e-Business in a Peer-to-Peer Networked World

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Work funded by the **SATINE ICT project**: Semantic-based Interoperability Infrastructure for Integrating Web Service Platforms to Peer-to-Peer Networks
Outline

• The rationale: ICT and Business
• Focus on Decentralised Networked Environments
• Component/Service-oriented Architecture and semantic integration
• Applying P2P Technology in a Corporate Trading Environment
• Process and Organisational level: Demonstration scenario in the Tourism and Travel domain
• Application in alternative markets
• Summary and discussion
ICT and Business

- **Networks** (e.g. Internet) → enabling many-to-many interactions beyond physical boundaries
- The very essence of **business** is about enabling people to interact to create value
- **e-Business** deals with similar subjects (collaborative commerce, supply chain management, e-markets, networked organisations, dynamic trading networks)
- Evolution is driven by:
  - The need for Industry consolidation
  - The requirement to move closer to customers, suppliers and partners
  - The growth of e-commerce – change “conventional” business models
  - The formation of “common interest” communities

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ICT and Business

Technology Evolution Towards…

- Linkage of diverse IT systems
- Support of multiple and heterogeneous applications
- Support of various connectivity paths, among numerous access devices
- Intelligent information retrieval and sharing
Decentralised Networked Environments

MainFrame, TinyOS, Obj-c

Sensor, TinyOS, Obj-c

MainFrame, UNIX, C++

refridgerator, TinyOS, Perl

Mobile, Symbian, C

Mac, MacOSX, Python

PC, Win2K, Java

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Decentralised Networked Environments

- P2P commercial implementations
- Decentralised network of workplaces
- Centralised premises stereotype

Requirements of Employees and Enterprises

- Eliminate the existence of intermediary systems

Initial investments and operation/maintenance costs hardly affordable for SMEs

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Component/Service-oriented Architecture and semantic interoperability

- Repositories and software systems are programatically accessed by business processes
- The definition of interfaces and their access at runtime is not uniform at all
- Every enterprise uses different technology for the programmatic access
- **Web Services** are proposed as a uniform and universal technology for this problem
Web Services Model

Service Registry (ebXML or UDDI)
- Web service descriptions

Service Provider
- Web service
- Service Description in WSDL

Service Consumer

Discover service
Publish service
Invoke service through SOAP
The Rationale of P2P

• Discovery of resources (e.g. Napster, Gnutella)
  – What about security?
• Eliminating the single-source bottleneck
  – Use P2P search capabilities to
    – locate Web service registries
    – and also individual not registered services
• The enterprise can now participate in B2B marketplaces and directly collaborate with its suppliers
Turn networked Business standards more flexible through Semantics

• This can be possible by introducing semantics to Web services:
  – By classifying Web services with well-known taxonomies, ontologies and controlled vocabularies
    • management, retrieval and use easier and more accurate
  – By introducing semantics to the messages exchanged
Process and Organisational level

- Travel Agency
- Hotel Chain
- Hotel Availability Services
- Monitoring Peer
- Ontology Manager
- ebXML
- UDDI
- Air and Car Availability Services
- Trusted Peer
- Insurance Company
- SP1
- SP2
- SP3

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Process and Organisational level – As is
Process and Organisational level – To be
Process and Organisational level – To be

- Find Available Flights
- Get Flight Information
- Reserve Flight
- Search Hotels
- Get Hotel Information
- Check Hotel Availability
- Book Hotel
- Etc.
Demo scenario in the Tourism & Travel Industry
Mr. Brown is on travel for work in Cyprus

Receives a call from The central office

He has to cancel his work in Cyprus and has to go to Copenhagen urgently

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He sends a query to find a tourism agency

Search For a Tourism agency In P2P Environment
SATINE Contribution

- Technology involved: Web services, Semantic Web and P2P in the travel domain
- Innovation: Discovering services through their semantics and P2P search mechanisms in the travel domain
Ask for Availability

Reservation is performed

InsuranceBookRequest Message

Insurance request for the passenger (Mr. Brown)

Attributes for InsuranceBookRequest

InsuranceCustomer
PlanCost

Insurance is approved

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SATINE Contribution

- **Interoperability** between the insurance company and the airline company is achieved through Web service technology
- **Composition** of Web services into workflows using the semantic definitions
The travel agency searches for a hotel in Copenhagen.

Tourism Agency

Sends a query for available hotels in Copenhagen, searches for relevant UDDI Registries in P2P Environment.

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SATINE Contribution

- **Distributed** Web service registries
- Semantic routing of the queries
  - Discovery of the Service Registries in the P2P environment based on the semantic information published in the P2P environment
Application in alternative markets
e-Government

- City Councils
- Ministry of Labour
- Employment Services
- Monitoring Peer
- Trusted Peer
- UDDI
- e-Inclusion Services
- SP3
- SP2
- SP1
- Municipality
- Ontology Manager
- Governmental Authorities
- ebXML
- e-Government Services

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Application in alternative markets
e-Science

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Application in alternative markets

e-Health

Specialists Communities

Governmental Authority

Electronic Health Record Services

Monitoring Peer

Ontology Manager

UDDI
Community of Practice Advice Services

Trusted Peer

GP

Organisation A

ebXML
Semantic Information Retrieval Services

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Summary and discussion

• **From the Infrastructure Provider viewpoint**: A Semantic Web Service based toolkit using P2P discovery mechanisms to locate the Web service registries and Web services

• **From Business User viewpoint**: Tools that facilitate the advertisement and discovery of their Web Services especially for SMEs

• **From End User viewpoint**: Easy discovery, composition and invocation of services
The Consortium Partners:

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2. Fraunhofer Institute, FOKUS, Germany
3. European Dynamics, Greece
4. Oxymel, France
5. Intro Solutions, Turkey
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Thank you!

Questions & Discussion

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