Software and Services a future in common: the NESSI perspective

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Agenda

- The Context
  - The company
  - Future Internet
  - NESSI
- NEXOF
  - Motivation
  - Main concepts
- NEXOF-RA
  - Project motivation
  - Main project results
  - Contribution to NEXOF
  - Consortium partners
A balanced approach to the market


ASE 2008 – 15-19 September 2008 – L’Aquila, Italy
A window on the world

Argentina (Telecom Personal, Diasorin)
Australia (IVECO, ENI)
Austria (Coca Cola HBC)
Belgium (Kraft)
Brazil (TIM Celular)
Congo (ENI)
Czech Republic (Coca Cola HBC)
Denmark (Cementir)
Egypt (ENI)
France (AO International, Autogrill, IKEA, FIAT)
Germany (Kraft, Eurofighter)
Greece (Atos Origin Hellas, BAE Systems)
Hungary (Coca Cola HBC)
Portugal (Whirlpool)
Poland (Whirlpool, FIAT, Selenia)
Romania (Whirlpool)

Russia (Whirlpool)
Serbia (Telecom Srbija, Promonte GSM)
Slovakia (Whirlpool, ENEL)
Spain (Whirlpool, Atos Origin Spain, Canon, FIAT)
Sweden (IKEA)
Switzerland (Atos Origin Schweiz)
Turkey (AVEA, FIAT)
United States (ENI)
United Kingdom (FIAT, Ferrero)
Venezuela (Digitel)
The Research & Development

- Operational since 1987
- Nearly 100 researchers
- 4 Labs
- Participation in more than 40 research initiatives (National and International)
- Wide European co-operation network with major Universities and Research Institutes

**Mission:**

To advance the practice of software engineering so the whole company can acquire it and sustain its software systems development activity with predictable and improved cost, schedule, and quality.
The Main Goal and the Research Lines

exploring the design and implementation of next generation tools to support distributed, dynamic and adaptive software systems

- systems that operate non-stop in a rapidly changing and possibly antagonistic environment, or, in other words, systems that have capabilities to:
  - reason about their own structure, performance and environment;
  - dynamically modify their behavior;
  - act autonomously.

- Service Engineering
- Security
- Service Oriented Infrastructure
- Innovative Business Models
- Engineering of Intelligent Systems
- Engineering of Business Process
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The evolutionary motivation

Internet:
- **Phase 1 = “connectivity”**
  - 80’s-90’s internet as communication infrastructure (e.g., email)
- **Phase 2 = “show room”**
  - 90’s publication of first web sites, internet as an advertising infrastructure
- **Phase 3 = “universal library”**
  - 2000’s easy access to any kind of unstructured content (e.g., Google), active role of users (e.g., WikiPedia)
- **Phase 4 = “Transform the Internet to service your life”**
  - 2015’s …

Dreaming the “net economy”

Implementing the “service economy”
“Future Internet to service everyday life”

“Future Internet” to be

- **Alive** (through services)
- (pervasively) **Trusted**
- **Rich** (due to knowledge)
- **Invisible** (ICT)

- Can internet interact?
- Can trust be real-time?
- Can internet react to events and generate experience?
- Can computers disappear?
Towards Future Internet

- Services
- Process
- Semantic
- Abstraction
- Middleware
- Grid
- Virtualization
- Hardware
- Network
- Devices
- Grid
- Virtualization
- Services
- For Users
- Citizens and Business

Future Internet

2015

"Internet of Services"

2007

WEB 2.0

1990

1960

Specialised networks

Computer at the Centre

USERS at the Centre

Computers at the Edge

"USERS at the Centre

USERS at the Edge"
Towards Future Internet

Internet of Services
- Collective End-user Intelligence
- Multi-Channel Access
- Discovery
- Mashup
- Tagging
- Resources

Professional Business Applications
Value-Added Services
Interoperability Service

Internet of contents (3D Internet)

Security

Future Infrastructure

Internet of Things
Towards Future Internet

- Internet of Services
- Internet of Contents (3D Internet)
- Future Infrastructure
- Internet of Things
- Social aspects
Exemplifying scenarios

- Imagine future retail ...
- Imagine future health-care ...
- Imagine future field working ...
- Imagine future service creation ...
- ...
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Services in IT - Market Expectations

Service is something used but not owned

- **Lower the risks** for customers and improve value and reliability
- **Increase process flexibility** for businesses as well as public administrations
- **Accept complex world environments**, and co-operate on standards, so the end-user value can be created for a huge number of people

NESSI is about transforming the EU economy through Service Oriented business models
The NESSI ETP

- The context - European Technology Platform

NESSI aims to provide a unified view for European research in Services Architectures and Software Infrastructures

Today, NESSI partners represent 1.7 Million strong workforce and 490 B€ in revenues

In US, SRII launched in March 2007 (www.thesrii.org)!!!
NESSI Holistic View

EU Economy

Business Services

Trust - Dependability

Comprehensive View

NESSI Landscape (Business level Services)

NESSI Adoption

Business Domain 1

Business Domain 2

Business Domain n

Cross business Collaborations

Architecture and Engineering

Core Services

 Practices and Usages

Regulatory Governance

Core Services

Semantics Layer

Service Integration Layer

Infrastructure Layer

NESSI Framework

Open Standards - Open Source - Quality - Connectivity - Federation

contributing to
## Research priorities highlights

<table>
<thead>
<tr>
<th>Requirement</th>
<th>NESSI Research</th>
<th>Research Area</th>
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<tbody>
<tr>
<td>Provide a flexible infrastructure to support the networked economy</td>
<td>Advanced infrastructure technologies in • HardWare (flexible allocation, virtualization, advanced storage, energy efficiency) • Middleware (new composite system designs, harmonized virtualization) • related programming models</td>
<td>Service-oriented utility infrastructure</td>
</tr>
<tr>
<td>Provide coherence to the composition of uncoordinated services across all layers and all providers</td>
<td>• Modelling, Construction and Management of hybrid service-based systems (situational, spontaneous, goal-based) • Mapping quality of experience of the services to non-functional properties of components • Refining semantics to become appropriate across hybrid service-based systems</td>
<td>Service and System Engineering</td>
</tr>
<tr>
<td>Add the dimensions of knowledge to the interaction between user and (business and societal) services</td>
<td>• Collaborative business intelligence for hybrid service-based systems • Knowledge- and situational-driven personalization of interfaces and services • Embodiment of educating principles in services</td>
<td>Adaptive interactions</td>
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<td>-------------------------------------------------</td>
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| 4 Pave the way towards the collaborative executable enterprise | •Dynamic formation, formalization management and interaction of business processes implemented through services  
•Support for long-term and transactional business collaboration | Business process modelling                  |
| 5 Define open architectures for intranet- to internet-scale service delivery | Harmonize SOA and SOI architectures to support all kinds of  
•business and provisioning models  
•applications and hardware environments  
•for all stakeholders | Reference Architecture and Implementations                                  |
| 6 Materialize the ubiquitous service availability | •Turn devices into enablers of services by embodying SOA principles into embedded systems  
•Link collaborative devices to services | Ubiquitous service availability          |
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| 7 | Provide end-to-end trustability in hybrid service-based systems  
- Provide a chain of trust across all levels and trust zones  
- End-to-end verification and assurance  
- Embed persuasive tactics and intuitive security | End-to-end Trust, security and dependability |
| 8 | Ensure social, economical, legal and cultural viability  
- Make services accessible to all  
- Multidisciplinary research to build a theory describing the relationship between organizations and social networks in regards to hybrid service-based systems  
- Support emerging business models for innovation | Systemic foundation for a Service Economy |
| 9 | Provide the business context for services in hybrid service-based systems  
- Build the specific collaborative service-based business systems for targeted application domains e.g. Industry automation, education  
- Identify specific and generic parts supporting services in hybrid service-based systems | Building NESSI |
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The NESSI Open Framework is an integrated, consistent and coherent set of technologies and associated methods and tools intended to

- provide European Industry and the Public Sector with efficient services and software infrastructures to improve flexibility, interoperability and quality;
- master complex software systems and their provision as service oriented utilities;
- establish the technological basis, the strategies and deployment policies to speed up the dynamics of the services eco-system;
- develop novel technologies, strategies and deployment policies that foster openness, through the increased adoption of open standards and open source software as well as the provision of open services;
- fostering safety, security and the well-being of citizens by means of new societal applications, enhanced efficiency of industry and administrations, and competitive jobs.
NESSI Open Service Framework

- Open Reference Model (ORM) → Concept, Glossary and Principles
- Open Reference Architecture (ORA) → Standards
- Open Reference Implementation (ORI)
- Conformance Test Suite

“The Independence Principle”

Size
Domain
Technology
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“Deliver a **coherent** and **consistent** open service framework, ranging from the infrastructure up to the interfaces with the end users, **leveraging research** in the area of service-based systems to consolidate and trigger innovation in service-oriented economies”

- NEXOF-RA is a step in the process of building and creating the conditions for the adoption of the whole of Open Service Framework
- The aim is that the RA will be built through consensus within the NESSI Community, validated by the NSPs and widely adopted to support the European Service Economy
NESSI Open Service Framework

- Open Reference Model
  - Concept and Principles
- Open Reference Architecture
  - Standards
- Open Reference Implementation
- Conformance Test Suite
- Validation of NEXOF instances in real scenarios

- Proof-of-concept
- NEXOF Roadmap

NEXOF-RA expected results
Expected results: proof-of-concept

- Software to prove key architectural choices
  - Possibly multi & cross platform deployments
- Guidelines and blueprints for instantiation
- Possibly based on outcomes from FP6, FP7 (including NSPs)
  - For FP6, consider e.g. Athena, NextGRID, SecSE, Prime, Serenity, QualiPSo
- Not a reference implementation of the RA
- Not designed for any specific user, internal validation use
- Public, but not supported (e.g. IBM alphaworks)
Expected results: Roadmap

It is the strategy for the building and adopting NEXOF. This consist of:
- Strategic plan
- Requirements for NEXOF
- Methodology to implement the plan
  - Supporting tools (e.g. CWE, Repository)
NEXOF-RA Community

Advisors & Promoters
Advisory boards & SC
- Input & Validate
- Topics & Applicability

“Adopters”
NESSI Members ++
- Adopt architecture

Investigation Team
- NEXOF-RA + Strategic Contributors
- Collect & evaluate input
- Investigate alternatives
- Write documents

“Strategic Contributors”
NSP, key projects
- Create input
- Collaborate in process

“Contributors”
NWGs, other projects, other parties
- Create input
- Review drafts

“whoever is committed”

NEXOF-RA
- Drives Process
- Collect & evaluate input
- Investigate alternatives
- Write documents
- In short … do the work
Candidate Investigation Topics (1/2)

- SUI.1 – declarative authoring languages for user interfaces
- SUI.2 – contextual adaptation
- SUI.3 – basic definition model for front-end resources
- SUI.4 – REST-based open service catalog APIs
- SP.1 – distributed registries
- SP.2 – distributed (intelligent) deployment / configuration
- SP.3 – interoperability (cross standards)
- SP.4 – event-driven architecture
- SP.5 – system federation → security/policy federation
- SP.6 (+SQ) – semantic description of non-functional aspects
- SP.7 – service description techniques (selection, overcome limits)
- SP.8 – SLA and service negotiation
Candidate Investigation Topics (2/2)

- SP.9 – transaction
- SP.10 – process definition
- SP.11 – access to current assets / legacy integration
- SOI.1 – definition of infrastructure services
- SOI.2 – description of infrastructure services
- SOI.3 – describe functional and non-functional characteristics of infrastructure services
- SOI.4 – usage and management reference points to be exposed
- SOI.5 – SLA parameters (offering guarantees)
- SQ.1 – privacy, incl. data protection architectures
- SQ.2 – access rights framework based on semantics
- SQ.3 – behaviour analysis and dynamic security in SOA
- SQ.4 – multi-level security in interconnected systems
- SQ.5 – secure SOA
- SQ.6 – Architectures for Highly Available Services – includes security aspects
- SQ.7 – identity management
As of 11-Sep-08 AM

- 93 unique email registered
- Including 12 from NEXOF-RA partner organizations
- From 23 identified countries
  - 4 Outside Europe: Australia, China, Korea, USA
  - 3 European outside EU: Norway, Switzerland and Turkey
  - Well represented: Italy (15), Spain (8), UK (8) (excludes NEXOF)
- Most registrations are recent
  - 64 (2 in 3) registered in September
  - Including 35 (1 in 3) on Sept 5th
  - Including 7 after deadline (NOTE - registration is still open)
Distribution per Topic

Core Service Framework Area
- Service Description (Piero) → 31
- Design Time Service Composition (Yosu) → 35
- Service Discovery (Yosu) → 33
- Interoperability of Message-Based Service Interaction (Katharina) → 16

User Interaction Area
- Declarative Authoring Language for User Interfaces (Nikolaos) → 10
- Context Model and Universal APIs (Jose Manuel) → 20

Infrastructure Area
- Definition of Infrastructure Services (Mike) → 32

Security Area
- Dynamic identity management for SOA (Pascal) → 13
- Privacy Management in SOA (Daniel) → 10

Quality of Service Area
- Scalable Approaches to Service Oriented Infrastructures (Ricardo) → 25
- Highly Availability for Multi-Tier Architectures (Ricardo) → 11
## Consortium Partners

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<tr>
<td>Engineering Ingegneria Informatica S.p.A</td>
<td>Italy</td>
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<tr>
<td>Alcatel-Lucent France</td>
<td>France</td>
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<tr>
<td>ATOS Origin S.A.</td>
<td>Spain</td>
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<tr>
<td>British Telecommunications plc</td>
<td>United Kingdom</td>
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<td>Hewlett Packard European Laboratories – Bristol</td>
<td>United Kingdom</td>
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<tr>
<td>IBM</td>
<td>Israel</td>
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<td>Lero at University of Limerick</td>
<td>Ireland</td>
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<td>Lero at University of Duisburg-Essen</td>
<td>Germany</td>
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<td>Logica CMG</td>
<td>The Netherlands</td>
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<td>MoMa - Modelli matematici ed applicazioni S.r.l.</td>
<td>Italy</td>
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<td>Siemens GmbH</td>
<td>Germany</td>
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<td>TIS Techno Innovation Alto Adige S.C.p.A.</td>
<td>Italy</td>
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<td>Telefonica Investigacion y Desarrollo</td>
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<td>Thales</td>
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Conclusions

- **NEXOF-RA** aims at **standardise** the way services are built, offered and consumed. There is the need for a Reference Service Architecture.

- The **Reference Architecture** should be defined in order to allow any business domain, size and technology.

- Implementing a **Reference Architecture** is not a single shot.

- Implementing a **Reference Architecture** requires a large community with contributions from many sources.

20-21 October 2008
NEXOF Investigation teams kick-off

www.nessi-europe.eu - www.nexof-ra.eu