A federation of EI/EC service delivery platforms implemented
- Prototype in the EI/EC domain of a Global Service Delivery Platform
- Instantiation of the FIA Federated Open Trusted Platforms concept
- Open architecture to future service- and platform- providers
- Platforms completely available in Open Source

- **Future Challenges**

- Integration with service-oriented Development / Mash-up Platforms
- GSPs deployment onto a Cloud Computing architecture
- Full EI/EC GSPs virtualization and plug & play facility
- Self-management and P2P governance of the federation
- Federated Business Models and Policies Management
- Integration with the Future Internet (and FI PPP Core Platform)



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