

NATIONAL COMPUTATIONAL INFRASTRUCTURE

AeRO Forum: Service Provider Perspectives A perspective from NCI

Lindsay Botten Director, NCI

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Geoscience Australia



Australian Research Council



NCI today: collaboration driving service evolution driving collaboration

Mission: World-class, high-end computing services for Australian research and innovation

What is NCI:

- <u>Highly-integrated</u>, e-infrastructure environment: HPC/HPD focus
- <u>Comprehensive, integrated and expert service</u>
- Supercomputer + supercomputer-class cloud + highest-performance storage + internationally-renowned expert support team

National, strategic and values driven:

- Enabling high-impact research that matters and informs policy
- <u>Research- & outcome-driven</u>—national priorities and excellence
- <u>Deep Engagement</u>—institutions, collaborations and industry
- Delivering transformative outcomes / national benefits
- <u>Quality</u> / <u>Innovation</u>—through scale, experience and expertise

Profile:

- A capability beyond the capacity of any single institution to provide
- Serves: 31x universities, 5x agencies, 6xNCRIS; 2 MRIs; industry
- ~2,500 users; ~600 projects
- 500+ papers pa; ~200 ARC/NHMRC funded activities—\$50M pa
- Capital (NCRIS): \$47M infrastructure + \$26M data centre building
- Recurrent Costs (\$17-18M): 60 staff; \$2.5M utilities; etc.
- Sustained by:
 - Collaboration: agencies/universities/ARC (~\$12M p.a.)
 - NCRIS (~\$5M p.a.)





- Supercomputer Raijin Australia's highest sustained performance research supercomputer
 - 1.2 petaflops , 57,492 cores, 160 Tbytes memory, 10 PB filesystem, 200+Tbit/sec IB backplane
- <u>HPC Cloud</u>: 3,200 cores, supercomputer spec. for orchestrating data services
- <u>Global integrated storage</u> (highest performance filesystems in Australia)
 - 36 PB disk (up to 120 Gbytes/sec b/w); 40 petabytes of tape for archive purposes



NCI Service Portfolio

Services and Technologies (~30 staff)

- Operations: Robust/expert/secure/dual site (20 staff incl. 2 contracted)
 - HPC: Expert support; Largest appl. library in Australia (~300)
 - Cloud: High-performance, integrated, secure; VMs, Clusters
 - Storage: Active (high-performance Lustre), archival (dual copy tape)
- User Support: (7) All expert (PhDs), discipline expertise

Research Engagement and Innovation (~20 staff)

- HPC and Data-Intensive Innovation (NCI, partners, Fujitsu)
 - Upscaling applications (e.g., ACCESS, 40% performance gain)
 - Bioinformatics pipelines, Earth Observation, Big-Data Movement
- Virtual Environments / Virtual Desktops (NeCTAR, NCI, partners)
 - Climate/Weather, Astrophysics, Geophysics, etc.
- Data Collections and Data Services (RDS, NCI, partners)
 - Management, publication, citation, standards,
 - Focus on environmental, medical (genomics), and astronomy
- Visualisation (NCI, partners)
 - Drishti, Voluminous, Interactive presentations











Forum Questions (1)

- Portfolio of services generalised / specialised
 - Services and Technologies portfolio
 - Generalised (high-performance) to meet all needs
 - Comprehensive, integrated infrastructure
 - Expert environment tailors for specialised needs



- Research Engagement and Initiatives portfolio ("special sauce" / "glue")
 - Evolved some general capabilities from meeting specialised requirements
 - Driven by research and innovation needs of NCRIS, partner organisations, MRIs, industry
 - Danger in overreaching to generalised solutions rather than attaining valued, specific goals







- Planning Ahead
 - Exceedingly difficult—few communities can accurately predict actual needs
 - Ongoing deep engagement with organisations/communities driving the business
 - Quasi-roadmapping scoping compute/storage growth, service—major communities/leaders
 - Deep engagement with vendors to understand infrastructure roadmaps
- Meeting Requirements how do we know?
 - Research/Outcome driven co-design of projects, systems etc., aligns requirements and delivery
 - User surveys assessing value, quality, emerging requirements
 - Return/new business: Vision + critical mass \Rightarrow Virtuous circle \Rightarrow New participants attracted
 - Health of the NCI Collaboration—perceived value leading to renewal, advocacy for NCI
- National Coordination
 - Requirement an artefact of fragmented infrastructure? aggregation/consolidation at the base
 - Coordination not a substitute for designed-in integration
 - Goal: making possible the impossible—not LCD coordination, but collab for HCF service innovation
- Workforce planning and development
 - Scoping: deep engagement with partners, monitoring international trends
 - Challenges: salaries; short contracts; scarce supply; competition; Ed/Tr system not delivering
 - Solutions: attractive employer, grow your own, opportunities (int'l conferences, vendor training)



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Thank you

Questions











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