AUSTRALIA AND NEW ZEALAND COOPERATIVE RESEARCH CENTRE FOR SPATIAL INFORMATION STRATEGIC PLAN 2017-2018 (and BEYOND)

Approved by the Governing Board: 2 March 2017

VISION: SPATIALLY ENABLING AUSTRALIA AND NEW ZEALAND

The CRCSI will be widely recognised for undertaking high impact, collaborative research that leads to accelerated industry growth, improved social well-being and a more sustainable environment.

WHAT SUCCESS WILL LOOK LIKE

By 2018 the CRCSI will be recognised world-wide for its high impact of our research. A thriving spatial industry will acknowledge the central role of the CRCSI. We will be considered an essential partner for complex SI research collaborations both locally and internationally.

OUR VALUES

We will be strongly **collaborative** in our relationships, strive for **excellence** in our research, and always aim to be **transformationa**l in our impact.

OUR STRATEGIC OBJECTIVES

NATIONAL PRECISE POSITIONING (RESEARCH PROGRAM 1)

Objective 1: To conduct research that solves the signal processing and economic impediments to the creation of a sparse, continental-scale, precise positioning multi-GNSS network operating at 2 cm (x and y) accuracies.

RAPID SPATIAL ANALYTICS (RESEARCH PROGRAM 2)

Objective 2: To conduct research that improves the ability and efficiency of government and industry to rapidly create and value-add spatial information products, manually or through automation, from devices and cloud-based infrastructure.

SPATIAL INFRASTRUCTURE FOR AUSTRALIA NEW ZEALAND (RESEARCH PROGRAM 3)

Objective 3: To identify and exploit the emerging capabilities of the semantic web to enable Foundation Spatial Data and their spatial data supply chains to create value-added applications.

APPLICATIONS (PROGRAM 4)

Objective 4: To realise high impact use of the CRCSI's research in the following areas: **Agriculture, Natural Resources and Climate Change (4.1)** through creation of a biomass and carbon monitoring system for high resolution and high frequency application on farms and through improved environmental monitoring; **Defence (4.2)** by adapting the capabilities of CRCSI's research portfolio; **Health (4.4)** by helping agencies to spatially enable their clinical databases; and **Built Infrastructure (4.5)** to build new tools to support sustainable built infrastructure development.

EDUCATION (PROGRAM 5)

Objective 5: By 2018 the CRCSI will have at least 51 PhD and Masters completions through our university partners, all of whom have significant industry experience.

INDUSTRY DEVELOPMENT AND SUSTAINABILITY (PROGRAM 6)

Objective 6: **Industry development**; assist our partners, in particular 43pl, develop and exploit CRCSI IP.

Objective 7: **Commissioned research and other funding;** generate an additional $11M of activity to June 2018 tackling complex research needs involving multiple partners from both public and private sectors.

PERFORMANCE INDICATORS

1. *A solution for the impediments of multi-GNSS signal processing and economic arguments for a continent-wide, ubiquitous, sparse, precise positioning network.*
2. *Adoption by our partners of new methodologies and software tools that enhance the level of rapid automation of data fusion, feature extraction and analysis.*
3. *Wide recognition by our partners of the CRCSI's role in helping establish and value-add critical supply information chains.*
4. *High impact end user applications adopted in each Application Program.*

STRATEGIC PLANNING BEYOND JUNE 2018

CRCSI is synchronising its long-term planning to align with whole of sector initiatives such as the 2026 Spatial Agenda. Commitment is being sought from partners from government, research and industry towards the creation of a successor entity to the CRCSI, post 2018. Detailed programs, plans and budgets for the successor entity will be confirmed and founding partners expected to sign up by the end of 2017, subject to approval by the Governing Board.

KEY ACHIEVEMENTS FOR EACH STRATEGIC OBJECTIVE

Positioning: We have pioneered the development of a new global form of precise positioning called PPP-RTK that uses signals from all six global and regional satellite system constellation. CRCSI research has solved the complex signal processing challenges and primed Australia for the completion of the outdoors component of the National Positioning Infrastructure plan that will deliver sub 5cm accurate, real-time positioning to all users anywhere, contributing up to $32 billion to the Australian economy over 20 years. World-first science achievements based on research using PPP-RTK crucial to supporting Australia's precision agriculture, construction, and autonomous transport industries (amongst others) include:

- First ever demonstration in Australia of remote guidance of an autonomous tractor using Japan's Quasi Zenith Satellite System (QZSS). Achievable accuracy was demonstrated to be better than ±5cm in real-time, comparable to commercial Network RTK solutions, but off sparser ground infrastructure and without reliance on the mobile phone network.
- World first integration of the new Chinese BeiDou satellite constellation with GPS to demonstrate the benefits for real-time positioning in obstructed environments such as large cities and open-cut mines.
- Development of new algorithms and software tools for the optimal and efficient integration and processing of signals from the new and existing GNSS positioning satellites from USA, Europe, Russia, China, Japan and India.
- World first integration of signals from Europe's Galileo satellites with GPSto demonstrate enhanced real-time positioning performance.
- Development of an indigenous capability for computing and delivering real-time, regionally enhanced BeiDou and QZSS orbit and clock products to support multi-GNSS positioning.

Rapid Spatial Analytics: The CRCSI has developed the new concept of Rapid Spatial Analytics designed to reduce processing times in critical information supply chains. This concept is now being developed as a National Spatial Analytics Capability, based on open source processing codes, that will form a centre piece of the 2026 Spatial Industry Transformation and Growth Agenda. Automated land property valuations are a key early initiative supporting the management of Australia's $3 trillion property portfolio.

Automated Image Processing: Under a Coalition of Australian Government mandate the CRCSI guided the development of a very high resolution digital elevation model covering 250,000 km2 of coastal built up Australia as an important contribution to improving Australia's vulnerability to sea level rise. This is now available as a national product via Geoscience Australia.

Spatial Infrastructure: CRCSI research established the basis for creative commons licencing that now underpins the open access data regimes of most Government spatial agencies across Australia – the ABS alone has generated around $20M of benefits as a result. The CRCSI also developed the framework for the transition to semantically web enabled spatial databases that provide the foundation spatial data for the nation (including geocoded addressing, cadastre and property boundaries. The research has led to the development of the concept of the Spatial Knowledge Infrastructure that provide intelligent platforms for web-enabled supply chains across the economies of Australia and New Zealand.

Agriculture, natural resources and climate change: The CRCSI has led the creation of the NRM Spatial Hub servicing 750 pastoralist and land management enterprises covering 60,000,000 ha with real time biomass monitoring based on satellite imagery. The Hub is currently being remodelled as a financial sustainable business and rebranded as Farm Map Australia. The Australian Livestock Spatial Information Program is working with about 70 organisations representing most of the red meat supply chain to fully spatially enable the supply chain from paddock to plate.

Defence: The Australian Geospatial-Intelligence Organisation utilises CRCSI as technical support in geospatial activities. The Program has drawn on CRCSI to improve automation of digital cameras and the extraction of reliable 3D information.

Energy Utilities: The CRCSI's research help establish the ROAME's business developing an advanced 2D automated airborne flight monitoring system that contributed savings of up to $40M a year to Ergon Energy's asset monitoring program. ROAME's was spun out as a successful business.

Health
The Health Program has engaged in successful cross-sector collaborations in Western Australia, Queensland, Tasmania, New Zealand and Sweden to produce novel modelling, tools and capabilities to improve decision support, business intelligence and resource management for the health sector. The Health Program underpins its approach to using spatial information by answering the question, "does my location affect my health?". Key achievements include; the Atlas of Cancer in Queensland which resulted in public policy reforms, including a landmark increase of Queensland's Patient Travel Subsidy Scheme in 2013 and has now lead to the National Cancer Council supporting the creation of a National Cancer Atlas; data reporting and visualisation tools Healthtracks; and 3DFAST, a clinical facial analysis tool to map genetic diseases.

Built Infrastructure: Two tools – Envision and Envision Scenario Planner – have been developed and are seeing successful implementation with eight local councils and authorities in Australia and New Zealand. The Greening the Greyfield's program has been written in to Plan Melbourne Refresh a Victorian Government white paper designed to impact the future of Melbourne's urban planning.

Education: We have 65 active and completed PhD and Masters students. All students have been supported by university partners and have an industry supervisor.

INDUSTRY DEVELOPMENT AND SUSTAINABILITY

Key Achievements:
- Creation and operation over the past 14 years of 43pl, our spatial industry cluster of companies, that partner on research with the CRCSI. Over 100 companies have participated in 43pl. Over $15M in direct funding has been provided to the companies.
- Seeding and facilitation of several company start-ups through CRCSI funded projects; Scanalyse, iintegrate Systems and Roames, leading to the employment of 150 people.
- Concept papers and reports by the CRCSI have helped lead to the development of the National Positioning Infrastructure plan, the single National Spatial Data Infrastructure concept, the 2026 Spatial Industry Transformation and Growth Agenda, and the first economic dimensioning of the size and composition of the Australian spatial industry
- Development of industry standards and guidelines including the ANZLIC metadata standard
- Development software and tools that benefit 43pl members such as QA4LiDAR, Barista, and the Australian Coastal Vertical Datum Transformation (AusCoastVDT). Additional intellectual property opportunities exist of which 15 have been highlighted here www.crcsi.com.au/commercial.