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# KIOS Research Center for Intelligent Systems and Networks

*Marios M. Polycarpou, Professor  
University of Cyprus*

*KIOS Meeting  
26 September 2008*



- **Full Name**
  - KIOS Research Center for Intelligent Systems and Networks
  - Ερευνητικό Κέντρο Τεχνολογίας Ευφυών Συστημάτων και Δικτύων «Κοίος»
- **Short Name**
  - KIOS Research Center
  - Ερευνητικό Κέντρο «Κοίος»
- **Webpage:** [www.kios.org.cy](http://www.kios.org.cy)
- **Logo**
- **Current Legal Status**



- **Administrative Support**
  - Kios Administrative Secretary
  - Kios Project Manager
- **Financial Issues**
  - Kios Accounts
  - Overhead return for Centers (meeting with Vice-Rector A. Kakas on 6<sup>th</sup> March 2008)
- **Space** 😞



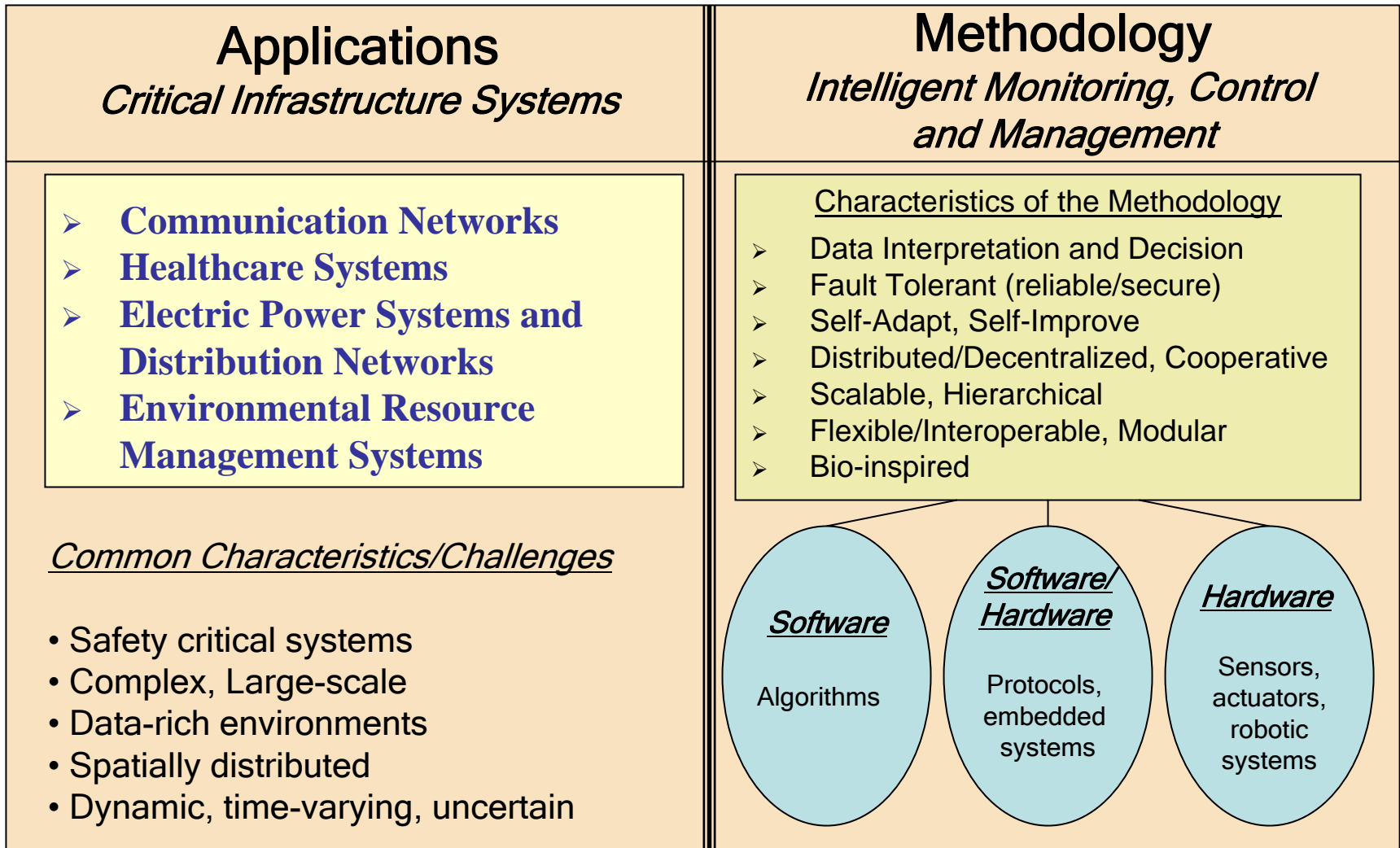
- Submission of a pre-proposal to IPE under the Strategic Centers Programme
- Initiation of a COST proposal: Intelligent Monitoring, Control and Security of Critical Infrastructure Systems (IntelliCIS)
- Organization of the 19th International Conference of Artificial Neural Networks (ICANN'09) in Cyprus, 14-17 September 2009.  
<http://www.kios.org.cy/ICANN09>



- **New European Projects**
  - WATERBEE
  - CON4COORD
  - SCANDLE (under final negotiation)
  - A zero CO2 electricity generation prototype (under final negotiation)
- **New IPE Projects**
  - 12 new projects totaling more than 1.6 M-Euros
- **Kios-Industry partnerships**
- **New positions for Post-Doc and Doctoral students are announced**



# An Overview of the Kios Research Theme



# Design and Analysis of Intelligent Systems

## Motivation

- Generation of huge amount of data in real-time
- Data is in various forms (time series measurements, audio, video, etc)
- Data may be from different geographical locations

## Objectives

- Need for information processing methodologies to extract meaning and knowledge out of the data
- Need to utilize data knowledge to design software, hardware and embedded systems that operate autonomously in some intelligent manner
- Ultimately: real-time decisions in the management of large-scale, complex and safety-critical systems



# Design and Analysis of Intelligent Systems

## Key Issues

- System Identification
- Prediction/Forecasting
- Optimization
- Scheduling
- Control
- Fault Monitoring
- Fault Isolation, Fault Accommodation
- Coordination/Cooperation
- Self-organization



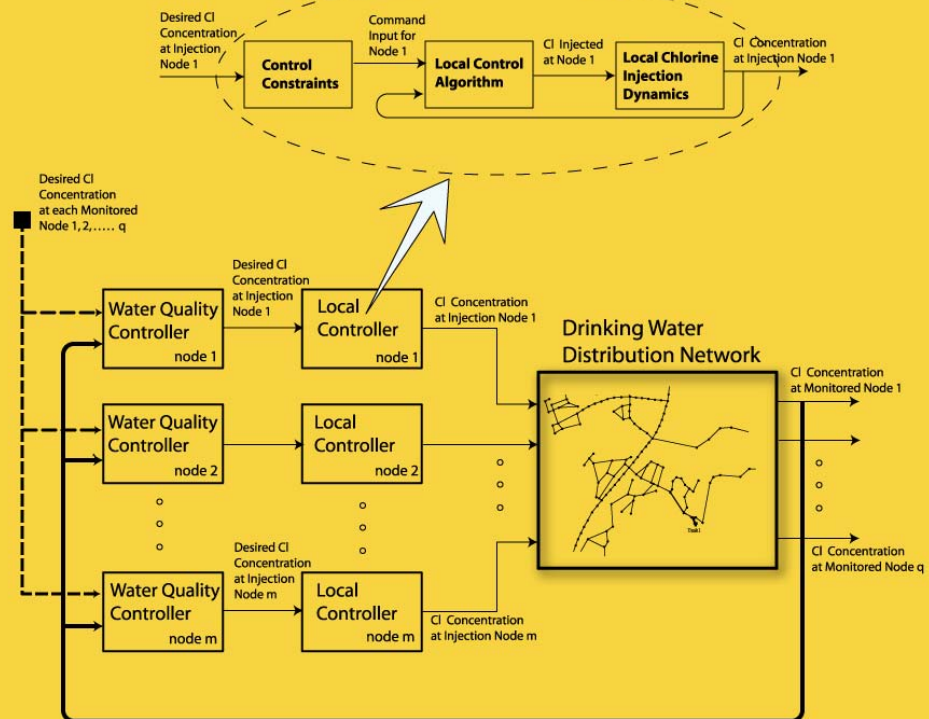
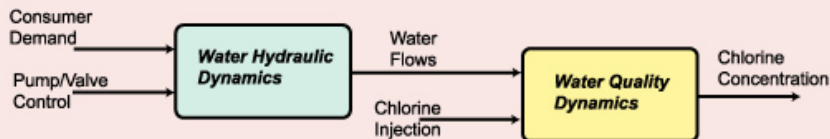
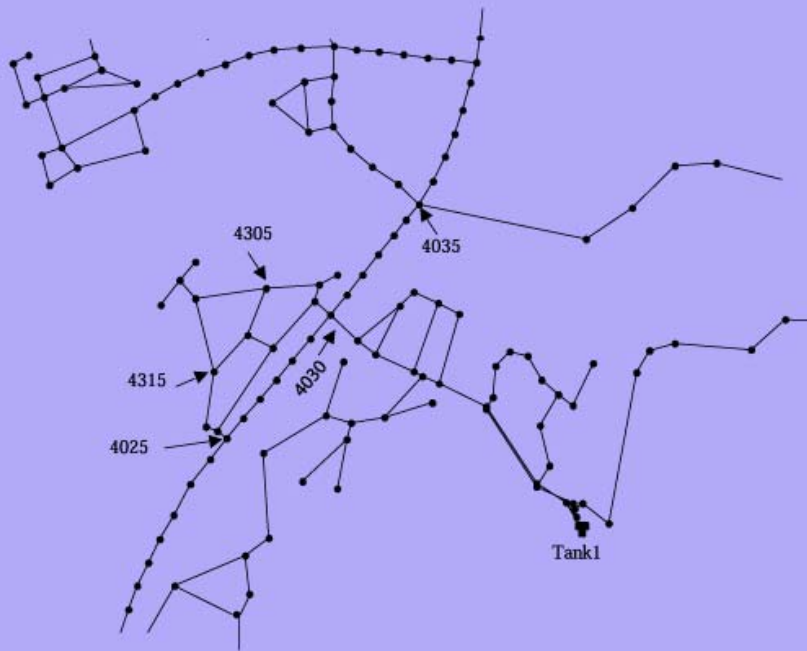
## Applications

- Communication networks
- Chip Multiprocessors
- Healthcare delivery systems
- Medical imaging
- Water distribution networks
- Autonomous vehicles
- Transportation
- Power Systems
- ..... and many more



# Water Distribution Networks

**Objective:** control the spatio-temporal distribution of drinking water disinfectant throughout the network by the injection of appropriate amount of disinfectant at appropriately chosen actuator locations



# Security of Critical Infrastructure Systems

- **Mathematical framework for security of Critical Infrastructure Systems:** define local and global objectives; define interactions of networked systems; define constraints.
- **Potential Applications:** water distribution networks; power distribution networks, optical networks.
- **Optimal Sensor Placement for security of Critical Infrastructure Systems:** given a certain topology, a number of objectives functions (possibly competing), the number of sensors, find suitable node locations for placing the sensors in order to enhance the security of the system under various scenarios.
- **Optimal Actuator Placement for fault management in real-time.**

