

# Design and Analysis of Interdependent Critical Infrastructure Experiments

## 1 Background

The Capability Systems Centre (CSC) is exploring the possibility of collaboration with researchers with expertise in the design and analysis of critical infrastructure modelling. We are particularly interested in interdependencies among various components of critical infrastructures, where participants are confronted with the challenge of predicting and controlling a dynamic system. CSC calls for EOIs from interested researchers with the suitable background and expertise to tackle the following work package.

## 2 Work package overview

CSC is interested in developing a research agenda focused on establishing an empirical understanding of various components of critical infrastructures and their interdependencies. A first fundamental step towards this direction is to establish a well-grounded view of existing experimental literature. The purpose of this work package is to draw on existing definitions and theoretical conceptualisation of interdependencies among critical infrastructure components and use this conceptualisation to assess and map how this conceptualisation has been operationalised in literature.

### 2.1 Scope

Commonwealth and state and territory governments share the following definition of critical infrastructure:

*‘those physical facilities, supply chains, information technologies and communication networks which, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact the social or economic wellbeing of the nation or affect Australia’s ability to conduct national defence and ensure national security’.*

(Source: The Critical Infrastructure Resilience Strategy, 2010)

The critical infrastructure sectors include the telecommunications, energy, health and emergency, transportations systems, water and waste water, food, financial services, oil and gas, and ports sectors.

The initial focus will be on the electricity, water, telecommunications and ports sectors. CSC is interested in

- 1) the identification of various elements of each of the identified critical infrastructure sector, and
- 2) the linkages between each of these sectors to form a system of systems view of the whole critical infrastructure network.

Given that the critical infrastructure sectors operate in dynamic environments, this task should consider using appropriate simulation modelling techniques (e.g. agent based models) to examine the interdependencies among critical infrastructure and the assess the systemic risks emerging from those interdependencies, and implications for decision support.

## 2.2 Focus

In this study, we aim to contribute to bridging this fundamental research gap, by addressing the following questions:

1. What elements form each critical infrastructure sector?
2. What interdependencies exist among the various sectors?
3. What is the best approach to assess the type and degree of interdependencies (i.e. impacts of disruption to one sector on other interdependent sectors)?
4. What are the future research opportunities in relation to this topic?

## 2.3 Milestones and Deliverables

Below are the indicative milestones for the task:

Milestone #	Milestone description	Date
1	Initial workshop with CSC staff to establish working arrangements, further define the problem and to clarify any questions or issues	Within two weeks of commencement of agreement, Location: TBD
2	Critical appraisal of the modelling techniques and decision support tools available to support critical infrastructure planning. This critical appraisal should be accompanied with a detailed proposal of the research questions to be tackled, the methodological framework (techniques and tools) to be used to address the defined question.	
3	Implementation of the proposed methodology	
<b>Deliverable 1:</b> Joint paper with CSC staff covering Milestones 1-3 to be submitted to relevant journal (TBD)		

## 3 References

<https://www.tisn.gov.au/Documents/Australian+Government+s+Critical+Infrastructure+Resilience+Strategy.pdf>

## 4 Requirements

Please provide

- A brief CV describing your research background.
- A focussed statement of your suitability for undertaking the work detailed above.
- A detailed description outlining how you would undertake the research described above.
- A brief project plan attaching dates and an outline budget to the milestones outlined above.

## 5 Submissions

Submissions must be lodged via email, as a PDF file, to: [capabilitysystems@adfa.edu.au](mailto:capabilitysystems@adfa.edu.au).

Inquiries may be directed to: Associate Professor Mike Ryan, Director, Capability Systems Centre, [capabilitysystems@adfa.edu.au](mailto:capabilitysystems@adfa.edu.au).