

# Critical Infrastructure Preparedness and Resilience Research Network (CIPRNet)

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## CIPRNet – Critical Infrastructure Preparedness and Resilience Research Network

- **Network of Excellence**, co-funded by FP7
- **Term:** 1.3.2013–28.2.2017



### Partners

1. Coordinator:  
Fraunhofer IAIS, DE
2. ENEA, IT
3. TNO, NL
4. UIC, FR
5. CEA, FR
6. EC Joint Research Centre, EU
7. Deltares, NL
8. University of Cyprus, CY
9. University of Technology and Life Sciences, PL
10. Università Campus Bio-Medico di Roma, IT
11. University of British Columbia, CA
12. ACRIS GmbH, CH



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- Experience in 60 research projects in CIP (FP6, FP7, EPCIP, CIPS, ...)
- Large inventory of knowledge and technologies
- Advisory board of government agencies, CI private sectors, and science
  - Dutch and Austrian Ministries
  - German BBK
  - Supplier ABB
  - Associations fostering CIP on national and EU level
- Internal Security Advisory Group
- External Independent Ethics Board

## CIPRNet

### Observations: CIP in Europe



- European Critical Infrastructures (ECI) directive 2008 adopted
- National CIP plans passed in some MS and are being successively implemented
- R&D projects on CIP, funded by Framework Programmes, EPCIP, and other programmes
- European-level community-building activities by ERNCIP and CIWIN
- **BUT: Transfer of CIP-related research results into practice typically lagged behind expectations in the EU.**
- **There is no facility in Europe that provides long lasting support in terms of both knowledge and technology to European emergency managers and CI operators.**
- In order to match the **advanced modelling, simulation and analysis capabilities** of NISAC in the USA, some European investment in developing such capabilities is needed.

The CIPRNetwork will provide  
**concrete and long-lasting support**  
from the CIP research communities to the **initial audience**,  
**enhancing their preparedness for CI-related emergencies**, and  
**provide knowledge and technology** to other stakeholders for  
**improving the understanding and mitigation of**  
**the consequences of CI disruptions**,  
leading to an enhanced resilience of CI.

**Stakeholders include:**

- **End-users (initial audience):**  
National and EU emergency management and other public authorities, Critical Infrastructure (CI) operators
- **Research:**  
core Critical Infrastructure Protection (CIP) research centres, individual researchers in CIP and related research areas, academic students, next generation infrastructure researchers including smart grid R&D
- **Other:**  
the population in the EU and nations (being safe and secure), private and public sector CIP policy-makers, governmental agencies, CI sector-specific associations, CI operators, CI owners

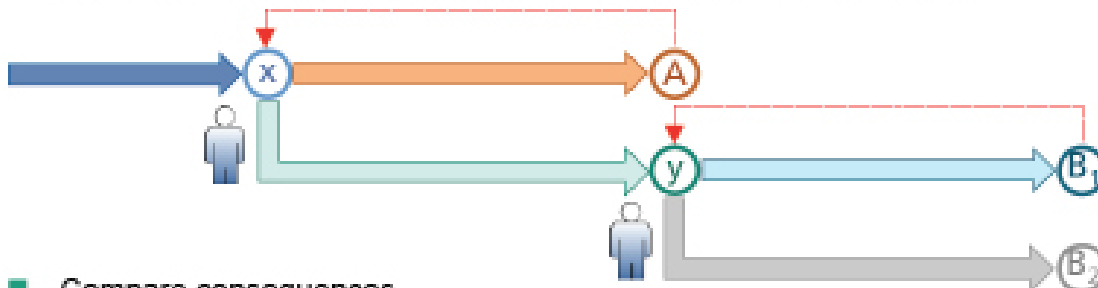
- Providing new **capabilities** to end users for better preparedness for CI-related emergencies:
  - **advanced decision support**
  - **»what, if ...« analysis**
  - **support of secure design of next generation infrastructures**
  - **»ask the expert« service**
- Building required **capacities** by educating and training experts and researchers (reaching a critical mass)
- **Providing knowledge and technology** to end users for improving their understanding of the role of CI in crises and emergencies.
  - **simulators, middleware, models, ...**
- Provide long-lasting end user support by establishing a **Virtual Centre of Competence and Expertise in CIP (VCCC)**.

- **Essential for preparedness and for mitigation capabilities** of emergency and crisis management staff and first responders:
  - Knowledge and practical experience gained in **real events**
  - Knowledge and practical experience gained in **real exercises**
  - Knowledge and experience gained in other **training activities**
- National exercise frequency: 1 per year (Germany) => Only 1 scenario **per year!**
- **Modelling, simulation & analysis by computer** provides:
  - Additional opportunities for training and practising
- MS&A also provides a basis for
  - Capability for **understanding (static and dynamic) dependencies** between CI
  - Capability for **analysing consequences and impacts of CI service disruptions**
  - Capability for doing **»what, if ...« analyses (different courses of actions)**
  - Capability for doing **post mortem analyses**

### CI MS&A modelling for analysing various possible courses of action

- »what, if ...« analysis:

The exploration of different courses of action and their different consequences in terms of the cross-cutting criteria mentioned in the ECI directive



- Compare consequences of courses of action A, B<sub>1</sub>, B<sub>2</sub> (consequence analysis)

- E.g.: Which action produces the least consequences?

### CI MS&A modelling for analysing various possible courses of action

- Application: planning the most effective use of resources in an emergency and exploring a variety of scenarios, for example:
  - which region to evacuate first
  - which infrastructures to reinforce best/first
  - which transport or traffic infrastructures required for a mitigation plan will be affected by a disaster and what contingency planning is required
  - which infrastructures outside a region affected by a disaster need to be operational in order to supply that region and thus need to be protected too

## Decision Support System with consequence analysis

- **Decision Support System (DSS)** for supporting Emergency Managers by providing a comprehensive assessment of the behaviour of CIs under severe perturbations.
- DSS tasks:
  - extract a 'dynamic' probability that a CI will be hit/disrupted by an external event
  - set-up the emergency scenario
  - evaluate the impact of the disruption of CI elements causing a reduction in the Quality of the delivered Services
  - evaluate the impact on population and economy (consequences analysis)
  - provide risk and emergency managers as well as CI operators with data and estimates helpful for making accurate scenarios assessment needed for undertaking the necessary decisions for optimal mitigation and healing strategies

## Basis for consequence analysis

- **Cross-cutting criteria** mentioned in the EU directive on European CI (ECI):
  - a) **casualties criterion**  
(assessed in terms of the potential number of fatalities or injuries)
  - b) **economic effects criterion**  
(assessed in terms of the significance of economic loss and/or degradation of products or services; including potential environmental effects)
  - c) **public effects criterion**  
(assessed in terms of the impact on public confidence, physical suffering and disruption of daily life; including the loss of essential services)
- Challenge: Quantification of the consequences
- Opportunity: Consequence analysis as basis for deciding on choosing courses of action



	DSS	»what, if ...« analysis
Methods		
Consequence analysis	X	X
MS&A	X ← Inter	face → X
Application	Training	Training
	Hot phase support	Post mortem analysis
		Sensitivity analysis
Target audiences	CI operators	Emergency managers
	Emergency managers	Decision makers

## CIPRNet Joint Programme of Activities

### Long lasting support



#### Virtual Centre of Competence and expertise in CIP (VCCC)

- CIPRNet will create the tangible VCCC already during the project term
  - by implementing the CIPRNet agenda and
  - by combining and integrating the excellence in CIP knowledge, expertise, experiences and technology of the partners.
- The VCCC serves as the foundation of the long-lasting European Infrastructures Simulation and Analysis Centre (EISAC).
- The »face« of the VCCC will be the CIPRNet web portal.
- EISAC 2020 is the **vision** of a European facility that matches NISAC

- Urgent need for advanced decision-support and consequence analysis capabilities for emergency managers and CI stakeholders in Europe
- National resources insufficient for creating the required capabilities
- No European CIP MS&A capability available
- Additional efforts required for creating new capabilities
  - pooling resources: experts, researchers, knowledge, technology
  - **transferring research results into practical application**
- A European Infrastructures Simulation and Analysis Centre, delivering such capabilities at different levels, could be the solution
- CIPRNet undertakes a next step towards realising EISAC by capability forming and capacity building
- Complementary to ERNCIP and CIWIN activities

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**Thank you for your attention!**