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Mobility Group

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# **Pervasive Computing & Mobile Agents: building virtual communities in cyberspace**

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# Building research group...

- ✓ More than 60 students (PhD, Masters (R), Masters (C/W), Honours) in 9 years
- ✓ 3-5 academics
- ✓ 180+ publications
- ✓ \$3,500K+ grant money & in-kind support
- ✓ Mobile computing laboratory
- ✓ Luleå University of Technology, Sweden (Skellefteå)
- ✓ HP partnership
- ✓ Microsoft partnership
- ✓ ARC grants
- ✓ Coolcampus
- ✓ DSTC, Cisco...

# Academics/Researchers



- ✓ Arkady Zaslavsky
- ✓ Seng Wai Loke
- ✓ Shonali Krishnaswamy
- ✓ Chris Ling
- ✓ Maria Indrawan
- ✓ Martin Dick
- ✓ Simon Cuce

# Pervasive Computing: Challenges

- ✓ Context: sensing, interpreting, manipulating, formalising
- ✓ Relationship between context, profiles and actors
- ✓ Adaptability & stability
- ✓ Flexible customizable interfaces
- ✓ Accuracy & credibility vs. performance
- ✓ Verification and validation of context

# Research areas

## ✓ Wireless networking and computing

Past projects

Current projects

## ✓ Distributed data mining and e-commerce

Past projects

Current projects

# Research areas

## ✓ Pervasive & mobile computing

Past projects

Current projects

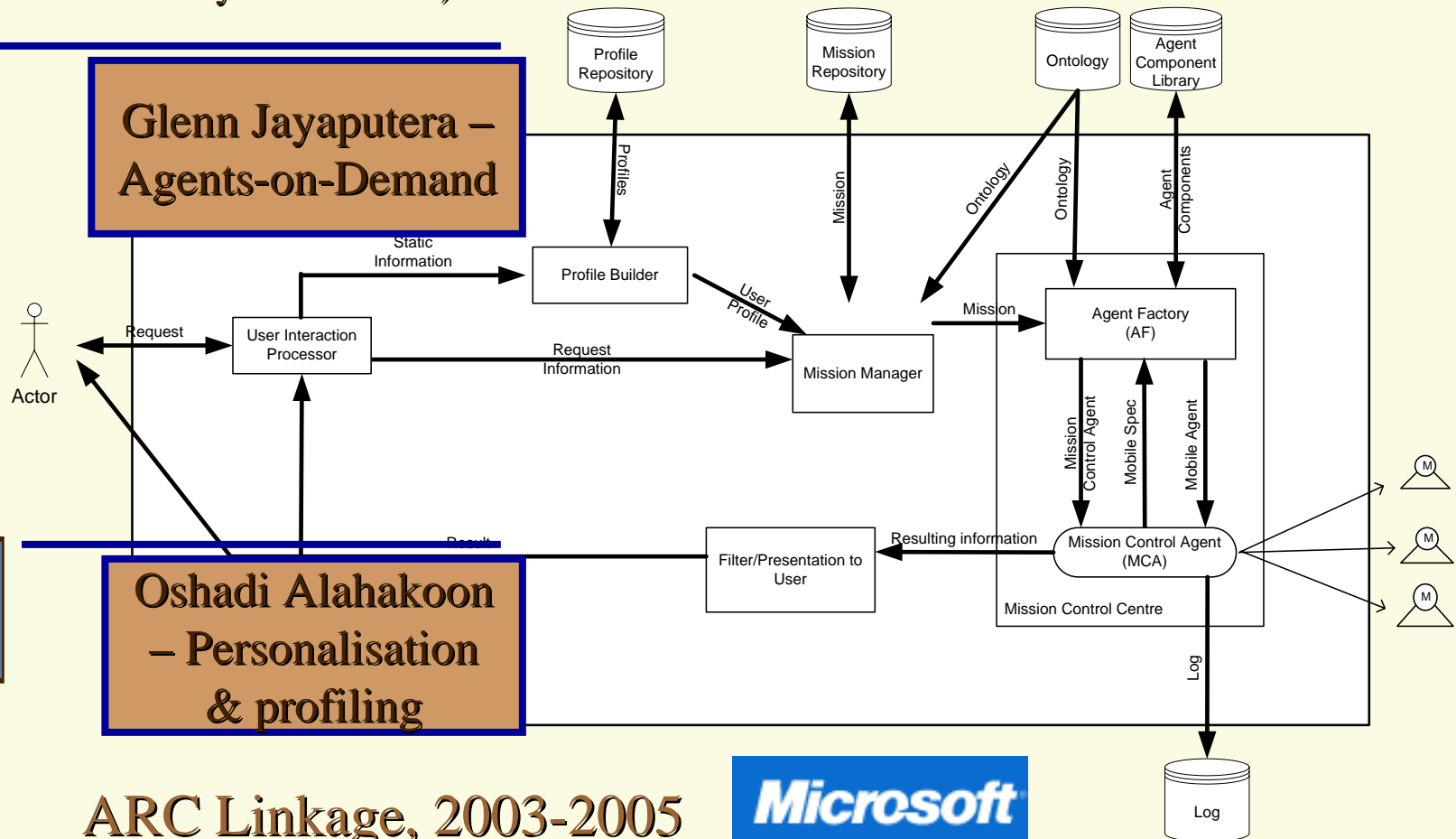
## ✓ Mobile software agents

Past projects

Current projects

# E-Hermes: Context-rich mobile agent technology to support information needs of financial institutions

A.Zaslavsky & S.W.Loke)

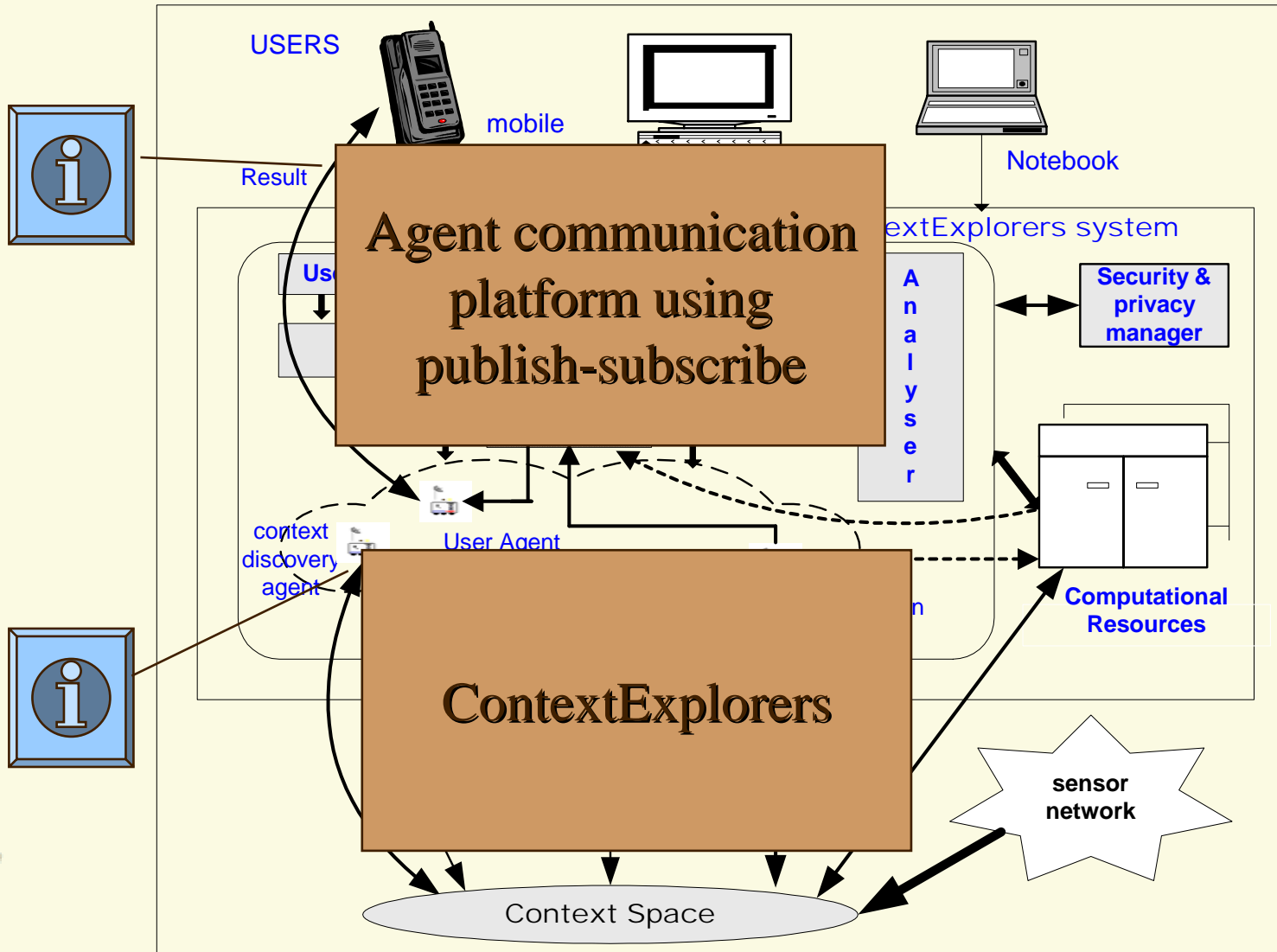


ARC Linkage, 2003-2005

Microsoft

# ContextExplorers - HP PhD endowment

A.Zaslavsky & S.W.Loke)



# ITAG - Itinerary Agents

✓ ITAG - Itinerary Agents - mobile agents (S.W.Loke)

- A high-level language for reasoning with and programming the mobility behaviour of agents

# SoundHunters: Mobile Agents Using Sound

- ✓ Track a moving sound source by listening to the sounds it emits and migrate through the network in order to always stay close to it, at least a step ahead
- ✓ Grasshopper, IBM ViaVoice, Speech Recognition, Sound Files
- ✓ Media attention !!!

# Mobile agent research ...

- ✓ M. Pirotta "Resource billing in agent-based systems" (PhD)
- ✓ Security in mobile agent communities - John Page - PhD project (M.Indrawan)
- ✓ Ontologies and domain-aware mobile agents - Lito Cruz - PhD (D.Squire)
- ✓ Reconnaissance agents - Masters - Rafi Cohen
- ✓ Transportable and Adaptive Web Services Using Mobile Agents - Dennis Pratistha - PhD (M.Dick, S.Cuce)

# Projects...

- ✓ "MAM: a Conceptual Model and Specification Language for Agent Mobility"
  - Team: SW Loke, S Krishnaswamy and R Price
  - Sponsored by a Monash Small Grant 1 year (2004)
  - The project is investigating a model and language for concepts in agent mobility, which can be integrated into different multiagent methodologies.
- ✓ "AOEX: Agent-Oriented Exception Handling Services"
  - Team: Susan Entwisle (Master by Research, part-time) Supervisors: S Krishnaswamy and SW Loke (2003-2004)
  - The project aims to develop an agent-oriented infrastructure which can provide exception handling services to large-scale distributed open systems such as Web services on the Internet and smart spaces.
- ✓ "CALMA: Context-Aware Light-Weight Mobile BDI Agents"
  - Team: Two Master of IT students: Su Hui Chua and Andiwijaya Sumartono Supervisors: S Krishnaswamy, SW Loke (2003-2004)
  - The project is developing a toolkit for mobile BDI agents which are aware of their contexts (such as resources on the hosting device) and can adapt accordingly, lightweight (and run on resource-constrained environments such as small devices) and are dynamically extensible. Agents are supported by an active infrastructure on both the mobile device and stationary servers.

# Projects...

- ✓ "BlueM: Bluetooth and Mobile Agents for Ad Hoc Services"
  - Team: One Master of IT student: Brett Gillick Supervisors: S Krishnaswamy, SW Loke (2003-2004)
  - The project has developed an integration of Bluetooth and mobile agents to provide services to mobile users, where the user's intention for an action and the time the action is carried out can be decoupled in time and space.
- ✓ "Itinerant Distributed Computing with the ITAG Language"
  - SW Loke, S Krishnaswamy, A. Zaslavsky
  - Partly DSTC funded (with three DSTC summer studentships). (1998-current) The project has developed a high-level language for programming mobility behaviour of agent systems. Applications include workflows, parallel and distributed computing, and data intensive Grid computing.

# Projects...

- ✓ **PIAVEE - Platform Independent Agent-based Virtual Educational Environment**
  - Team: John Hurst, Selby Markham, Shonali Krishnaswamy and Mohan Chhetri
  - Sponsored by: Strategic Infrastructure Grant, Monash University
  - The project aims to develop an agent driven support infrastructure that facilitates the following primary objectives:
    - Curriculum development and re-use of curriculum materials with various underlying pedagogical models
    - Self-managed learning
- ✓ **A Formal Compositional Model for Multiagent Interactions**
  - Staff: Chris Ling and Seng Loke
  - Timeline: 2003 and ongoing
  - Funding: Funded by Monash Small Grant in 2003
  - The project shows how to translate AUML interaction protocols to Petri net specifications for verification purposes. It also serves as a basis for synthesising skeleton code of interacting agents from specification in the spirit of interaction-oriented programming.

# Projects...

- ✓ Petri Net Simulation and Analysis of Mobile Agent Itineraries
  - Staff: Chris Ling and Seng Loke
  - Student: Wenjie Chen (Master student - completed 2003)
  - ITAG is a high-level language for programming mobility behaviour of agent systems. This project has developed a Petri net based approach for modelling and analysing mobile agent ITAG expressions. A translation scheme converting the expressions to Petri net models is implemented using an existing Petri net simulation tool called Renew.
- ✓ SoundHunter: Using Mobile Agents to Track Multiple Sound Sources
  - Staff: Arkady Zaslavsky and Chris Ling
  - Student: Stuart Vaile (Master student - completed in Mar 2004)
  - The project has developed a mobile agent system for tracking the positions of multiple real-world objects using the sound emitted from the objects in the spirit of context-aware computing.
- ✓ Visualisation Applets for Mobile Agents
  - Staff: Chris Ling and Arkady Zaslavsky
  - Student Eric Pau (Master student - ongoing)
  - The project aims to use mobile agent technology to develop a visualisation interface to view the movement of mobile agents in an environment.

# CoolCampus - pervasive services and applications in educational environment

- Pervasive/
- Ubiquitous/
- Mobile Research
- Location awareness
- Sensor networks
- Adaptability
- Context management
- Resource constraints
- Devices & services
- Software
- .....



- University users
- Administration
- Library
- Student services
- Academic board
- IT Services
- Community sector
- Monash International
- .....

<http://www.infotech.monash.edu.au/coolcampus/>

QUESTIONS ?

