

ACCS Research

In the *science* stream of its research program, the Centre aims to develop a coherent set of theories, computational techniques and modelling tools for network based systems, drawing inspiration from nature.

The *engineering* stream of the Centre's research program aims to provide a modelling framework, theory, toolset, and infrastructure to enable economic and reliable modelling and simulation.

- > **Genetic regulatory networks** pose fundamental questions about growth and form in cellular biology. We seek to better understand the network structuring and control mechanisms that underlie genetic regulation in cell-level development of organisms, extract general principles, and transfer them to other domains, such as air traffic control and economics.
- > **Free-flight air traffic control** involves a shift from centralised to localised control-where pilots take over primary responsibility for maintaining separation between aircraft. Safety and service continuity issues arise.
By modelling airspace as networks of aircraft, we can apply complex systems science to the free-flight problem and develop new solutions.
- > **Evolution of economic systems** is an application area to which our core research is applied. We aim to establish a new kind of value theory that can translate the connective geometry of economic systems into aggregated value measures.



Australian Government
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The ARC Centre for Complex Systems is a partnership of:

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ARC Centre for Complex Systems



ARC CENTRE FOR
COMPLEX SYSTEMS

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The ARC Centre for Complex Systems (ACCS) conducts world-class basic and applied research on questions fundamental to understanding and managing complex systems.

The ACCS is headquartered at The University of Queensland, Brisbane, with nodes at Griffith University, Brisbane, Monash University, Melbourne, and UNSW@ADFA, Canberra.

The Centre brings together leading researchers from a range of disciplines including:

- > systems and software engineering
- > visualisation
- > human factors
- > mathematics and statistics
- > application domains including aerospace, economics and biology .

World-class basic and applied inter-disciplinary research on questions fundamental to understanding, designing and managing complex systems.



A network view

A network view of complex systems is based on the observation that many complex systems share these characteristics:

- > **networks of interacting agents** – how do macro-level system properties and behaviours emerge from relatively simple micro-level interactions?
- > **emergent properties** such as self organisation and cascading failures – how can complex systems be managed and controlled?
- > **adaptation** – what mechanisms enable natural complex systems to self-organise and adapt?

Supporting researchers

Details of research assistant and postdoctoral research positions are posted on the ACCS web site as opportunities arise. The ACCS supports postgraduate and postdoctoral researchers to work on our research program by providing the projects, advisors and facilities, and offering some scholarships.

Participation & Collaboration

The ACCS encourages participation in its research programs. To receive regular announcements of seminars and other Centre activities, email us requesting to be added to the ACCS emailing list. To become an official Centre Participant, you need to be actively involved in a Centre project. Details of current projects and Project Leaders are available on the ACCS website. To apply for Centre Participant status, contact the Director.