

Critical Infrastructures

Everyday life relies heavily on the reliable operation and intelligent management of large-scale critical infrastructures, such as electric power systems, telecommunication networks, and water distribution networks. The design, monitoring, control and security of such systems are becoming increasingly challenging as their size, complexity and interactions are steadily growing.

When critical infrastructures, (e.g., water distribution networks, power systems, transportation networks, and health care delivery systems) fail, the consequences may be tremendous, in view of societal, health, and economic aspects. Disruptions to one of these systems – through deliberate “cyber” attacks, natural disasters, or technical failures – could cause major economic and social damage.

We are all too aware of the damage that may be caused by an unexpected failure in the electricity distribution system or a disruption in the distribution of water, especially if the cause of this disruption is not detected, contained and controlled quickly.

A failure in one infrastructure could lead to failures in other sectors as well, because of the synergistic effect of critical infrastructure industries on each other. Critical infrastructures are dependent on each other, or sometimes interdependent.



ESF COST

COST is an intergovernmental framework for European Cooperation in Science and Technology. The framework focuses on the creation of specialists networks for collaboration between European scientists to address specific research challenges and help strengthen Europe's research and innovation capacities.

The main objectives of COST are to:

- build capacity by connecting high-quality scientific communities throughout Europe and worldwide;
- provide networking opportunities for early career investigators;
- increase the impact of research on policy makers, regulatory bodies and national decision makers as well as the private sector.

This is achieved through COST Actions which are science and technology networks, with a duration of four years, and a minimum participation of five COST Member countries. The science and technology networks are organized through a range of networking tools, such as workshops, conferences, training schools, short-term scientific missions, publications, etc.

As a precursor of advanced multi-disciplinary research, COST has a very important role as a “bridge” towards the scientific communities of emerging countries, increasing the mobility of researchers across Europe and fostering the establishment of “Networks of Excellence” in many key scientific domains.




IntelliCIS
COST Action **IC0806**



www.cost.eu



COST Action IC0806:

Intelligent Monitoring, Control and Security of Critical Infrastructure Systems (IntelliCIS)

Working together for the secure, reliable, and optimal operation of critical infrastructure systems.

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What is IntelliCIS?

IntelliCIS is an acronym for Intelligent Monitoring, Control and Security of Critical Infrastructure Systems. It is a European-wide scientific and technology knowledge platform, established to instigate interdisciplinary interaction and the development of innovative intelligent monitoring, control and safety methodologies for critical infrastructure systems, such as electric power systems, telecommunication networks, and water distribution networks.

IntelliCIS is a COST Action, which is a science and technology network enabling cooperation among scientists and researchers across Europe. It was initiated by the KIOS Research Center for Intelligent Systems and Networks at the University of Cyprus. The aim was to bring together researchers working in various different fields, in order to enable the cross-fertilization between research areas, knowledge transfer and technology transfer between areas and between Academia and Industry.

IntelliCIS has members from 34 different countries, including non-European countries (South Africa, USA, Australia and Moldova). The network has brought together 188 scientists from Europe and beyond, providing an ideal avenue for researchers to share knowledge and enhance their expertise through collaboration.

The network has explored key and critical aspects of electric power infrastructures, communication infrastructures and water infrastructures, and their management, monitoring and control through innovative techniques based on the principles of distributed, multi-level control, intelligent agents, adaptivity, fault tolerance and self-healing approaches aided by intelligent sensors and actuators.

The activities of IntelliCIS were organized in four Working Groups (WG). Three WGs promoted research dealing with intelligent monitoring and control of specific application infrastructures. The fourth WG focused on the development of a common methodological framework for bringing together the various application domains.

This structure has facilitated the cross-fertilization of ideas between the areas and has assisted in achieving one of the fundamental objectives of this Action which is to bring together researchers from different research fields with common scientific challenges. This has also helped to investigate models and design methodologies for the interaction and interdependence between application infrastructures; for example, the interaction between communication networks and electric power networks.

The four Working Groups are:

- WG 1: Intelligent systems approaches for critical infrastructure systems (CIS)
- WG 2: Reliable management and control of electric power systems
- WG 3: Reliable management and control of telecommunication networks
- WG 4: Health monitoring and control of water systems

Outcomes and Impact of the IntelliCIS COST Action

The IntelliCIS COST ACTION has succeeded in the development of a novel, European-wide, scientific and technology knowledge platform capable of making significant contributions to ensuring the secure, reliable, and optimal operation of critical infrastructure systems.

Critical infrastructure systems are of crucial importance to the European well-being and economy, and have an enormous scientific and commercial growth potential. Reducing the vulnerabilities of critical infrastructures is one of the major policy objectives of the EU, which is the most densely populated region in the world, with a number of inter-connected infrastructure networks that have different owners or operators. Research on critical infrastructure systems can assist in the increase of their security, as well as to the development of novel technological tools, methodologies and processes to gain a global technological edge.

IntelliCIS has:

- Created a critical mass for a strong interdisciplinary research team that can tackle challenging engineering problems related to the monitoring, control and security of CIS.
- Promoted the technology transfer from academia to the industry and other government organizations.
- Facilitated knowledge transfer between organizations and researchers, as well as between research areas through cross-fertilization of ideas.
- Has brought together researchers with diverse backgrounds and expertise to create synergies.
- Provided the opportunity to initiate conferences/symposia on intelligent management, control and security of CIS.

