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SWINBURNE
UNIVERSITY OF
TECHNOLOGY

Centre for Intelligent Agents and Multi-Agent Systems

Research Profile Outline

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Current Status (very dynamic :-)



- Founded in 2nd half 2003, 1st member in Oct 2003
- People
 - 6 members: 2Acad, PDF, RA, 1(+2) PhD, 2 Masters
 - plan by end 2004 : add 2-8
- Collaboration (project based)
 - Internal SOC@Swin (Service-oriented computing)
 - Component Software and Enterprise Systems
 - Internet Computing and E-Commerce
 - Partners
 - Everyday Interactive Networks, Telstra, DSTO
 - International
 - EU: HPI, DC, Siemens, DERI, Rodan, ...
 - Chinese Academy of Sciences; (IBM T.J. Watson)



- *Look for more, esp. AU!*

Intelligent Agents and Multi-Agent Systems



- Autonomous decision-making, coordination and adaptation in intelligent distributed (agent) systems
 - Distributed decision-making models, strategies, negotiation, learning, interactions, ...
 - Cooperation, competition, coopetition mechanisms
 - Dynamic organisations/coalitions/compositions

- ...in Complex dynamic environments
 - Service-oriented computing, web/grid services, services grids
 - Collaborative environments, virtual enterprises, adaptive supply networks, smart information environments
 - Autonomic distributed systems
(self-composing, self-managing, self-adapting, self-...)

Research Areas (evolving...)



- Agent negotiations and collective decision-making
 - Multiple: parties, attributes, preferences, objectives,...
 - Relationships: collaboration <-> competition
 - Applications: dynamic SLA compositions and management in open service environments

- Distributed learning and adaptation in MAS
 - “El Farol Bar Problem” (e.g. congestion, minority games)
 - Decentralised adaptation (collective adaptation of individuals)
 - Applications: service discovery, control and QoS management

- Dynamic interactions and organisational mechanisms
 - Coordination, local vs global, etc (e.g. monitoring, control, negotiation)
 - Coalition formation and evolution (e.g. roles, norms, coordination)
 - Applications: collaborative VO, VE, SOC, ...

Some Projects (current and planned)



- Adaptive Supply Networks (CSIRO)
 - Negotiation agent-based collaborative scheduling and adaptive cooperation
- Adaptive Services Grid (with EU FP6, 21 partners, July 2004)
 - (grid, web services, semantic web, agents, process technologies)
 - Automated creation, composition & execution of complex service-oriented apps
- Adaptive Service Agreement and Process Management in Services Grid (Gov and/or industry) – extended part in ASG (July 2004)
 - Complex SLA and QoS negotiation, re-negotiation and mediated re-planning
- Services Environment Network for Virtual Organisations (EIN)
 - Interactive 3D avatar personalisation and intelligent agent automation
 - Web/Grid services enablement of collaborative environments
- Agent-based Smart Information Environments (DSTO)
 - Agent-based service-oriented enterprise systems
- On-Demand Negotiated WS Composition (Chinese Academy of Sciences, July 2004)

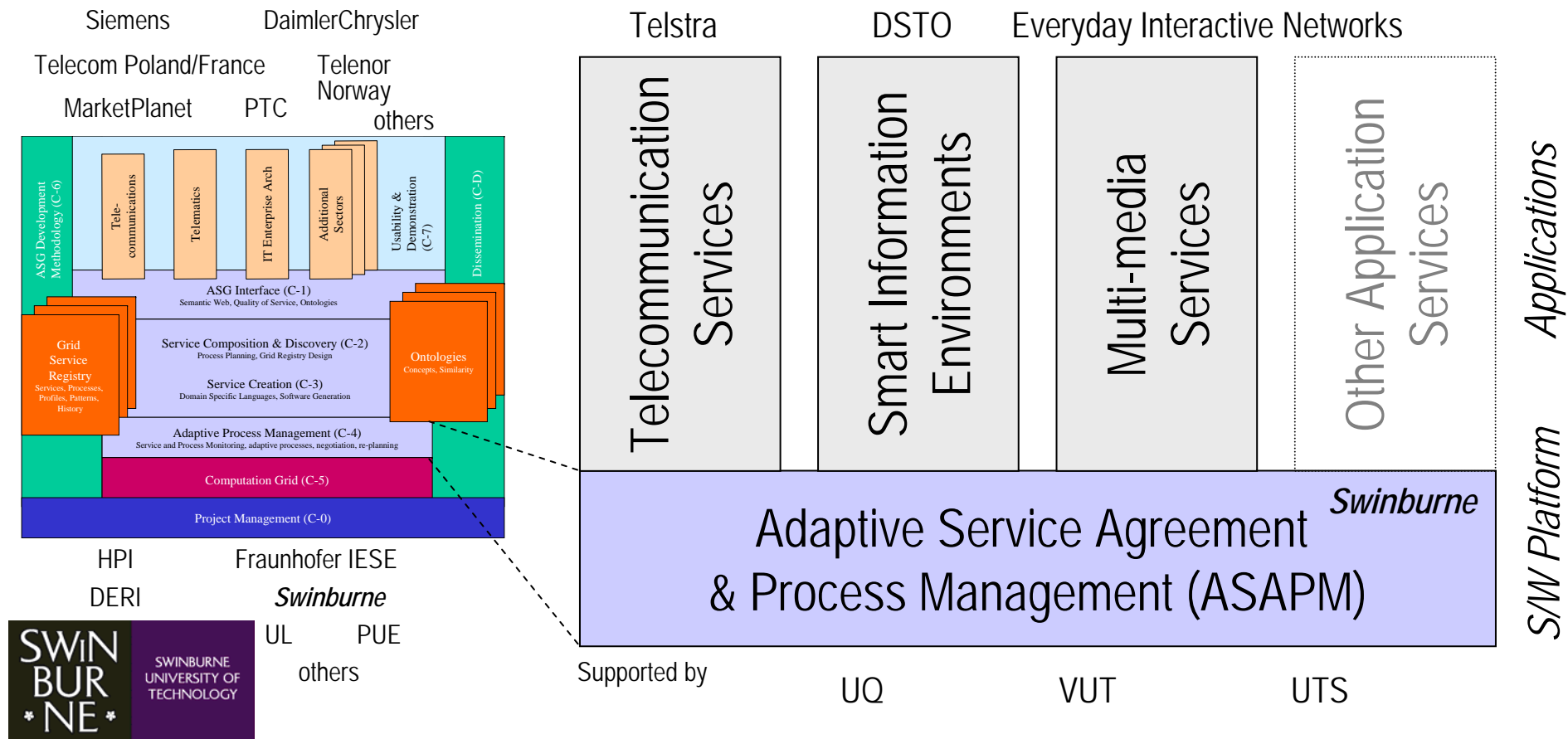
Adaptive Service Agreement & Process Management (ASAPM) in Services Grid



- Key part of EU Project *Adaptive Services Grid (ASG)*
- Swinburne leads and coordinates research in ASAPM

EU FP6 ASG project

Australian ASAPM project





ASG and ASAPM

- ASG: Develop an *open service-oriented development platform* providing adaptive service discovery, creation, composition and enactment in order to support automation of *complex service application construction and their QoS delivery*
- ASAPM: Develop agent-based solutions for *flexible, dynamic and robust management* of service-oriented composition and application provision processes
 - *Adaptive service agreement management*
 - Dynamic selection of services/providers, negotiation of compound service agreements (SLA), dynamic service profiling, and run-time service agreement re-negotiation and life-cycle management (QoS).
 - *Adaptive service process management*
 - Flexible enactment of application service workflow bound with the negotiated services (SLA), its monitoring and visualisation, and mediated re-planning of the original workflow to ensure QoS.
 - *Applications*
 - Telecommunication services
 - Smart Information Environments
 - Multi-media services

Postgraduate research projects (2004)



- Agent-based SLA negotiation in grid service composition
- Adaptive control of QoS in open service environments
- Integration of agent and services grid environments
- Qualitative decision-making mechanisms for collective agent negotiation
- Adaptive and dynamic management of grid services
- Agent-mediated workflow management in virtual enterprises

Questions?

