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University of Queensland

Research Computing Centre

Strategic Plan

2013 - 2018

David Abramson

EXECUTIVE SUMMARY

New techniques and technologies are enabling us to both ask, and answer, bold new questions. This is causing a significant shift in the way research is conducted, leveraging new resources such as massive data stores, enormous computational power and new ways of communicating. This emergent infrastructure is called e-Research.

For researchers trained in recent decades, this represents a substantial challenge. In order to even remain competitive, let alone lead their field, they need to embrace the new ways of working, and must feel comfortable and productive in this new environment. In response, governments and private organisations around the world have invested not only in e-Research, but also in support services that allow researchers to be productive.

The Research Computing Centre (RCC) is a University level Centre that provides coordinated management and support of the University's sustained and substantial investment in e-Research. RCC is an innovative and multidisciplinary environment that supports collaboration to facilitate discoveries in science and engineering, humanities, and social sciences, through advanced computation, data analysis and other digital research tools. The centre enhances the University's e-Research infrastructure, and provides support for interdisciplinary research and education.

RCC has developed a structure and interaction model that matches the way research is conducted at UQ, leveraging expertise in Faculties, Research Centres, Institutes and other support groups. This is no mean feat – the UQ research landscape is complex, diverse and distributed, and employs widely different models that are domain specific. RCC has developed a unique, multi-tiered structure that both lowers the gap between researchers and e-Research infrastructure, but empowers those who already have the skills to excel.

RCC leverages investment by government in initiatives such Queensland Cyber-Infrastructure Foundation (QCIF); the National eResearch Collaboration Tools and Resources (NeCTAR); the Research Data Storage Infrastructure project (RDSI); and the Australian National Data Service (ANDS). It also builds on key support services in the University, namely Information Technology Services (ITS) and the Library.

RCC aggregates expertise in core e-Research technologies, such as Cloud Computing, Data Management, High performance Computing (HPC), Workflow Tools and Visualisation. Over and above this, it builds an expandable layer of domain expertise, initially in Bio-informatics and Genomics; Computational Engineering; Environment and Ecology; Humanities and Social Sciences; and Advanced Imaging. These domain layers are the primary interface to researchers, and are collaborative ventures with existing groups.

RCC uses a collaborative funding model, utilising multiple sources, including the Office of the Deputy Vice-Chancellor (Research), QCIF, NeCTAR, RDSI, ANDS and other initiatives. It is likely that changes will occur in the national landscape across the planning horizon of this plan, so adjustments will be made depending on the level of State and Federal investment.

At UQ, we have no choice but to engage. RCC is a key partner in this journey, and this 5 year plan provides the details.

INTRODUCTION

New techniques and technologies are enabling us to both ask, and answer, bold new questions. This is causing a significant shift in the way research is conducted, leveraging new resources such as massive data stores, enormous computational power and new ways of communicating. This emergent infrastructure is called e-Research.

For researchers trained in recent decades, this represents a substantial challenge. In order to even remain competitive, let alone lead their field, they need to embrace the new ways of working, and must feel comfortable and productive in this new environment. In response, governments and private organisations around the world have invested not only in e-Research, but also in support services that allow researchers to be productive.

CONTEXT

Established in 2011, the Research Computing Centre is a University level Centre reporting to the Deputy Vice-Chancellor (Research) that provides coordinated management and support of the University's sustained and substantial investment in eResearch infrastructure. The Research Computing Centre is an innovative and multidisciplinary environment that supports collaboration to facilitate discoveries in science and engineering, humanities, and social sciences, through advanced computation, data analysis and other digital research tools. The centre enhances the University's eResearch infrastructure, and provides support for interdisciplinary research. The Centre interacts with all Faculties and Institutes, the University's Information Technology Services and the Queensland Cyber Infrastructure Foundation as well as industry and government.

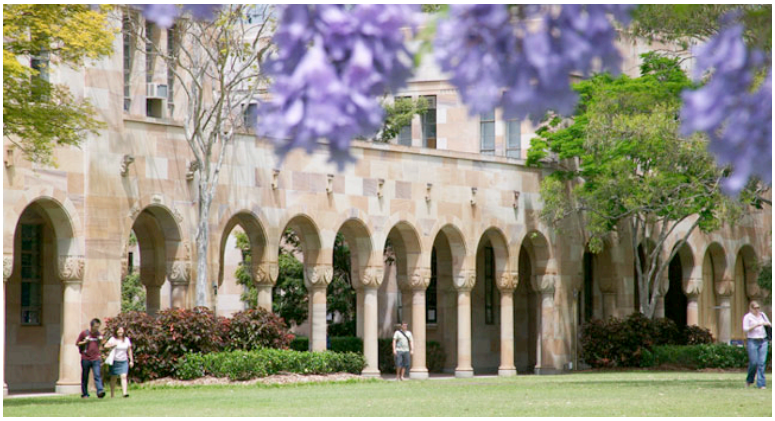
RCC supports and underpins the 2013-2017 University Strategic Plan Discovery themes:

Theme 1: Develop a critical mass of expertise and an uncompromising focus on research of the highest quality to increase international recognition for leadership;

Theme 2: Encourage and support research collaboration with key Australian and international universities, and high quality end-users (including public agencies, communities and industries);

Theme 3: Foster outstanding performance from early career researchers at higher degree, post doctoral and early career levels; and

Theme 4: Enhance and sustain an excellent research infrastructure capability, concentrating on the University's existing and emerging areas of research strength.



AIM

The aim of this document is to set the broad strategic direction for RCC, and annunciate a range of goals and strategies. A separate operational plan presents specific implementation plans on an annual basis.

GOALS

Goal 1: Build critical mass of expertise in e-Research Technologies

5 key generic technologies are important for building modern research applications:

- *High Performance Computing (HPC)*
- *Data management (DM);*
- *Cloud Computing (CC);*
- *Visualisation (VIS);*
- *Scientific workflow tools (SWF).*

Strategy 1: Recruit and retain staff with expertise in core areas

RCC will recruit and retain professional IT staff with expertise in these 5 areas. Staff will form agile teams that support short-term projects efficiently. While RCC cannot compete on salary, it will provide exciting projects and excellent opportunities for staff to work at the leading edge of technology. Further, professional development will be provided to maintain excellence.

Strategy 2: Create 'RCC fellowships'

A wide range of relevant expertise already exists in the University. RCC Fellows will retain their existing positions, and may also provide linkages to PhD students and projects of relevance to the Centre.

Strategy 3: Leverage research partnerships nationally and internationally

RCC will liaise with national bodies, such as NeCTAR, RDSI, ANDS and NCI to bring specific skills to UQ researchers. Further, RCC will build links to key international groups to access best practice globally.

Strategy 4: Utilise existing skills in UQ ITS and Library

RCC does not duplicate expertise in other service units, and will partner with Information Technology Services (ITS) and the Library to provide an all encompassing support for researchers. In particular, RCC will look to ITS for expertise in operating research infrastructure, and the Library for expertise in data management, sharing and curation.

Goal 2: Form partnerships in key University research priorities

RCC is an innovative and multidisciplinary environment that supports collaboration to facilitate discoveries in science and engineering, humanities, and social sciences, through advanced computation, data analysis and other digital research tools. It does this by forming partnerships with research groups in the University.

Strategy 1: Invest in strategic research themes

UQ has a wide portfolio of research. Initially, RCC will focus on Bioinformatics & Genomics; Imaging; Environment and Ecology; Computational Engineering; and Humanities and Social Sciences. These will be augmented with emerging areas over time.

Strategy 2: Execute a co-investment model to support partnerships

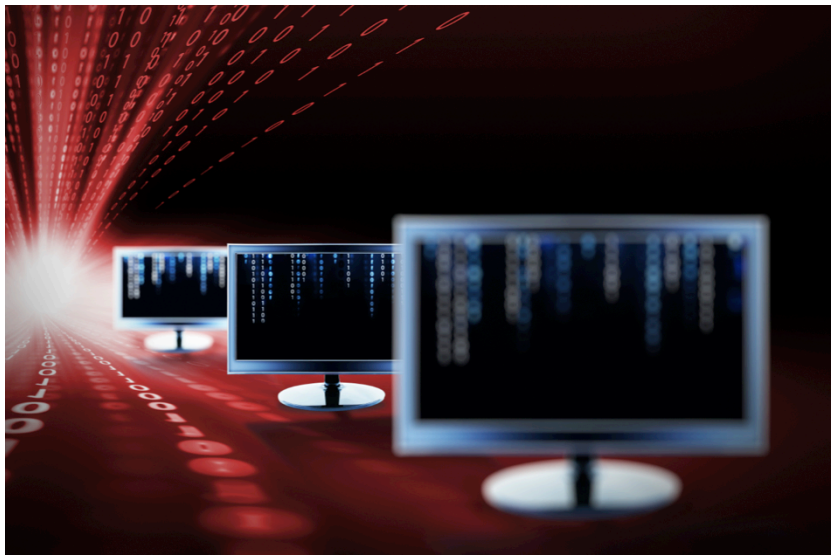
RCC will develop and execute a co-investment model in which strategic research themes are supported both by internal funds and key stakeholders. Thus, research will be supported by a mix of central and domain specific funding. A minimal level of support will be required to produce sufficient critical mass, however, additional funding will used to expand the range of services on a needs basis.

Strategy 3: Perform collaborative projects in target research themes

Together with our partners, RCC will establish a set of implementation projects. These may range in scope from installing and applying appropriate software stacks through to development of new software solutions for challenging research problems.

Goal 3: Increase research uptake of leading edge equipment and software

A wide range of computing platforms and software services are available nationally. RCC will work with researchers to identify and locate appropriate resources, and implement solutions across these.



Strategy 1: Leverage significant national resources

RCC will work with researchers to utilise a wide range of national advanced e-Research infrastructure. This includes local computing equipment at UQ (including the QCIF operated QRIScloud), as well as high performance systems at NCI, NeCTAR, MASSIVE and VLSCI. Particular focus will be on the exploitation of infrastructure to support both computation and data storage in research.

Strategy 2: Build expertise in open source and commercial software platforms.

RCC will engage with the latest developments using both open source and commercial software as appropriate. Examples include OpenStack for cloud computing, Nimrod for distributed computation, and OMERO and DARIS, for data repositories.

Strategy 3: Build local infrastructure

Strategy 1 specified leveraging national infrastructure, but RCC will build local infrastructure where it complements existing national resources and addresses a strategic need for UQ research

Strategy 4: Develop uniform platform for University HPC infrastructure

RCC will develop and deploy information systems that make it easier for researchers to discover resources. This will involve the deployment of a single point of access for computational and data infrastructure.

Goal 4: Promote e-Research

RCC will increase awareness of the potential of e-Research technologies at UQ and in the broader community.

Strategy 1: Promote activities and achievements

RCC will produce and distribute newsletters, flyers and press releases that present e-Research exemplars in the University. These communications will target both UQ researchers as well as the wider community.

Strategy 2: Public seminars

RCC will run public seminars on relevant topics and promote these to both UQ researchers and wider community. The use of advanced video conference and display technology, plus RCC's extensive international links, will make it possible to source speakers from all around the world.

Strategy 3: Outreach to UQ students

RCC will engage UQ students in e-Research projects. It will provide unique training opportunities for both undergraduate and postgraduate students.

Strategy 4: Outreach to high schools

Today's high school students are tomorrow's undergraduate and graduate students. RCC will engage with local secondary schools about UQ research and the role of advanced computing..

Goal 5: Play leading role in national e-Research policy

RCC plays a role nationally and internationally by providing leadership in the deployment of advanced technologies for research.

Strategy 1: Contribute to national bodies and committees

RCC will contribute and lead the development of e-Research in Australia through membership in various governing bodies and committees.

Strategy 2: Organise and engage in national conferences

RCC will host and organise a range of international and national conferences through membership of appropriate organising committees.

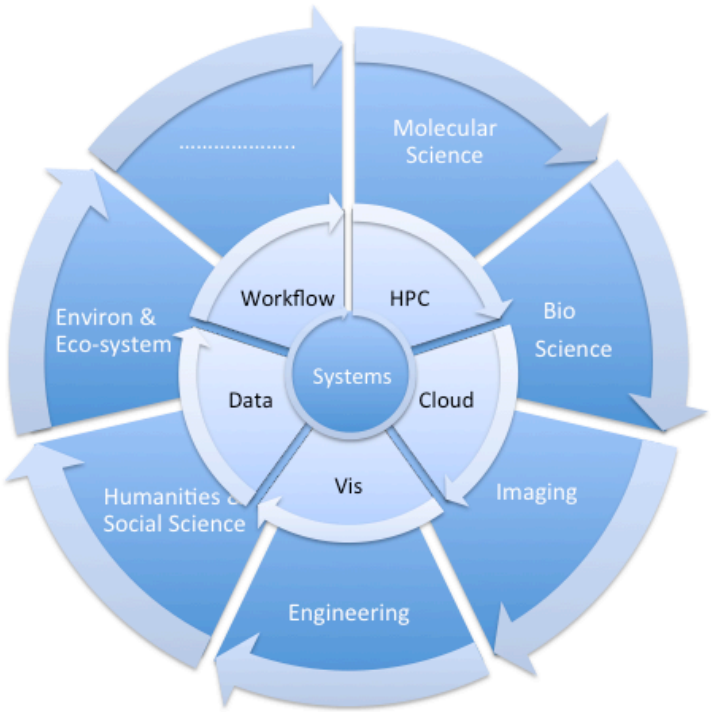
CENTRE STRUCTURE

RCC has developed a structure and interaction model that matches the way research is conducted at UQ, leveraging expertise in Faculties, Research Centres, Institutes and other support groups. This is no mean feat – the UQ research landscape is complex, diverse and distributed, and employs widely different models that are domain specific. RCC has developed a unique, multi-tiered structure that both lowers the gap between researchers and e-Research infrastructure, but empowers those who already have the skills to excel.

The RCC model layers domain specific research expertise ('Themes') on top of generic computing tools ('Core'). Researchers can engage at a variety of levels depending on their own skills and needs. The innermost 'Core' layers contain generic technologies that can be applied across a wide range of research areas. For example, workflow tools can be applied in everything from digital humanities to molecular science. Data management occurs in almost all research, but needs vary in different fields. The outer 'Theme' layers are domain specific, and contain multi-disciplinary teams with both domain knowledge and computing skills. The model does not dictate particular Themes, but supports those of strategic importance to the University.

Agile teams are formed pulling expertise from a variety of areas. For example, a project in Bio-science may require skills in data management, high performance computing and workflows. Another project in imaging may require expertise in data management alone. The RCC structure allows the centre to adapt to varying needs over a longer planning horizon.

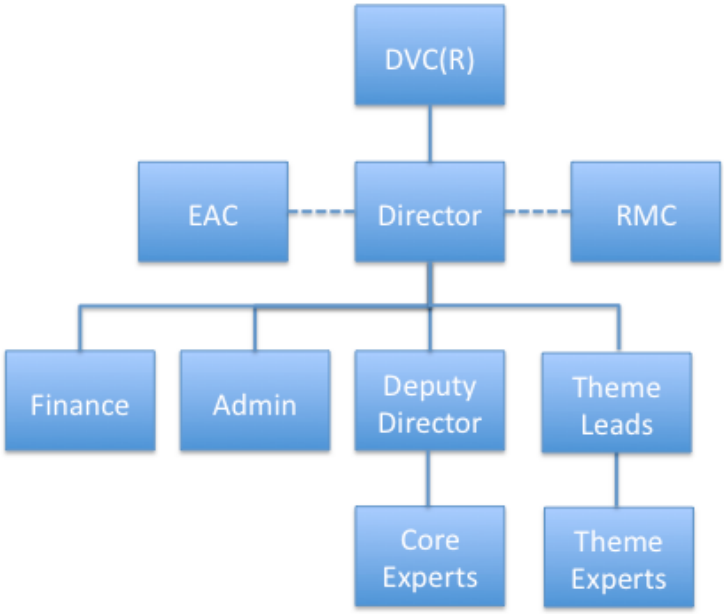
Importantly, RCC will fund all activities in the inner two layers, and will call for co-investment in the outer, domain specific, layers. This provides a base level of service, but allows research units to provide direction on the resourcing of various Themes.



RCC maintains a close working relationship with UQ library around research data management. Specifically, RCC will focus mainly on technical issues associated with data storage and transport (particular of large data sets), whilst the Library will focus mainly on the development of data management plans, meta-data specification and management and linking to publications. Together, these will underpin UQ's Data Management Policy.

GOVERNANCE

RCC reports to the Deputy Vice Chancellor (Research) and attracts core funding from the University research budget.The Deputy Director is responsible for management of the Core Experts, however for strategic reasons the Theme leads report to the Director.



EXTERNAL ADVISORY COMMITTEE (EAC)

RCC will convene a small focussed External Advisory Committee, comprising:

- Director, RCC
- DVC-R or delegate
- CEO, QCIF or delegate
- Director of e-Research at another G08 University
- One or more international advisors

The role of this committee is to assist the Director in formulating overall strategic direction of RCC. A key objective is to establish RCC at the leading edge of best practice. Through its members, the EAC will provide links to external organisations of both national and international significance. The committee will explore both national and international funding opportunities.

Because of the involvement of international advisors, the committee will use video-conference meetings wherever possible.

EAC will meet once per year.

RCC MANAGEMENT COMMITTEE (RMC)

RCC will convene an inward focussed management committee, comprising:

- Director, RCC
- Two Deans of relevant Faculties or Directors of Institutes.
- Director ITS or delegate
- Director Library or delegate
- Senior academics with relevant links to RCC

The role of this committee is to assist the Director in matters relating to the Centre's operation, including setting annual goals, assessing progress towards goals, and levels of funding required to support the ongoing operations and strategic initiatives. The committee will meet face-to-face two times per year.

CONCLUSION

RCC has developed a structure and interaction model that matches the way research is conducted at UQ, leveraging expertise in Faculties, Research Centres, Institutes and other support groups. Because the UQ research landscape is complex, diverse and distributed, and employs widely different models that are domain specific, RCC has developed a unique, multi-tiered structure that both lowers the gap between researchers and e-Research infrastructure, but empowers those who already have the skills to excel.

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