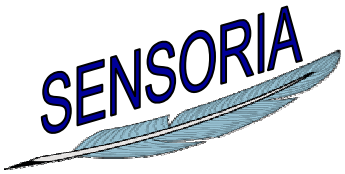


SENSORIA
Software Engineering for Service-Oriented Overlay Computers

Information Society

Motivation

Computing is becoming a utility and software a service. [. . .] applications will no longer be a big chunk of software that runs on a computer but a combination of web services; and the platform for which developers write their programs will no longer be the operating system, but application servers. [The Economist, May2003]

- Selling services has become the biggest growth business in the IT industry
  - changes the economics of IT industry and
  - influences the e-Society as a whole
- Today, services are being delivered through the

  Web, Personal Digital Assistants, mobile phones…
- Tomorrow, they will be delivered on all kinds of

  global computers

Services as Global Computers

- **Service**

  autonomous, platform-independent computational entity

  that can be

  described, published, categorised, discovered

- **Services** can be **dynamically assembled** for developing

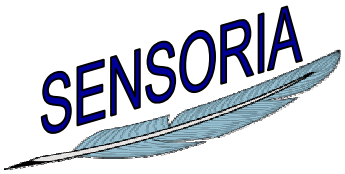
  massively distributed, interoperable, evolvable systems and applications.

State of Art

- **Service-Oriented Computing**
  - addressed by IT industry only in an ad-hoc and undisciplined way
  - applications have the ability to “talk” to each other but they do not “understand” what they are talking about

    e.g. WSDL only syntactic, BPEL4WS not expressive enough
  - Formal approaches
    - Z, TLA too static, process calculi promising
    - but no uniform framework for SO Design
- **Web service standards**
  - weakly defined (mainly syntactic, poor semantic foundation, incoherent)
  - next round of standards development: rectification of shortcomings

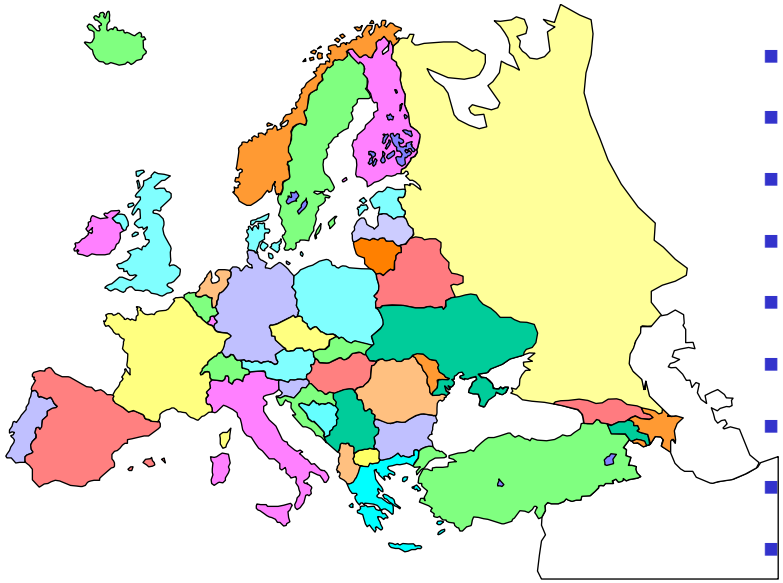
Aim of SENSORIA



- Novel comprehensive approach to
  Engineering of software systems for
  Service-Oriented Overlay Computers
  integrating
  - foundational theories, techniques, and methods and
  - pragmatic software engineering

- **Application areas**
  - e-business,
  - automotive systems,
  - e-learning
  - telecommunications

SENSORIA – Partners



- Università di Pisa
- Università di Firenze
- Università di Bologna
- ISTI Pisa
- Universidade de Lisboa
- University of Edinburgh
- ATX Software SA
- Telecom Italia Lab
- London Software Systems (Imperial College & University College)
- FAST GmbH
- Budapest University of Technology and Economics
- S&N AG
- LMU München
- Università di Trento
- University of Leicester
- Warsaw University
- TU Denmark at Lyngby

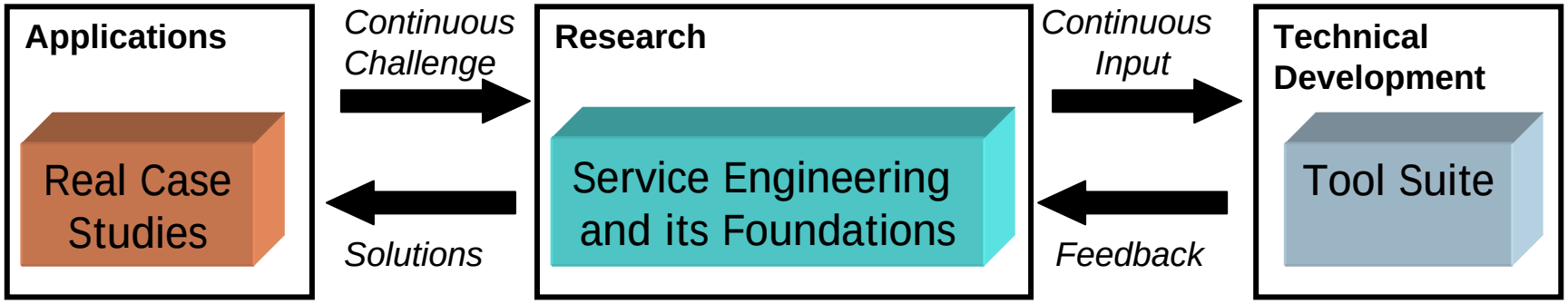
Services in SENSORIA

- **General concept of service**
  - independent from particular global computer and from any programming language;
  - described in a modular way, so that

    security issues, quality of service measures and behavioural guarantees are

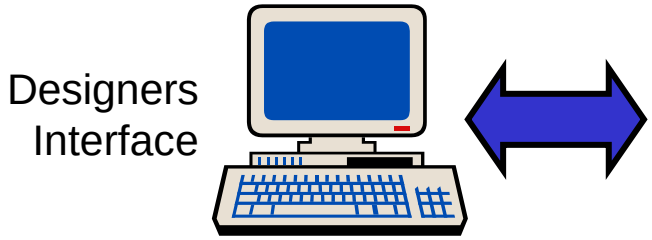
    preserved under composition;
  - supporting dynamic, ad-hoc, “just-in-time” composition;
  - part of an integrated service-oriented approach to business modelling

General Approach



- **Research on**
  - Service Engineering and its foundations
- **Tool suite**
  - New SOC language primitives
  - Analysis and CASE tools
- **Case studies**
  - guide research
  - show applicability of research results

A Typical Scenario for SENSORIA Service Design



UML for GC Services
(Model-driven Development)

Automatic connections

Hidden from the designer

Mathematical Models
(Primitives and languages for GC -services)

Integration
Simulation/verification

Quantitative and Qualitative Properties
(Performance, reliability, fault-tolerance, security, trust, mobility,)

SENSORIA Development

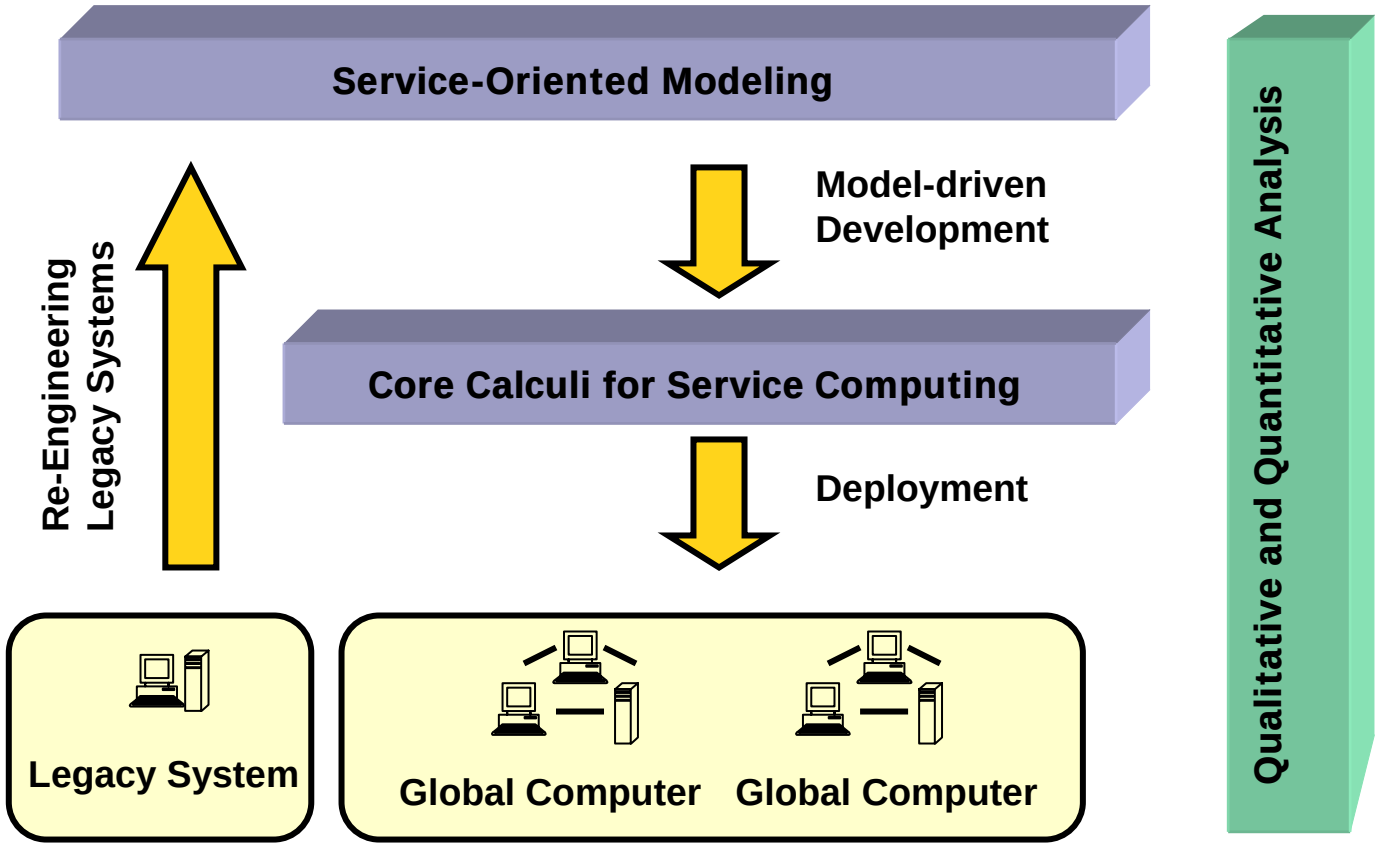
integrates

practical SW Engineering

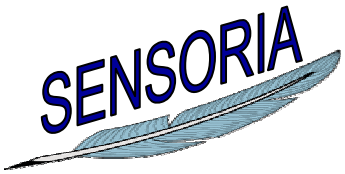
with

math. foundations

SENSORIA Detailed Approach



Summary



- **Expected results**
  - language primitives for global service-oriented systems
    - modelling and programming
    - full mathematical semantics
  - qualitative and quantitative analysis methods for, e.g.,
    - quality of service, security, performance and resource usage
  - sound engineering methods and deployment techniques
    - forward development through model-based transformations
    - re-engineering of legacy systems
- **Based on**
  - experience of partners covering relevant areas
  - effective collaboration of projects partners, e.g.,
    - in previous FET GC projects (AGILE, DEGAS, PROFUNDIS, MIKADO)
  - continuous information flow between industrial and academic partners

Outlook

- **Service-oriented computing is becoming the driving force behind innovation in IT-industry**
- **Competitiveness of European industries depends on early and successful adoption of this new paradigm**
- **SENSORIA will**
  - produce theoretical foundations and practically relevant results
  - strengthen the international position of the EU research community.