INFORMATION SOCIETY TECHNOLOGIES
FP6 – CALL 5

Co-operating Objects Workshop
Brussels, June 23-24, 2005

“Software Platform Development for Continuous Monitoring Sensor Networks”

Sebastià Galmés and Ramon Puigjaner
Dept. of Mathematics and Computer Science
University of the Balearic Islands, Spain
Outline

- Taxonomy of data models
- Continuous monitoring sensor networks
- Objectives
- Specific skills
Taxonomy of data models

- Data collection models
  - Continuous monitoring
  - Event driven
  - Store-and-forward
- Dialog models
  - Polling
  - On demand

Sensor nodes
Continuous monitoring sensor networks

- Continuous tracking of certain parameters, characteristics or conditions
- Environmental monitoring
  - Control actions (in automated or non-automated way)
  - Scientific study
- Parameters under study are characterized as time-space functions over the region of interest (sensor field)
Continuous monitoring sensor networks (cont.)

- Periodic sampling vs. stochastic sampling
  - Periodic sampling: all nodes report at a regular rate
    - Overhead (definition of cluster head, data aggregation techniques)
    - Many collisions
  - Our approach: **stochastic sampling**
    - Adaptation of multi-dimensional sampling theory (extension of Nyquist theorem) to the essential nature of sensor networks
Continuous monitoring sensor networks (cont.)

- Stochastic sampling: random scheduling of the sampling process
  - It exploits better the spatial and temporal redundancies
  - It enhances power conservation and network lifetime
  - A new concept of reliability is introduced
Objectives

- Objective 1: To strengthen the research activity around the new proposed strategy (research and technical assessment task)
  - Characterization and analysis
  - Performability, energy and real-time responsiveness modelling
  - Architectural choices (see figure below)
  - Improvement of access mechanisms
Objectives (cont.)

- Objective 2: Design of a software platform for application development, testing and simulation
  - Easy adaptation to specific environments
  - Essential facilities
    - Control actions over sensor nodes
    - Image processing techniques
    - Energy management
    - Tracing
    - Collection of statistics
    - Simulation (hybrid simulation)
Objectives (cont.)

- Objective 1
  - Under development
  - Available results

- Objective 2 - Projected scenario:
Specific skills

- Useful experience of the research group in:
  - Modelling and simulation of queuing network based systems
  - Traffic modelling
  - Performance evaluation of communication networks
  - Real time systems design and performance evaluation
  - Wireless sensor networks

- Participation of the research group in:
  - EU funded projects
  - Spanish Research Plan funded projects
  - Integrated Actions
  - Cooperation with developing countries
  - Private companies funded projects
Thank you!

For more information (profile of our institution, expression of interest, main actor’s profile, detailed participation in research funded projects, publications, etc.), please contact:

http://dmi.uib.es/people/sgalmes

Dr. Sebastià Galmés
  E-mail: sebastia.galmes@uib.es
  Phone: +34-971172989
  Fax: +34-971173003

Prof. Ramon Puigjaner (research group responsible)
  E-mail: putxi@uib.es
  Phone: +34-971173288
  Fax: +34-971173003