crc•si

ANNUAL REPORT 2008-09

"Ready and timely access to spatial information – knowing 'where' people and objects are – is essential to Australia's continued development in the information age. It is a critical tool in informed decision-making on key economic, environmental and social issues."

CRC for SPATIAL INFORMATION

Established and supported under the Australian Government's Cooperative Research Centres Program

CRC AUSTRALIA

'a user-driven, public-private research cooperation
with successful outcomes in
adoption and commercialisation and education
across an emerging industry for
structural, economic and national benefit'

Those who wish a deeper knowledge of CRCSI activities are referred to the corporate web pages and are welcome to contact the CRCSI office.

CRC for Spatial Information

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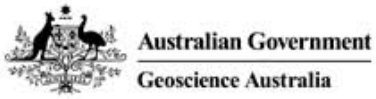
Core Participants



CRCSI is established and supported under the Australian Government's Cooperative Research Centres Programme

Support Participants

43pl members

AAMHatch
Advanced Spatial Technologies
Alexander & Symonds
Apogee Imaging
AquaSpy
Brazier Motti
Brown & Pluthero
C. R Hutchison & Co
CR Kennedy & Co
CSBP Limited
CTF Solutions
D.M. Gerloff & Associates
ERDAS
Fugro Spatial Solutions
Geogenx
Geodata Information Systems
Geomatic Technologies
GIS Jobs International
gps-Ag
iintegrate Systems
Industrea
Intergraph
Land Equity International
Leica Geosystems
Lester Franks Survey & Geographic
Lisasoft
Logica
McMullen Nolan & Partners
Navigate
NGIS Australia
Omnilink
Omnistar
Pitney Bowes Business Insight
Position 1 Consulting
PSMA Australia Ltd
QASCO Surveys
Reeds Consulting
Scanalyse
Sinclair Knight Merz
Spatial Information Technology Enterprises
True 3D
Spatial Vision
Sundown
SuperAir
Survey 21
Trimble
Twynam
V-TOL
VPAC
we-do-IT
Whelans

"More than 80% of respondents expect the **CRCSI will add value** to their business in the future and expect that the future **competitiveness of their business will be enhanced** through their participation in the CRCSI"

Third Year Review independent industry survey of non-university CRCSI participants

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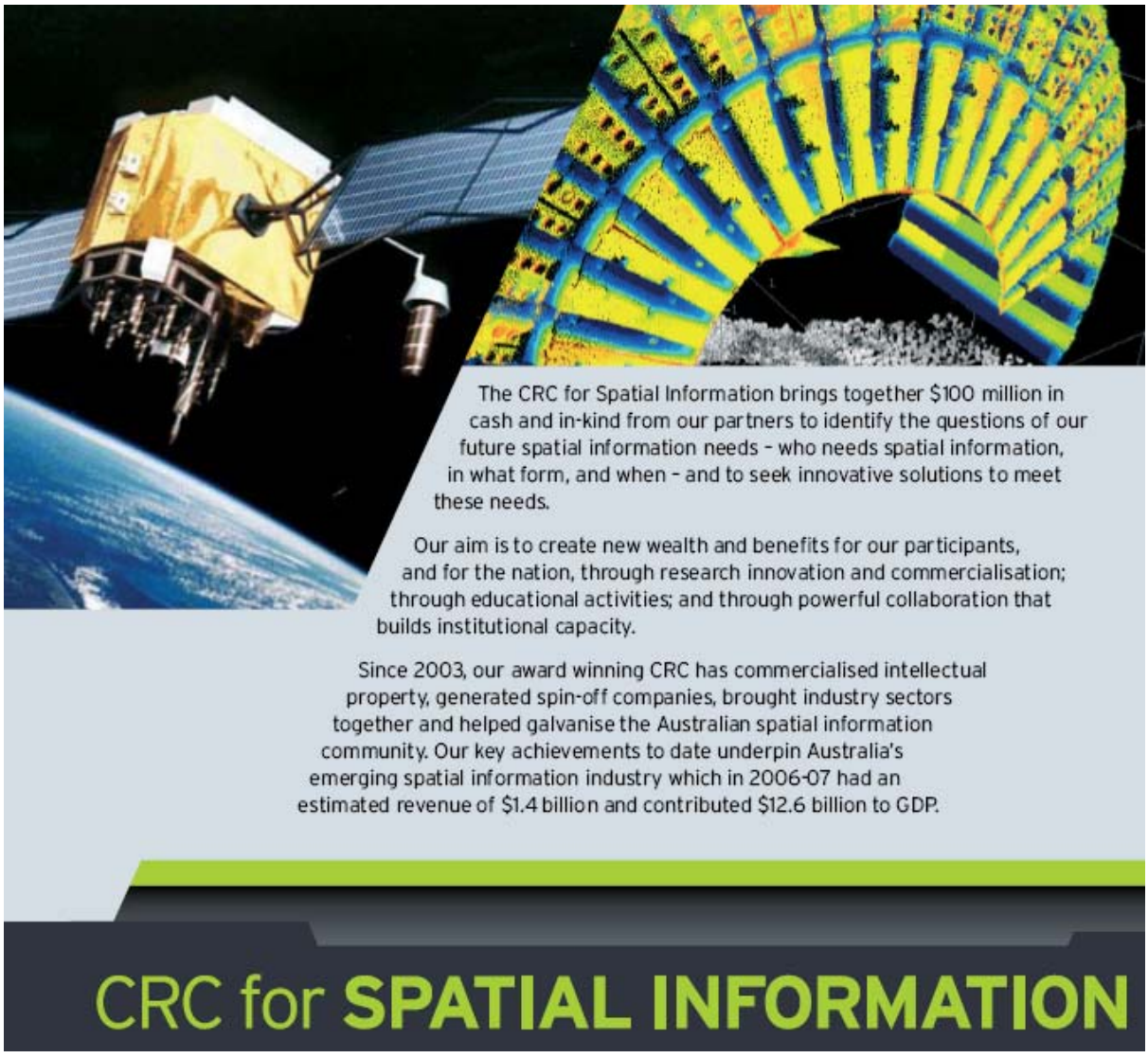


CRC for Spatial Information

Vision

To make the CRCSI a world leader in spatial information applications that are affordable, useful and readily available to all — at any time and in any place.

The application of the vision is the holistic representation of the vast array of information about our world in three dimensions and at any useful scale. In simple terms this means one can remotely access map-based information, combine it with information from other sources, conduct analyses, view the information in three dimensions, conduct forecasts, analyse historic trends, supply information and analyses to others, and know one's geographic position. Moreover it provides us with the ability to convey this position to others, at any time. Spatial information and its enabling technologies are therefore linked through this vision.

Statement of Purpose

To create new wealth for the participants of the CRCSI and for the nation through research innovation and commercialisation; through educational activities; and through powerful public private collaboration to build institutional capacity.

4.1 EXECUTIVE SUMMARY

Achievements and Activities in relation to Research, Commercialisation / Utilisation and Education Outcomes for 2008-09

Research

Program 1 Positioning researchers are building a shared software platform (SSP) to facilitate present and future GNSS research. New projects are investigating issues of vertical datum harmonisation across the inter-tidal zone. This is a pressing problem for the prediction of climate change impacts and disaster events such as tsunamis.

Program 2 Image Analysis research continues to advance geospatial information generation from both high-resolution satellite imagery and terrestrial laser scanner data through improved sensor calibration and orientation and enhanced automated feature extraction, with a focus on asset and infrastructure management

Program 3 Spatial Information Systems research has been incorporated into live trials within State Government information provisioning systems. This includes digital rights management and the facilitation of e-commerce transactions in spatial information.

Program 4 Remote Sensing research outcomes are being picked up by agriculture, environmental monitoring and emergency management. Significant progress continues to be made in relation to the use and exploitation of Interferometric Synthetic Aperture Radar (InSAR) data, particularly in relation to various applications of ground subsidence monitoring.

Within the Demonstrator Program 6, the National Data Grid Project is continuing to enhance the capabilities and utility of the CRCSI developed Platform for Environmental Modelling Support (PEMS), which is a component of the Australian spatial data infrastructure that uses a grid cell based approach to managing spatial information.

Commercialisation / Utilisation

Scanalyse Pty Ltd, a spin out company of CRCSI funded research, continues to expand overseas and now employs 15 people in high qualification jobs.

Iintegrate Systems Pty Ltd uses its IndjiWatch product that came from CRCSI's first project outcome to service the entire eastern seaboard high power transmission grid, and is establishing a USA market.

Barista continues developing international software sales. A new start-up company "NS7" is being established to commercialise CRCSI funded InSAR technology.

Education

A collaborative arrangement with the Surveying and Spatial Sciences Institute was put in place to support delivery of continuing professional development across the country. The national education portal was provided to the Spatial Education Advisory Committee as a support infrastructure to increase awareness across the whole community including school level materials.

Risks, opportunities and responses to the above

The CRCSI Risk Management Strategy caters for commercial and other risks associated with such activities. The opportunities were included in the Round 11 submission where sufficient end-user buy in was demonstrated, where the impact was deemed significant, and where a multi-sector approach was deemed to be necessary to achieve success.

Australian Spatial Consortium

The ASC is made up of all the peak bodies in the spatial information industry in Australia across all sectors. It was created as a result of a strategic planning forum of the CRCSI in 2007 and has formally expressed a desire to become the parent of the successor to the CRCSI establishing a permanent entity for both fundamental and applied spatial research in Australia. The ASC is also a forum where lead bodies in the spatial community can share information and contribute at the highest level to shape important initiatives, from space policy considerations to a national positioning infrastructure.

Australian Space Policy Unit

The new SPU was established in May 2009 and is an excellent initiative of the Federal Government. It is an opportunity for the CRCSI to help influence the shape of space related activities.

Impediments to achievement of the CRCSI's objectives experienced during the year and strategies adopted to address these

There were no specific impediments experienced during the year, which is in part attributable to a very strong support from the participant base and a willingness by the Board to embrace a collaborative approach across the national stakeholders in the spatial information community.

This includes communication channels such as the Australian Spatial Consortium, links with the peak government body for spatial information in Australia known as ANZLIC representing all of the states and territories as well as the Australian Federal Government and the New Zealand Government, the peak private sector body known as SIBA and its 500 members, and the peak professional body known as the SSSI and its 4000 professional members and others, close dialogue with relevant agencies at federal and state level, and an open and transparent mode of operation.

Awards, special commendations, CRCSI highlights

CRCSI featured strongly at the industries' National Awards (the Asia Pacific Spatial Excellence Awards). The premier "JK Barrie Award for Overall Excellence" was won for work supporting the Sichuan Earthquake response done in the CRCSI by the University of New South Wales and the Department of Lands, NSW. CRCSI also won the "People & the Environment Award". Several of our participants also won awards.

The Urban Digital Elevation Model project with the Department of Climate Change is a signal recognition of the role the CRCSI can play in bringing a multi-sector approach to bear with sound governance on an issue of national importance – coastal vulnerability to global climate change.

The CRCSI will be one of give founding members of a new international consortium to be known as the Global Spatial Network for Networks for Spatial Information Research which will be formally launched in 2010.

The CRCSI was one of the co-Founders of the "spatial@gov" conference in Canberra in June 2009 which raised awareness amongst three hundred attendees. The CRCSO also provided strong organisational support to several other spatial conferences around the nation. The CRCSI was central to winning for Australia two international conferences: IGARRS (2000 delegates) and ISDE Congress (600 delegates)

4.1.1 Context and major developments during the year

Industry Context

The Global Financial Crisis was initially viewed as a serious impediment to CRCSI growth. However given that the business of many spatial information companies is in infrastructure and efficiency gains there were many companies who were more positive about the future. For instance a January 2009 SIBA survey indicated that over 50% of their members (largely those in the IT / GIS sector) forecasted business growth in the coming year. And an international study predicted that "2009 geospatial industry worldwide growth is forecast to slow to 1 per cent, down from 11 per cent in 2008, 17.4 per cent in 2007 and 17.3 per cent in 2006, according to a study by market research firm Daratech Inc"

The corporate participants of the CRCSI remained stable in the year and contributions remained in excess of contractual commitments. There was no adverse effect on the

CRCSI's ability to achieve its objectives and exceed its performance indicators for the year.

Outcomes to date compared to Commonwealth Agreement Expectations

The expected outcomes in the CRCSI Commonwealth Agreement are detailed at section 5.2 and can be summarised as:

1. to increase capacity of the spatial community (ie government, academia and private sector)
2. to enhance commercialisation/adoption of research outputs

The CRCSI in conjunction with ANZLIC commissioned an independent study to analyse the impact of Spatial Information on the wider Australian economy for the first time in the history of Australia. CRCSI project outcomes were included in these considerations and the study by ACIL Tasman concluded that "the spatial information industry contributed between $6.4 - $12.6 billion to GDP (0.6-1.2%)"

The CRCSI independently reviews 43pl company performance each year and the conclusion is that the 43pl cadre consistently outperforms industry norms.

Our postgraduate targets have been exceeded and 65% of higher degree student completions have been picked up by end-users.

Another indicator of value is provided by the volume of contract research earned by the CRCSI, ($5.1 million to date); the participant inkind contributions ($2.6 million over target); and the requests for tender issued to the CRCSI participants for provision of services relating to CRCSI projects (six over the year).

CRCSI will continue with its final year of activities as it transitions into the new activities of CRCSI-2

Major Developments or Initiatives

Round 11 submission

The CRCSI conducted an extended program of consultation in order to build a competitive submission for a second term of CRC Program funding. Put simply, the first term of the CRCSI has concentrated on building capacity within the Spatial industry itself; CRCSI-2 aims to extend this innovative capacity into five Australian market sectors through a suite of nation building and infrastructure initiatives that will significantly increase Australia's international competitiveness. At 20 March we had 90 participants including over 60 SMEs. The research in the submission underpins critical infrastructure developments for Australia namely a national CORS framework for precise positioning (2cm accuracy) and the design of an Australian Spatial Marketplace.

International links

A major initiative was to open dialogue with various international collaborators, including New Zealand. CRCSI is a founding member of the global spatial Network for Networks, and established a Joint Research Centre for Spatial Information with the Chinese Academy of Sciences. We now have formal links with 14 international research groups

Major research contracts

The Urban Digital Elevation Model contract with the Department of Climate Change is on track and has been expanded in scope. In addition a $2 million research project was struck in June 2009. The project is subject to confidentiality at this time

Personnel

An Assistant Research Director was appointed. Two important "Spatial Information Professor" appointments were made: one at Curtin University, with the support of WA Landgate; and one at the UNSW, with the support of the NSW Lands and Property Management Authority. We now have three such professorial appointments across the country to underpin our research and international links and will look to continue such investments.

4.2 National Research Priorities

The National Research Priorities (NRPs) are thematic and are underpinned by 'priority goals'. There are four priorities:

1. An environmentally sustainable Australia
2. Promoting and maintaining good health
3. Frontier technologies for building and transforming Australian industries
4. Safeguarding Australia.

Geo-information, a synonym of spatial information, is highlighted in federal government descriptions of designated NRPs as an example of a Priority Goal, namely Breakthrough Science. Projects within the CRCSI's portfolio are also aligned with other NRPs, and especially the Priority Goals of Smart Information Use, Frontier Technologies, Critical Infrastructure and Transformational Defence Technologies.

Spatial Information is a platform technology and as such it is very relevant to all NRPs. In particular, the CRCSI work in remote sensing and earth observation is contributing to natural resource management and related environmental work.

DIISR Table: National Research Priorities and CRC Research

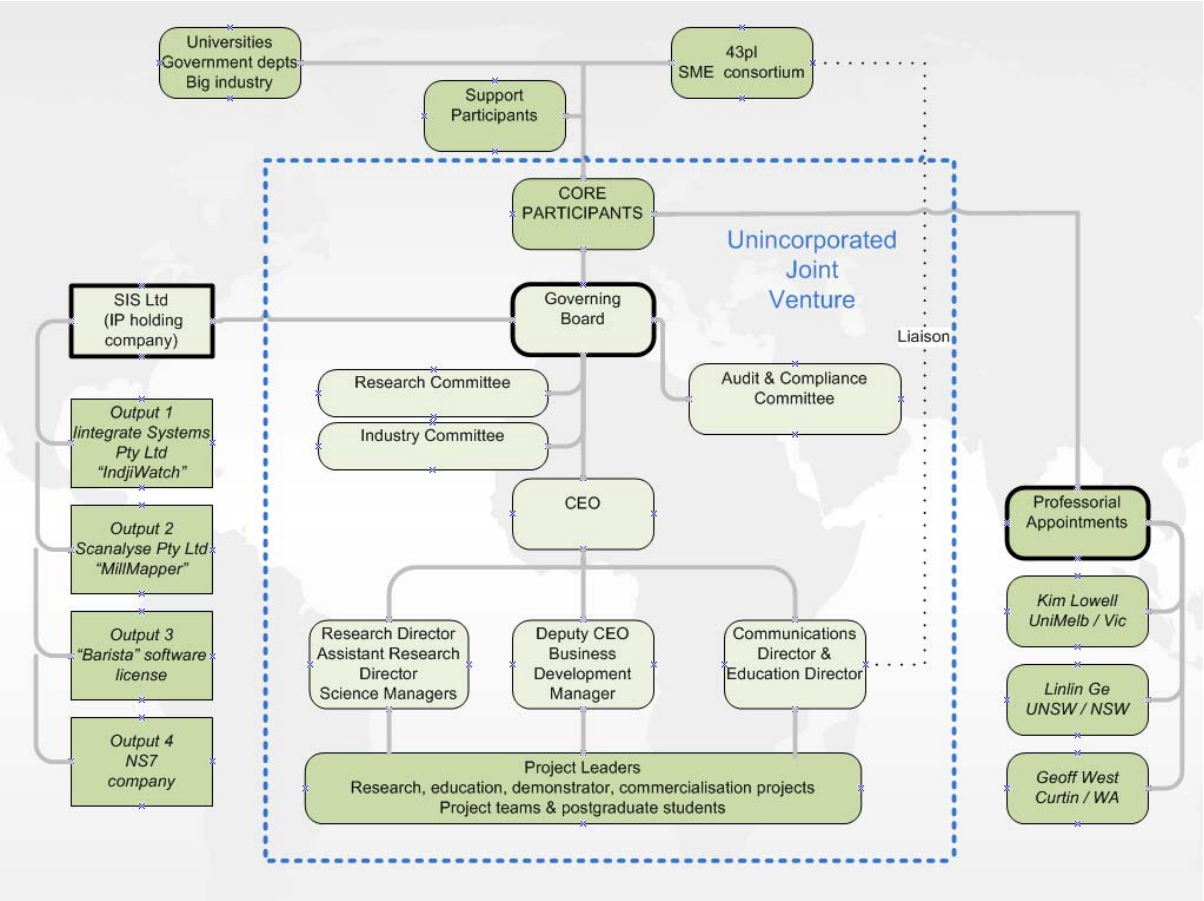
NATIONAL RESEARCH PRIORITIES	CRC RESEARCH (%)
AN ENVIRONMENTALLY SUSTAINABLE AUSTRALIA – *Transforming the way we use our land, water, mineral and energy resources through a better understanding of environmental systems and using new technologies*	
Transforming existing industries	20
Sustainable use of Australia's biodiversity	5
FRONTIER TECHNOLOGIES FOR BUILDING AND TRANSFORMING AUSTRALIAN INDUSTRIES – *Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research*	
Frontier technologies	30
Smart information use	20
SAFEGUARDING AUSTRALIA – *Safeguarding Australia from terrorism, crime, invasive diseases and pests, and securing our infrastructure, particularly with respect to our digital systems*	
Critical Infrastructure	20
Understanding our region and the world	5

4.3 Governance and Management

The CRCSI is an unincorporated joint venture. It has a Board of four independent and seven nominated members. The Board is advised by the Research and Education Advisory Committee, the Industry Advisory & Commercialisation Committee, and the Audit & Compliance Committee.

Management comprises an Executive and support staff, several Science Program Managers, and Project Leaders. The Executive are employed by the company Spatial Information Operations Ltd. An Education Reference Group meets regularly and as required. Project Management Groups meet quarterly to review each project's progress and future.

There were no changes to Core or Support Participants during the year.



Roles and Accountabilities

Board	Executive	Science Managers	Project Leaders
Strategic direction Policy Budget Strategic Plan Achievement CEO appointment	Strategic Planning Operational Management Business Development Commercialisation Communications (in & out) Ensuring programs interconnect and link to the market Member and client relations	Independent project input and advice (project development; work quality; technical and commercial networks) Internal links Market interface Research utilisation	Research leadership Project stakeholder communication and relations Project mgt (staff and budget), esp. meeting milestones & reporting Internal liaison

Governing Board

The CRCSI Board of directors meets quarterly (four times in this year) and holds an annual strategic planning forum. There is a maximum of eleven directors, some of whom have alternates, comprising:

- an independent Chairman
- three independent directors including the CEO
- two representatives from each of 43pl and university colleges
- three representing the government college

Each college operates independently and confers amongst itself so that views of any participant can be brought to consideration in a Board forum. Not all Members have Board seats, but all have equivalent access through rotation of Directors that represent participants. Directors are made fully cognisant of the obligations of Corporations Law, which dictates that the interests of the CRCSI be placed above those of their own organisation while acting as a director. Comprehensive governance protocols have been designed for the CRCSI by Mr Henry Bosch AO.

"bouquets for the CRCSI – I have been involved in five or six CRCs, and this one is the most professionally run and rigorous in governance and management"

Third Year Review independent industry survey [of non-university CRC participants]

CEO, Governing Board Members and Committee Members

Director *Alternate Director*	Organisation	CRC Position / Role & Skills
Mary O'Kane	Independent Mary O'Kane & Assoc	**Board Chair** Intellectual Property management, Negotiation, Capital Raising, Computer hardware and software knowledge and experience, Financial Management, Australian R&D environment , Business Management, Governance, International experience, research management
Bill Charters AM	Independent	**Board Director (and Founding Chair)** Negotiation, Capital Raising, Financial Management, Marketing, Business Management, Governance, Australian R&D environment, International experience, research management
Peter Woodgate	CRCSI	**Chief Executive Officer & Board Director** Intellectual Property management, Licensing, Spatial Industry experience and technical knowledge, Business Management, Australian R&D environment, and applications, research management
Roland Slee	Independent Oracle Corporation Australia Pty Ltd	**Board Director** Negotiation, licensing, Computer hardware and software knowledge and experience, Spatial and computing technical knowledge, Financial Management, Marketing, Business Management, International experience
Mike Bradford	CEO, Landgate WA	**Board Director** Negotiation, Intellectual Property management, Spatial Industry experience and technical knowledge, financial management, Australian R&D environment, business management, research management, government policy
Tony Burns **43pl representative** *Chris Lunnay* *Land Equity Pty Ltd*	Land Equity International Pty Ltd	**Board Director** Intellectual Property management, Negotiation, Spatial Industry experience and technical knowledge, Marketing, financial management, Australian R&D environment, business management, International experience
Prof Les Field *Leigh Schwartzkoff* *University NSW*	University of NSW	**Board Director** Negotiation, capital raising, licensing, intellectual property management, Marketing, financial management, Australian R&D environment, research management
Chris Pigram	Deputy CEO Geoscience Australia	**Board Director** Intellectual Property management, negotiation, Spatial Industry experience and technical knowledge, financial management, business management, research management, government policy

Malcolm Lester **43pl representative**	Lester Franks Surveying & Geographic Services Pty Ltd)	**Board Director** Intellectual Property management, Negotiation, Spatial Industry experience and technical knowledge, Marketing, financial management, Australian R&D environment, business management, International experience
Bruce Thompson *Tai Chan Dept Sustainability & Environment Victoria*	Dept Sustainability & Environment, Victoria	**Board Director [and Deputy Chair]** Intellectual Property management, negotiation, Spatial Industry experience and technical knowledge, financial management, business management, research management, government policy
Graeme Wright	Curtin University	**Board Director** Negotiation, Intellectual Property management, Australian R&D environment, business management, research management
Directors retiring during 2008-09	**New Directors in 2008-09**	**Replacement reasons**
Grahame Searle	Mike Bradford	Mr Searle left the CRCSI Participant organisation
Steven Jacoby		Rotation of Government college directorships
Warwick Watkins	Bruce Thompson	Rotation of Government college directorships
Bill Richards	Malcolm Lester	Mr Richards retired from Fugro

Audit and Compliance Committee

The Audit and Compliance Committee met once this year. It supports the audit process and CRCSI fiduciary and other protocols. Membership at 30 June was Tony Burns (Chair) and Bruce Thompson, with a further appointment to be made. Pitcher Partners is the auditor for the CRCSI, SISL and 43pl.

Name	Organisation	CRC Position / Role
Tony Burns	Land Equity International Pty Ltd	ACC Chair 43pl representative director on Board
Bruce Thompson	Vic Dept of Sustainability and Environment	Board Director (and Deputy Chair)

Research and Education Advisory Committee

This independent committee provides advice and recommendations to the Board on the research and education activities of the CRCSI. It met twice in the year, jointly with the Industry Advisory and Commercialisation Committee. The REAC Chairman is an observer at Board meetings. Its membership at 30 June comprised two private sector and two university members.

Name	Organisation	CRC Position / Role
Clive Fraser	CRCSI & University of Melbourne	REAC Chair Research Director (50%) Program Leader (30%)
Arthur Berrill	Pitney Bowes Business Insight	43pl member
Peter Loughrey	ESRI Australia	43pl member
Graeme Wright	Curtin University of Technology	CRCSI Board Director

Industry Advisory and Commercialisation Committee

This committee advises the Board on industry and commercialisation matters. It met twice in the year, jointly with the Research & Education Committee. The IACC Chairman is an observer at Board meetings. Membership at 30 June comprised three private sector members and two government end user members

Name	Organisation	CRC Position / Role
Jack de Lange	Spatial Industries Business Association	IACC Chair
Tony Burns	Land Equity International Pty Ltd	CRCSI Board Director
Hun Gan	Starfish Ventures Pty Ltd	Independent
Mike Bradford	Landgate WA	CRCSI Board Director
Chris Pigram	Geoscience Australia	CRCSI Board Director

Spatial Information Systems Limited (SISL)

CRCSI established SISL to hold its intellectual property and oversee its exploitation. SISL acts as the commercial agent for the CRCSI participants to identify, protect, use and commercialise the Centre Intellectual Property. The SISL Board met four times in the year. It comprises five private sector or independent directors, one university and one government director, and the CRCSI CEO.

Name	Organisation	CRC Position / Role
Bill Charters	Independent (Chair)	CRCSI Board Director
Tony Burns	Land Equity International Pty Ltd	SISL Director
Tina McMeckan	Independent	SISL Director
Jack de Lange	Spatial Industries Business Association	IACC Chair; SISL Director
Les Field	UNSW	SISL Director
Roland Slee	Oracle Corporation	SISL Director
Warwick Watkins	NSW Dept of Lands	SISL Director
Peter Woodgate	CRCSI	CRCSI CEO; CRCSI Board Director; SISL Director

43pl – the SME consortium

43 Pty Ltd, or 43pl, is a company established as a construct to efficiently manage the large number of small to medium sized enterprises (SMEs) to participate in the CRC. It has a board that oversees the trust, in which member companies hold units proportional to their aggregate cash subscription. Board directors come from each state involved in the CRCSI. Two 43pl representative directors on the CRC Board are elected from nominations by the membership of 43pl. It met twice in the year.

43pl is a core participant in the CRC. The proprietary limited company brings together the SME companies through a unit trust deed. Each SME is a unit trust holder. A company from each jurisdictional area provides a Director for the Board of 43pl. At 30 June the 43pl Directors were Mark Judd (Chair; Victoria and Tasmania), Jack de Lange (Queensland), Dean Howell (SA), Chris Earls (WA), Tony Wheeler (NSW & ACT). All states and territories bar the Northern Territory have headquarters of 43pl members.

The name 43 Pty Ltd derives from the 43 companies that initially expressed interest in being part of the CRCSI bid for establishment. During the year new companies sought to join 43pl bringing the total consortium at 30 June 2008 to over 50.

Program Leaders

Name	Organisation	CRC Position / Role
Chris Rizos	UNSW	Research Program 1 Leader
Clive Fraser	UM	Research Program 2 Leader
Peter Woodgate	CRCSI	Research Program 3 Leader
Tony Milne	UNSW / retired	Research Program 4 Leader
Ian Bishop	UM	Research Program 5 Leader
Graeme Kernich	CRCSI	Commercialisation Program Leader
Michael Ridout	CRCSI	Education Program Leader

There have been no changes requiring Commonwealth approval to the participants in the reporting period.

4.4 Research Programs

CRCSI research includes the innovative use and application of emerging technologies as well as the development of new technologies. The CRCSI undertakes world-class research that will lead to new applications of spatial information and enabling technologies that can be used to generate new wealth for its participants.

The Vision of the CRCSI will be realised when spatial information is made useful and available to all – at any time and in any place. Implicit in this vision is that the needs of SI users will be met through the development of the necessary supporting products and services. These will provide accessibility and knowledgeable use of SI within a favorable environment of regulatory policies and institutional frameworks. An enhancement of industry and user capabilities is essential if the broad spectrum of SI needs within society is to be satisfied. New developments in the acquisition, analysis, synthesis and delivery of SI are being continually called for. This in turn requires active research and development in the science and technologies of positioning, modelling and data processing, integration and archiving, and dissemination and visualisation of SI.

In forming projects the CRCSI focuses on the needs of the user of SI and is responsive to the future needs of Australian industry. This demands early stage planning for user adoption and utilisation of research outcomes, along with commercialisation of technological innovations for the benefit of CRCSI participants, the wider industry and the nation.

4.4.1 Research Activities and Achievements Outputs and Milestones

Key research achievements

Within Program 1 (Positioning) researchers across two projects are collaborating to build a shared software platform (SSP) to facilitate present and future GNSS research. The SSP gives researchers access to a common development environment and minimizes duplication of software development effort. The SSP is a core outcome from the current research initiatives in relation to real-time quality assessment, stochastic model generation, tropospheric modeling and reverse RTK processing. Also within Program 1, two new projects are investigating issues to do with vertical datum harmonization across the littoral (inter-tidal) zone. This is a pressing problem in the context of the building of a seamless national DEM and the consequent need to integrate bathymetric and topographic data, to which these projects should make a substantial contribution.

In Program 2 (Image Analysis) research is centred on spatial information generation from imaging and laser ranging sensors, with a focus upon high-resolution satellitye imagery and terrestrial laser scanning. Significant progress was made over the reporting period in automated generation of orthoimagery through enhanced orbital modeling for the ALOS satellite system. The developed long-strip adjustment technique has been

implemented in production at Geoscience Australia and has led to productivity gains of 300%. Progress has also made in feature extraction from both terrestrial laser scanner data and satellite imagery, with the focus being upon automated 3D mapping and modeling for asset and infrastructure management. The imagery-related research is contributing to the ongoing development of the Barista software, which is now used commercially in Australia, Europe, China, India and Japan.

In Program 3 (Spatial Information Systems) the efforts of the research team are directed at developing an institutional model for transfer and exchange of public sector spatial information that is based on sound legal, economic and technical principles. Recent Research has concentrated on policy and legal framework issues to do with licensing and accessibility of government held spatial information including digital rights management and the facilitation of e-commerce transactions in spatial information.

The Remote Sensing program (Program 4) has hosted projects with a focus on applications in agriculture, environmental monitoring and emergency management. Significant progress continues to be made in relation to the use and exploitation of InSAR data, particularly in relation to various applications of ground subsidence monitoring and digital elevation model generation. New algorithms, software and procedures are being developed to both streamline the production of topographic maps from data collected using multi-band radar systems and the TerraSAR-X satellite, and to utilize differential InSAR for near real-time deformation monitoring applications. This project has developed very strong links with Chinese researchers and with Australian Industry.

Within the Visualisation program (Program 5) the research effort pivots on the further development of the SIEVE environmental visualization software. Various applications of SIEVE are being trialed in spheres such as agriculture, precision agriculture, climate change and defence in order to further enhance the capabilities and applicability of the software.

Amongst the suite of active Demonstrator projects that are progressing well are Clever Cattle and Cropping Systems, with its research into the integration of near-real-time paddock and infrastructure data into farm management systems through the use of web-based spatial information delivery; Spatial Information Business Improvement Applications at Ergon Energy which is investigating improved business processes for network planning, asset management and vegetation management (for line clearance), as well as looking into new data acquisition technologies and processes for utility corriodor mapping; and the National Data Grid Project, which is further developing Platform for Environmental Modelling Support (PEMS).

A list of key publications is at Appendix 1.

Highlights of the research year also included the migration of project outputs and expertise into commercial and national benefit initiatives of high potential. The former include “loka deva” and Barista software, with other initiatives such as MillMapper and HazWatch consolidating their commercialisation. The latter is represented within the preparation of a new portfolio of research activities for the Round 11 submission for a new term of CRC Program funding.

Nature of major external contracts

Project	Researcher(s)	Client	Project Title	Gross Value
1.08	Claessens, Hirt, Featherstone, Kirby	Land Information New Zealand	Development of a new quasigeoid model for New Zealand	
6.08	David Lamb	GRDC	13th Symposium on Precision Agriculture in Australasia	$10,000
3.10			Part 2 – Landmark Navigation Model Report: May 31 2008	$7,200
4.12			Flood Risk	$60,000

9.06	CRCSI (Graeme Kernich)	Australian Dept Climate Change	Urban Digital Elevation model	$2,000,000
2.7	CRCSI (Clive Fraser)	Australian Dept Climate Change	Provision of Services for Preparation of the Science Case for the National Elevation Data Framework	$17,200
2.09		Allen Consulting	Economic evaluation	$50,000
2.05		DSE		$10,000
3.60			Scoping a national system for reporting use	$20,000
	CRCSI (Kim Lowell)	Australian Dept Climate Change	International Global Carbon Monitoring Scheme Project	$2,000,000 tbc

4.09 Urban DEM project with Department of Climate Change

Sea level rise and increased storm surge are a major risk to Australia's settlements and infrastructure. Highly accurate three dimensional models of these coastal areas will give us a better understanding of the impacts of future sea level rise and storm surges. These digital elevation models (DEMs) allow the necessary computer modelling to assess inundation risks to our population and built infrastructure, and identify ways in which the risks can be reduced.

CRCSI is developing a DEM of selected high priority urban areas under a $2 million contract for the Commonwealth Department of Climate Change. Initial work will focus on Perth, Darwin, Adelaide, Sydney, Brisbane, Melbourne, the Gold Coast and the NSW Central Coast.

In addition a number of consultancies were conducted under commercial in confidence terms.

Nature of any grants

Project	Lead Researcher & Participant	Project Title	Granting program	Period of Grant	Total of Grant
1.08	Will Featherstone & Petr Vanicek	Validation of synthetic regional gravity field models	Australian Research Council – Linkage International Program	2009-2010	$54,000
1.08	Will Featherstone Chief investigator [with others]	Environmental geodesy: variations of sea level and water storage in the Australian region	ARC Discovery-Project Grant	2008–12	$1,160,000

Changes proposed to future research directions

The CRCSI prepared an R&D program within its successful submission to the 2009 funding round of the CRC Program. This drew on the successes of the first CRCSI and expanded the science and technology into new areas of application, for instance health and sustainable urban development. These are further described at the www.crcsi2.com.au website.

4.4.2 Research Collaborations

CRCSI has many participants across Australia – over 60 companies had formal collaborative arrangements with CRCSI activities in the year, along with a dozen government departments and six universities. There is a great diversity in organisation

type and size. Respective organisational cultures differ between the various government agency structures, small service companies and manufacturers, R&D based enterprises, and universities, yet these differences have been both accommodated and well managed by the CRCSI. Fostering a CRCSI culture is important to the Governing Board and management. CRCSI is above all a collaborative enterprise and this is practised in various ways, as described in the following sections. The independent industry survey of the Third Year Review concluded "SMEs are engaged through 43pl, which is both innovative and successful" and that "end-users are well satisfied"

Internal

The CRCSI has achieved significant progress in developing collaborative linkages within the CRC. The CRCSI is vertically integrated in that leading edge customers are engaged with technology and service providers. In addition many of the customers are also suppliers of the data and infrastructure used by the market in devising new products.

Cooperation amongst geographically spread activities and entities is assisted through regular telephone and other conferences, coordination of physical meetings by the Board and the executive. The Annual Conference and state based get-togethers are perceived to be of high benefit by our participants.

A comprehensive Communications Strategy adopted by the Board provides a central role in fostering collaboration. This has seen the independent industry survey of the Third Year Review conclude that "the CRC's communications and networking are both a strength and a principal value."

Other CRCs

Cooperative arrangements with other CRCs are selectively sought where resources allow and mutual interest is found. Over 30 CRCs have interests in and applications of spatial information. Contact and occasional joint activities are held with those of obvious relevance, eg CRC for Sensor Signal and Information Processing and the two Biosecurity CRCs, and the Cotton Catchment CRC (with a common scholarship program). Focused workshops have developed formal and close collaborations with the Bushfires and Forestry CRCs. In addition we have working links with NICTA and CSIRO.

National

Strong links have been established with key stakeholder groups, notably the Spatial Industries Business Association (SIBA), the Surveying and Spatial Sciences Institute (SSSI) and the peak government body ANZLIC – the Land Information Council. Mechanisms include board invitations, joint board meetings, membership, committee representation, and invited presentations, shared web links, and collaborations on important initiatives such as the national Spatial Education Advisory Committee; leadership roles within the NCRIS AuScope and related activities; and the commissioning of joint projects. These relationships are important to give strategic advice and context to the CRCSI on the one hand and on the other to effectively convey the work of the CRCSI to the broader spatial and user communities.

International

Three international collaborative alliances were maintained during the period with strategic advantage sought for specific projects. The following international links are being pursued for strategic reasons and net benefit to our shareholders.

- GEOIDE Network based at the University of Laval in Quebec, Canada (analogous to a CRC, funded as a Canadian 'Networks of Centres of Excellence' (http://www.geoide.ulaval.ca). – *strategic link of CRC-wide benefit*
- Chinese Academy of Sciences (CASM) - A collaborative research agreement underpins joint activities that are being developed, in particular through CASM's Centre for Earth Observation and Digital Earth (CEODE)
- International "Network for networks" of which the CRCSI is a founding member. This new organisation has five core members joining CRCSI: Canada (GEOIDE), South Korea (Korean Land Specialisation Group), Mexico (Centro-Geo), South America (through Institute Panamericano de Geografica e Historiq) and Europe

(Association Geographic Information Laboratories Europe). Several other organisations will also seek involvement

In addition there were many project based links with researchers and end users around the world, such as

- Project 1.08 link with Prof Vanicek of Canada – “Collaboration on geoide modelling and height systems”
- Project 2.11 link with the Institute of Photogrammetry and GeoInformation, Leibniz University of Hannover – “R&D related to Barista and research into building extraction”
- Project 3.05 links and activities with various bodies in UK, Europe and New Zealand and elsewhere on access and use of public sector information
- 43pl has attracted six expressions of interest in joining 43pl-2 from overseas based companies

4.5 Commercialisation & Utilisation

4.5.1 Commercialisation and utilisation strategies and activities

The CRC for Spatial Information has been established to:

'to create new wealth for the participants of the CRCSI and for the nation: through research innovation and commercialisation, through educational activities, and through powerful public-private collaboration to build institutional capacity.'

The CRCSI Commercialisation and Utilisation Plan outlines the strategies for maximising the industrial, commercial and economic impact of CRCSI activities.

Commercialisation of CRCSI Centre Intellectual Property

Spatial Information Systems Limited (SISL) is the holder of Centre Intellectual Property (CIP). It is responsible for the commercialisation of CIP including marketing, seeking potential licensees and seeking other commercial applications.

If SISL intends to commercialise any CIP, it must advise each CRC participant in writing and each participant has a period in which to express a desire to commercialise or participate in the commercialisation of the Centre Intellectual Property. Through the structure of 43pl, all of the SMEs involved can bid for commercialisation rights. If no participant desires to commercialise then SISL is free to commercialise the CIP in the manner it sees fit. The details of the commercialisation plan for the CRCSI, including the patent and licensing strategies, is documented within the CRCSI Commercialisation and Utilisation Plan.

Projects

The CRCSI strategy for technology transfer is inherent in the way it selects and funds its activities. The technology transfer and commercialisation strategy must be built into a proposal before the Governing Board will approve CRCSI funding and formalisation into a CRCSI project agreement contract.

Criteria for project funding approval include a requirement that prospective commercialisers and/or end users have significant involvement in the project; that there is a clear and credible route to market; that the work plan reflects market awareness; and that it is aimed at a demonstration of the project output.

Every project is governed by a Project Agreement which details intellectual property ownership, the proposed route to commercialisation / application, and the role to be played by the entities involved. All parties to the project sign the Agreement. The Project Management Group pro forma agenda for quarterly meetings includes consideration of any commercial aspects pertinent to project progress and output.

Where commercialisation within a project is evident, our strategy is simple: identify potential technologies for commercialisation early through the project proposal process; develop a business case, through quarterly project management group meetings, for presentation to the Governing Board. If approved, this is passed for implementation to the CRCSI commercial agent, SISL. An expression of interest to develop the commercial proposition is then sought from CRCSI participants.

Key Commercialisation Activities

Those organisations selected by the Board to lead the commercialisation of CRCSI opportunities are chosen on the basis of two principles; firstly preference is given to those who have played a lead role in the research and development phase, secondly the choice of the commercialiser must be in the overall best interests of all CRCSI partners. The strength of the business case presented for commercialisation is a key factor in helping the Board with its final decision.

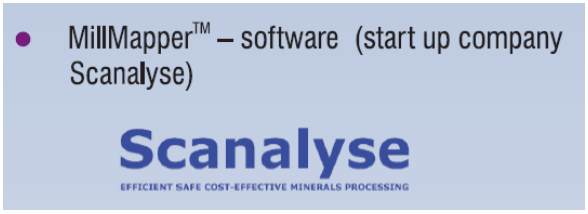
There are several commercialisation-utilisation activities and results that have been developed and or built on this year, as described below.

A review of all research and demonstrator projects by a CRCSI Panel at the annual conference, and ongoing monitoring of projects within the quarterly Project Management Groups, has kept focus on commercialisation and utilisation aspects.

A pipeline of commercialisation / adoption opportunities has been generated, with business cases prepared for the Board to commercialise several project outcomes. Several projects indicate promising results and commercial opportunities are being explored. The most mature commercialisation activities of the CRCSI are described below.

No patents have been taken out during the year.

MillMapper - start-up company "Scanalyse Pty Ltd"



Scanalyse is developing laser scanning technology products to improve the efficiency of mining and mineral processing operations. The first product, MillMapper, significantly reduces the maintenance cost of grinding mills by providing unique wear detection, monitoring and predictive intelligence. The CRCSI has negotiated commercial terms for an ongoing role in the company.

Scanalyse now employs 15 people and has gained investment for further expansion and growth. It has several overseas offices and is expanding the family of products based on its core intellectual property.

HazWatch – start-up company "iintegrate Systems Pty Ltd"

HazWatch is being commercialised through iintegrate Systems Pty Ltd. The company is a specialist geospatial software developer offering a portfolio of advanced products including the GeoSamba© location server. GeoSamba provides HazWatch the ability to connect many types of information, previously locked away in private and public databases, and to make it available in real-time to emergency response teams from many different agencies and jurisdictions in various locations. The CRCSI has licensed the HazWatch IP to the company and also negotiated equity in the company. Hazwatch is being commercialised as 'IndjiWatch' and has now been purchased by all of the energy companies that control the integrated transmission grid through Queensland, New South Wales, Victoria, South Australian and Tasmania.

Iintegrate has recently attracted further venture capital funding and is establishing a USA office on the back of a successful marketing trip which has the product in trial in all client organisations approached during a specific campaign during the year.

Barista - software

An output of Project 2.1 is Barista, a low-cost software system for data processing and metric geo-information extraction from high-resolution satellite imagery (HRSI). Barista has been designed to have commonly needed image analysis and measurement functions, which makes it an ideal tool for practitioners and non-specialists seeking to extract spatial information from HRSI, especially from single images from the Ikonos, GeoEye-1, Quickbird, WorldView-1, SPOT5, Cartosat and ALOS satellites. Barista's strength is that it offers easy-to-use, commonly needed spatial information extraction tools which are either not currently available or are only available in high-end specialist digital photogrammetric workstations.

A distribution license with a 43pl company has been entered into and commercial sales have begun in Australia and overseas eg to Infoterra of France.

NS7

This nascent company uses advanced radar remote sensing technologies and processes developed by the CRCSI in conjunction with the University of New South Wales. It is currently the subject of due diligence by potential funding sources.

IP Management

The effective management and commercialisation of intellectual property (IP) is fundamental to achieving the CRCSI purpose. The Board applies as a core principle the need for maximum benefit to accrue to the nation as a result of all uptake of CRCSI IP, whether it be for commercial or public benefit application.

The CRCSI IP Management Policy provides a framework for the CRCSI participants and researchers to permit the utilisation and commercialisation of research outcomes of the CRCSI. The policy sets out ownership rights and the responsibilities of researchers and participants. It provides guidance on the identification, protection and commercialisation of CRCSI IP. The policy is based upon the IP ownership and management principles outlined in the CRCSI Centre Agreement, Commonwealth Agreement, and Centre Intellectual Property Trust Deed.

An IP register of Centre IP, Background IP and nascent IP is disseminated to all project leaders. Each quarterly Project Management Group meeting discusses commercial issues, concepts and opportunities. These are also considered at Project Leader fora and at the annual conference. CRCSI has considerable internal expertise to advise projects on IP and related strategies, accessing expert inputs when required, including that of the CRCSI Advisory Committees.

During the year the CRCSI's IP holding company SISL handled the IP transactions described in the Commercialisation Activities submitted electronically to DIISR. Each transaction is reviewed with considerations of national benefit as well as reflecting the inputs of organisations to the CRCSI activities.

SISL is aware of the National Principles of IP Management and related guidelines and incorporates these into its considerations and strategies.

All PhD students and some early career researchers have received specialised training in IP and commercialisation including a commercialisation "Bootcamp," and students and staff of 43pl have been offered subsidies for undertaking the eGrad course on commercialisation.

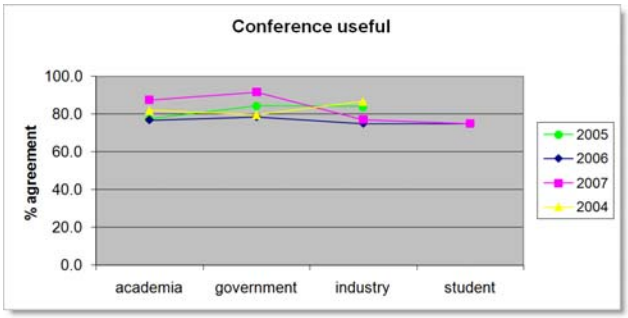
New IP developed during the period includes the core of the proposition behind the start-up company "NS7" which is under commercial confidence at this stage.

Communication Strategy

A comprehensive Communications Plan was adopted by the Board at the outset of the CRCSI. The independent industry survey conducted as part of the Third Year Review commented favorably on the CRCSI's performance in this regard: "The CRC's communications and networking are both a strength and a principal value"

Communication strategies include:

- Regular roadshows, workshops and "get-togethers" in each state to bring all participants views into strategic planning, and to encourage understanding across sectors. Specific workshops are also held with participants and with sectors
- The Annual Conference of participants for a wide-ranging technical discussion and personal interaction, including over 200 people in Brisbane for two days at the November 2008 Conference which was addressed by international speakers from Canada and China
- The Annual "stakeholder survey" to maintain and understand the engagement of parties, reflected in nearly all parties joining the Round 11 CRC bid.
- Regular correspondence and newsletters which include summaries of board minutes immediately following Board meetings
- The encouragement of Project by all participants. Projects must have representatives from each area of participants – government, corporate and academic. Project Management Groups of wide and diverse membership meet quarterly to discuss project progress and ramifications and potential applications. Dissemination of project progress reports through a closed web system allows appropriate information flows and encourages organisational interaction
- The Communications Director driving and resourcing these strategies through sound relationship management, and in particular nurturing relationships amongst the 43pl SME consortium and between member companies and the CRCSI. This has been effective in increasing the ability of the SME companies to collaborate with academia and with government – and vice versa.
- Encouraging the Research Director and Assistant Research Director to take a wide remit, draw parties together through program and project seminars and other activities
- The use of the Board. For instance two SME nominees sit on the Governing Board. Experienced research and industry advisory committees – for instance an SME representative chairs the Industry Advisory & Commercialisation Committee, and both committees have members from each sector in the CRCSI
- Co-location of R&D and management personnel and activities in the CRCSI offices around Australia
- Reliance on a strong web platform for project and other communications. The website is now getting some 16 thousand visits per month and is top of the Google ranking for a global search on "spatial information" for the fourth year in a row. It has a relevance ranking of 6 (the Google page itself has a ranking of 8)



Strategies for Developing SME Links

The CRCSI has a unique structure for its SME consortium: members purchase units in a unit trust through which each can participate in the CRC with appropriate flexibility. A resourced set of strategies to engage with these companies is implemented through the Communications Director position. New members of 43pl are encouraged and over 70 companies are now seeking to join 43pl within the Round 11 bid.

The Australian Spatial Information industry has many SMEs. From the outset it was recognised that there was a need for SMEs to be integrated. SIBA, which has some 500 members, played a strong role in the formation of a unique CRCSI structure to achieve this. A representative company 43 Pty Ltd, or "43pl", is the trust manager. This company is a CRCSI core participant; companies wishing to participate in the CRCSI buy units annually (as their cash contribution through to the CRCSI). A beneficial interest in the trust assets held by 43pl and hence of the CRCSI joint venture is held by each in proportion to their cash contribution each year. The structure provides limited liability and ease of entrance and exit, two important factors to the SME.

The CRCSI provides finance, administration and communications functions to the company and its board of directors. The consortium is a major platform for the CRCSI to achieve industrial development, which is a core outcome of the CRCSI and enunciated in the Strategic Plan.

The 43pl value proposition includes (but is not restricted to)

- Access to R&D initiatives and IP for commercialisation
- Neutral ground to meet clients and suppliers
- Growing the business (technical, professional development)
- Meaningful networking into government & academia
- Market development; kudos

End-user involvement and CRCSI impact on end-users

End-users are involved in all aspects of the CRCSI. As required by the Commonwealth guidelines the following tables list "research users" with active and meaningful engagement in the CRCSI during the year. Strong SME engagement is a particular strength of CRCSI and is reflected in all aspects of the CRC operation.

With regard to wider anticipated benefits to users, the CRCSI annually conducts through KPMG an independent confidential financial survey of the 43pl companies. The survey continues to reveal growth above industry norms.

Importantly, the Third Year Review's industry survey commented very favorably on the CRCSI engagement with end users, noting that "end users are well satisfied with their engagement levels" and "SMEs are engaged through 43pl, which is both innovative and successful".

Furthermore it concluded that the CRCSI was "vital to the organisation of the fledgling SI industry, and creating a cross sectoral collaborative framework that will lead to economic and social benefits to the nation in the long term."

Industry is a key part of the CRCSI. 43 Pty Ltd (43pl) is a company set up to facilitate CRC participation by a large number of SMEs. Award-winning 43pl breaks new ground in small company engagement in the CRC Programme. 43pl now has 53 company members spread across the nation – over ten percent of the number in the whole Australian Spatial Information Business Association. 43pl companies are embedded in all CRCSI strategic planning, governance, research, and commercialisation. Other interactions occur at the annual networking conferences and through special 43pl and user workshops.

"43pl gives us an unprecedented opportunity to bring the small corporates and researchers together in a rapidly growing industry"

"The CRCSI's use of the innovative 43pl structure to engage a large number of SMEs is noteworthy within the CRC programme, as well as being of vital importance to the fledgling SI sector and to the CRCSI."

"Most 43pl members would not have participated in large-scale, cooperative research programs without a 43pl-type mechanism. Thus, 43pl remains of paramount importance as a vehicle to gain SME engagement in the CRC's research, to provide a path for adoption of the CRC's research findings and to gain user input to the strategic planning and conduct of research."

"At least ten organisations are implementing new ideas from the CRC."

Quotes from our independent third year review survey of industry and government users

End-user Involvement in CRC Activities

Relationship with CRCSI	Type of activity and user location	Nature and scale of benefits to users	Actual or expected benefit to user
Core Participants			
Dept Agriculture & Food, WA	Research User and contributor. Based in WA, with field stations throughout the Wheatbelt. Participation in CRC wide planning workshops	Contributing to the development and trialling of CRC research (project 4.3 in particular) with a view to increased farm management efficiency and productivity.	
Dept Sustainability & Environment, Vic	Research User and contributor. Participation in CRC wide planning workshops. Victoria, with regional facilities.	Trialling outcomes of Project 1.2. Principal contributor to Virtual Australia Standing Committee Project engagement	
Geoscience Australia	Participation in CRC wide planning workshops. Project Leader Canberra, Perth	Enhanced product (accuracy) Trialling of project outcomes Project engagement	
Landgate (was Dept of Land Information) WA	Project participant & Project Leader; Trialling Project outcomes Perth	Enhanced product; Trial project outcomes ; business efficiency; support of operations (Shared Land Information Platform); technology awareness	
Dept of Lands, NSW	Project participant Participation in CRC wide planning workshops Sydney, Bathurst	Business efficiency; technology awareness; Trialling of project outcomes Project engagement	
Dept Environment & Resources Management, Qld (formerly Natural Resources & Water)	Project participant Participation in CRC wide planning workshops Brisbane	Business efficiency; technology awareness; Trialling of project outcomes Project engagement	
Dept of Primary Industry, Victoria	Project participant, Rural and urban Victoria Participation in CRC wide planning meetings, Melbourne	Enhanced products through visualisation technologies and landscape modelling.	
43 Pty Ltd – see below	Project participant Participation in CRC wide planning workshops Australia wide	See below	
Ergon Energy	Research user & contributor Project 6.7 Leader Participation in CRC wide planning workshops	Increase in productivity and decrease in operational costs, estimated in the millions of dollars	
Support Participants			
ESRI Australia	Project participant Perth	Close collaboration with potential business partners and clients.	
Defence Imagery and Geospatial Organisation	Participation in CRC wide planning workshops Project participant Canberra, Melbourne, Bendigo	Accelerated access to new and emerging technologies for national defence.	
Intergraph	Project participant REAC member Melbourne, Perth	Close collaboration with potential business partners and clients.	
43pl Participants			
AAMHatch	Project participant [and leader] Workshop participant Perth, Sydney, Melbourne	Importantly, the Third Year Review's industry survey commented very favorably on the CRCSI engagement with end users, noting that "end users are well satisfied with their engagement levels" and "SMEs are engaged through 43pl, which is both innovative and successful"	Furthermore, the independent survey of end-users of the Third Year Review reports **"…the level of engagement between the CRCSI and respondents is high"**
Alexander & Symonds Pty Ltd	Project participant Workshop participant Adelaide		
Apogee Imaging International	Project participant Workshop participant Adelaide		
Advanced Spatial Technologies	Workshop participant Perth		
Brown & Pluthero Pty Ltd	Workshop participant Surfers Paradise, Brisbane		
Beveridge Williams & Co	Melbourne		
C. R Hutchison & Co	Melbourne		
CR Kennedy	Project contributors Melbourne		

CSBP Limited	Project participant Workshop participant Perth
D.M. Gerloff & Associates	Port Headland
Fugro Spatial Solutions Pty Ltd	Project participant Workshop participant Board director 43pl director Perth, Sydney, Brisbane, Melbourne
Geomatic Technologies	Project participant Project leader Workshop participant Melbourne
Glenndew Pty Ltd	Melbourne
GISjobs International	Workshop participant 43pl director Adelaide
Iintegrate Systems Pty Ltd	Project participant Commercialising agent Perth
Intergraph- Mapping & Geospatial Solutions	Project participant REAC member Melbourne
Land Equity International Pty Ltd	Workshop participant; Board director Wollongong, Perth
Lester Franks Survey & Geographic Pty Ltd	Project participant; Board director Workshop participant Devenport, Adelaide
Lisasoft Pty Ltd	Project participant Workshop participant Melbourne, Adelaide
LogicaCMG Pty Ltd	Melbourne
Pitney Bowes Business Insight (formerly MapInfo)	Workshop participant RAEC member Brisbane, Canada
Survey 21 (Max Braid Surveyors Pty Ltd)	Workshop participant Melbourne
McMullen Nolan & Partners Pty Ltd	Project participant Workshop participant Melbourne
Navigate Pty Ltd	Sydney
NGIS Australia Pty Ltd	Project participant; Workshop participant Commercialising party Perth, Sydney
Omnilink Pty Ltd	Workshop participant 43pl Board director Sydney
Omnistar	Project participant Workshop participant Perth
Position 1 Consulting	Supplementary Bid Round 11 Bid Brisbane
PSMA Australia Ltd	Project participant Workshop participant Canberra
QASCO Surveys Pty Limited	Project participant Workshop participant Brisbane, Sydney
Reeds Consulting Pty Ltd	Melbourne
Scanalyse Pty Ltd	Project participant Commercialising agent Perth
Searle Consulting NQ (now True 3D)	Project participant Workshop participant North Qld

Furthermore it concluded that the CRCSI was "vital to the organisation of the fledgling SI industry, and as creating a cross sectoral collaborative framework that will lead to economic and social benefits to the nation in the long term."

Reasons given by 43pl members for CRCSI participation:

- Access to R&D initiatives and IP, technical expertise
- Neutral ground to meet clients and suppliers
- Growing the business (technical, professional development)
- Meaningful networking into government & academia
- Market development; kudos
- Technology awareness and "horizon watching"

Third Year Review reports

" … ten respondents acknowledged that their organisation had already attempted to implement a new idea from the CRC's research … and several expected to start implementing such new ideas in the near future"

" … more than 80% (45) of respondents expect the CRC will add value to their business in the future and 36 expect that the future competitiveness of their business will be enhanced through their participation in the CRC."

Sinclair Knight Merz Pty Ltd	Project participant Workshop participant Sydney	
Spatial Information Technology Enterprises	IACC Chair Workshop participant Brisbane	
Spatial Vision	Project Participant Melbourne	
Sundown	Project Participant Brisbane	
SuperAir	Project Participant Brisbane	
Trimble	Brisbane Project Participant	
Twynam	Brisbane Project Participant	
VPAC	Melbourne Project Participant	
V-TOL	Brisbane Project Participant	
Webmap Pty Ltd	Workshop participant Brisbane	
we-do-IT Pty Ltd	Workshop participant Melbourne	
Affiliate Members		
i-Delve, Akuna, Fusion GIS, GPSat Systems, Pracsys	Conference participant Workshop participants Project engagement	

ANNUAL CONFERENCE 2008

200 people; 70 private sector personnel from 50 companies...

"It was a real epiphany for me: I realised that the CRCSI has become the absolute centre of everything spatial in the country"

4.6 Education and Training

Summary
Twenty CRCSI scholarship-holding students have graduated or submitted their thesis and are joining the workforce, most with CRCSI participants. Six have academic positions; 3 have government end user positions, and 8 are working in industry. Another 16 scholarships are held by current students, and a further 7 students are officially recognised as receiving benefit through affiliation with CRCSI projects.

A unique partnership with the Surveying and Spatial Sciences Institute (our professional association) is delivering strong skills development throughout the spatial information industry including into remote and rural Australia.

A national online Education Portal has been established, supported by the wider industry, and is recognised as the national 'clearing house' on skills formation issues by the Australian Spatial Education Advisory Council (SEAC), which has representatives of all major spatial interest groups. The CRCSI is a key contributor to SEAC.

New university subjects have been put online and industry short courses held.

Our CRCSI Annual Conference and workshops are attended by over 500 delegates each year, and we had direct involvement in organising events which attracted over 1000 delegates of which some two thirds were end-users.

The CRCSI established an Education Reference Group Chaired by Associate Professor Sue Moffat (CSU). Members are Clive Fraser (Chair, CRCSI Research & Education Advisory Committee); Mike Ridout (CRCSI Education Program Coordinator); Bert Veenendaal (Higher education leader, CUT) and Geoff Taylor (Short courses leader, UNSW). This operational group meets as required to drive forward the various education initiatives.

A key achievement has been the establishment of the Education Portal, a dedicated web site that offers information and links for all the community as well as being able to offer online education courses through the internet. This provides remote and regional Australia with access to educational resources through modern learning technology. Other organisations, such as SEAC, SSI and ANZLIC, can use the Portal facility to maximise the benefits to the spatial information industry.

The CRCSI is a key member of the Spatial Education Advisory Committee, a national forum with representatives from SSSI, SIBA, ANZLIC and other industry bodies. This means that the initiatives of the CRCSI can be informed by the interests of the wider community and our activities and with national input from all relevant educational interests. The CRCSI is a prime delivery agent for industry skills formation and is involved in ongoing discussions with the academic and organisational sectors to coordinate CRCSI offerings.

The Short Courses program was restructured in response to demand and the presence of a growing SSSI capability. Accordingly, the Board approved a move away from the CRCSI organising its own courses towards supporting the course delivery through the SSSI regional administrative structures in each state and region. This allowed extra funding to be applied to the electronic capture of learning events, for distribution through the portal. Courses are credited with Surveying and Spatial Sciences Institute "Continuing Professional Development" points.

In addition to the short courses for industry, workshops involving 43pl and other user participants are convened, focussed on new R&D project generation and on specific topics where new technologies may bring new business opportunities.

The Annual CRCSI conference was held in Brisbane, with very good feedback from the two days' events. It highlighted the commercial and adoption achievements of the CRCSI and its participants. Pleasingly, the 200 attendees included 70 private sector participants representing 50 companies. The Conference is restricted to member participants only as requested by the members.

Of the PhD and Masters students who receive full or top-up CRCSI Scholarships, and are being supervised with industry and end-user input, 20 have completed all requirements for their degree and several others are in the process of writing up. Students are brought to a professional and networking day associated with each CRCSI Annual Conference. CRCSI Participant organisations are encouraged to bring their own staff into higher degrees by coursework research.

We have exceeded our Commonwealth Agreement targets for education and will continue to produce a high rate of completions. Industry involvement in supervision is strongly encouraged.

All our graduates are finding employment, with many of our first PhD and Masters completions going to 43pl companies. Details are below.

CRCSI Scholarship Students who have graduated, or have submitted their thesis.

David Belton — Classification and feature extraction of Terrestrial Laser Scanning point clouds

Supervisor (Academic)	Dr Derek Lichti, Uni Calgary Dr Jon Kirby, Curtin Uni Dr Kwang-Ho Bae, Curtin Uni
Assoc Supervisor (Industry)	Chris Earls, AAMHatch
Completion Date	July 2008
Source of Funding	Doctorate Top up scholarship
Project affiliation	Project 2.2
Now with	Project 2.06, Curtin Uni, WA

Anna Boin — Exposing Uncertainty: Communicating spatial data quality via the Internet

Supervisor (Academic)	Dr Gary Hunter, Uni Melbourne Dr Matt Duckham, Uni Melbourne Dr Allison Kealy, Uni Melbourne
Assoc Supervisor (Industry)	Duncan Brooks & Susan Brown, Vic DSE
Completion Date	August 2008
Source of Funding	Doctorate Full scholarship
Project affiliation	Project 5.3
Now with	Uni Melbourne

Mark Broomhall — Near real-time Aerosol Optical Depth Retrieval from Satellite Measurements

Supervisor (Academic)	A/Prof Merv Lynch, Curtin Uni
Assoc Supervisors (Industry)	Dr Brendon McAtee, Landgate WA
Completion Date	July 2008
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 4.1
Now with	Bureau of Meteorology, Australia

Michael Day — Hyperspectral remote sensing for land management applications

Supervisor (academic)	A/Prof Geoff Taylor, Uni NSW Dr Ray Merton
Assoc Supervisor (industry)	
Completion Date	***submitted***
Source of Funding	Doctorate Top-Up Scholarship
Project affiliation	Project 4.4
Now with	University of Wollongong

Michael Chang — Interferometric Synthetic Aperture Radar

Supervisor (Academic)	Dr Linlin Ge, Uni NSW Prof Chris Rizos, Uni NSW
Assoc Supervisor (Industry)	Mr John Douglas, Apogee
Completion Date	July 2008
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 4.2
Now with	School Surveying & Spatial Info Systems, University NSW

Weidong Ding — Integrated positioning and geo-referencing platform: development

Supervisor (Academic)	Dr Jinling Wang, Uni NSW
Assoc Supervisor (Industry)	Mr Doug Kinlyside, Dept of Lands Bathurst
Completion Date	July 2008
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 1.3
Now with	Road Transport Authority, NSW

Martin Hale — Identifying and Addressing Management Issues For Australian State Sponsored CORS Networks

Supervisor (academic)	Dr Philip Collier, Uni Melbourne Dr Allison Kealy, Uni Melbourne
Assoc Supervisor (industry)	Mr Peter Ramm, Victorian Dept of Sustainability & Environment
Completion Date	December 2007
Source of Funding	Masters Scholarship
Project affiliation	Project 1.2
Now with	Dept Sustainability & Environment, Vic (GPSNet)

Sue Hope — Integrating Spatial Datasets of Different Quality

Supervisor (academic)	Dr Allison Kealy, Uni Melbourne
Assoc Supervisor (industry)	Geoff Menner, Logica CMG Jessica Davies, Geomatic Technologies
Completion Date	July 2008
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 5.3
Now with	Dept Industry & Regional Management, Vic

Matthew Hutchinson — Development of an Intelligent Geocoder to Enable Spatial

Supervisor (academic)	A/Prof Bert Veenendaal, Curtin University of Technology
Assoc supervisor (industry)	Dr Derek Milton
Completion Date	2009
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 3.2
Now with	Woolpert Inc, Ohio USA

Abida Iqbal — Integrating spatial data sets using road networks from heterogeneous and autonomous data sets

Supervisor (academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc supervisor (industry)	Hemayat Hussain, Vic Dept Primary Industries
Completion Date	September 2007
Source of Funding	Masters Scholarship
Project affiliation	Project 5.2
Now	Resident overseas

Wing Yip Lau — Landslide Recognition and Prediction using Spaceborne Multispectral Data

Supervisor (academic)	Assoc Prof Linlin Ge, Uni NSW Dr Xiuping Jia, Aus Defence Force Academy
Assoc supervisor (industry)	Hemayat Hussain, Vic Dept Primary Industries
Completion Date	July 2006
Source of Funding	Masters Scholarship
Project Affiliation	Project 4.2
Now with	Intergraph, Hong Kong

James McIntosh — Comparison of the Spatial Accuracy of Disparate 3D Laser Point Clouds in Large Scale 3D Modelling and Physical Reproduction Projects for Large Cultural Heritage Structures

Supervisor (academic)	Dr Derek Lichti, Curtin Uni
Assoc supervisor (industry)	Sinclair Knight Merz
Completion Date	December 2006
Source of Funding	Masters Scholarship
Project affiliation	Project 2.2
Now with	Pitt & Sherry, Tas

Dana Meng — Filtering Technique for Interferometric Phase Images

Supervisors	A/Prof Eliathamby Ambikairajah, Uni NSW Dr Linlin Ge, Uni NSW
Completion Date	August 2006
Source of Funding	Uni NSW Masters Scholarship
Project affiliation	Project 4.2
Now with	The MathWorks Pty Ltd

Alice O'Connor — Integrating environmental visualisation with spatial data

Supervisor (academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc Supervisor (industry)	Mr John Creasey, Geoscience Australia
Completion Date	July 2007
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 5.2
Now with	Geomatic Technologies Pty Ltd, Vic

Joanne Poon — Spatial Information generation from high-resolution satellite imagery

Supervisor (academic)	Prof Clive Fraser, Uni Melbourne Dr Jochen Willneff, Uni Melbourne
Assoc Supervisor (industry)	Mr John Cazanis, Spatial Division, SKM
Completion Date	December 2007
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 2.1
Now with	SKM, Vic

Noor Raziq — GPS Deformation Monitoring of Engineering Structures

Supervisor (academic)	Dr Philip Collier, Prof Clive Fraser
Assoc Supervisor (industry)	Mr Peter Ramm, Victorian Dept of Sustainability & Environment
Completion Date	2008
Source of Funding	Doctorate Top-up Scholarship
Project affiliation	Project 1.2
Now with	GPSat Systems Pty Ltd

Adam Roff — Hyperspectral imagery for vegetation management

Supervisor (academic)	Assoc Prof Geoff Taylor, Uni NSW Dr Ray Merton
Assoc Supervisor (industry)	
Completion	***submitted***
Source of Funding	Doctorate Top-up Scholarship
Project affiliation	Project 4.4

Zaffar Sadiq — Data models to support regional variation in spatial data quality

Supervisor (academic)	Dr Matt Duckham, Uni Melbourne
Assoc Supervisor (industry)	Geoff Lawford, Geoscience Australia Rob Morrison, Vic DSE
Completion Date	May 2009
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 5.3
Now with	SKM, Vic

Asghar Tabatabaei — GNSS Interference

Supervisor (academic)	Dr Andrew Dempster, Uni NSW
Assoc Supervisor (industry)	
Completion Date	May 2008
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 1.1
Now with	School Surveying & Spatial Info Systems, University NSW

Martin Tomko — Generation of Granular Route Descriptions based on City Structure

Supervisor (academic)	Dr Stephan Winter, Uni Melbourne
Assoc Supervisor (industry)	Maurits van der Vlugt, NGIS
Completion Date	August 2007
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 3.3
Now with	Dept Geography, University of Zurich

Current Scholarships

Alex Chen — Augmented reality integration and live communication between GIS and SIEVE

Supervisor (Academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc Supervisor (Industry)	Christopher Pettit, DPI Vic
Commencement Date	March 2005 ***on leave***
Source of Funding	Doctorate Top-up Scholarship
Project affiliation	Project 5.2

Hao Hui Chen — Application of rural landscape visualisation for decision making and policy development

Supervisor (Academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc Supervisor (Industry)	Christopher Pettit, DPI Vic
Commencement Date	February 2008
Source of Funding	Doctorate Top-up Scholarship
Project affiliation	Project 5.04

Nicholas Davies — Comprehensive standards for the best practice and quality control

Supervisor (Academic)	Dr Derek Lichti, Curtin Uni
Assoc Supervisor (Industry)	Lester Franks
Commencement Date	9 March 2005
Source of Funding	Masters Scholarship
Project affiliation	Project 2.2

Aiden Deem — Regional Integrity (details to come)

Supervisor (Academic)	Dr Yanming Feng, QUT Dr Rob Walker, QUT
Assoc Supervisor (Industry)	
Commencement Date	2 July 2007
Source of Funding	Doctorate Top-up Scholarship (with APA)
Project affiliation	Project 1.04

Rakhesh Devadas — Analysis of wheat productivity using hyperspectral and multi-temporal satellite data

Supervisor (Academic)	A/Prof David Lamb, Dr David Backhouse, UNE
Assoc Supervisor (Industry)	Dr Steven Simpfendorfer
Commencement Date	21 Sep 2005
Source of Funding	Doctorate Top-up Scholarship
Project affiliation	Project 6.08

Anna Donets — Detecting and mitigating multipath in structural monitoring using GNSS

Supervisor (Academic)	Dr Phil Collier, Uni Melbourne Prof Clive Fraser, Uni Melbourne
Assoc Supervisor (Industry)	Martin Hale, DSE Vic
Commencement Date	13 Feb 2007
Source of Funding	Doctorate Top up Scholarship
Project affiliation	Project 1.2

Simon Fuller — Quality Control issues for real-time positioning

Supervisor (academic)	Dr Phil Collier, Uni Melbourne Dr Allison Kealy Uni Melbourne
Assoc Supervisor (industry)	Peter Ramm, Vic DSE
Commencement Date	1 March 2004
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 1.2

Jiang Li — Intelligent placement of vegetation in virtual worlds

Supervisor (Academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc Supervisor (Industry)	Jean-Philippe Aruambout, DPI Vic
Commencement Date	1 January 2008
Source of Funding	Masters Top up Scholarship
Project affiliation	Project 5.04

Eric Zhengrong Li

Supervisor (Academic)	
Assoc Supervisor (Industry)	
Commencement Date	
Source of Funding	Full Scholarship
Project affiliation	Project 6.07

Marco Marinelli — Assessing error effects in critical application areas

Supervisor (academic)	Dr Rob Corner, Curtin Uni Prof Graeme Wright, Curtin Uni
Commencement Date	April 2005
Source Funding	Doctorate Full Scholarship
Project affiliation	Project 5.3
Now with	Bureau of Meteorology

Steve Mills

Supervisor (Academic)	Dr Luis Meijias, QUT Dr Jason Ford, QUT Prof Rodney Walker, QUT
Assoc Supervisor (Industry)	
Commencement Date	May 2007
Source of Funding	Doctorate Top up Scholarship
Project affiliation	Project 6.07

Alex Ng — Persistent radar interferometry

Supervisor (academic)	Assoc Prof Linlin Ge, Uni NSW Prof Chris Rizos, Uni NSW
Assoc Supervisor (industry)	tba
Commencement Date	Jan 2007
Source of Funding	Doctorate Full Scholarship
Project affilation	Project 4.09

Marcos Niño Ruiz Visualisation of Environmental Models

Supervisor (Academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc Supervisor (Industry)	Christopher Pettit, DPI
Commencement Date	
Source of Funding	Masters Full Scholarship
Project affiliation	Project 5.04

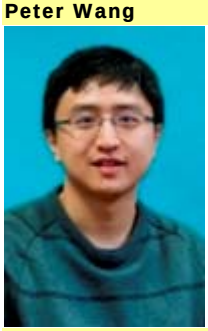
Eric Richards The use of high resolution satellite data (IKONOS) in the establishment and maintenance of an urban Geographical Information System

Supervisor (Academic)	Dr John Trinder, Uni NSW
Assoc Supervisor (Industry)	Mr Andrew McCleave, SKM
Commencement Date	January 2006
Source of Funding	Masters Full Scholarship
Project affiliation	Program 4
Now with	Dept of Defence

Eldar Rubinov Quality Assessment for Real-Time GNSS Positioning

Supervisor (Academic)	Dr Phil Collier, Uni Melbourne
Assoc Supervisor (Industry)	Mark Judd, Geomatic Technologies
Commencement Date	May 2008
Source of Funding	PhD Top up Scholarship
Project affiliation	Project 1.12

Peter Wang Automatic building of interiors for security purposes



Supervisor (Academic)	Prof Ian Bishop, Uni Melbourne Dr Christian Stock, Uni Melbourne
Assoc Supervisor (Industry)	tba
Commencement Date	February 2008
Source of Funding	Masters Full Scholarship
Project affiliation	Project 5.04

Kui Zhang Advanced InSAR Technologies

Supervisor (Academic)	Assoc Prof Linlin Ge, Uni NSW
Assoc Supervisor (Industry)	David Abernethy, NSW Dept Lands
Commencement Date	1 January 2008
Source of Funding	Doctorate Full Scholarship
Project affiliation	Project 4.09

Affiliated Students

These students are involved in and benefit from CRCSI project activities but are not in receipt of direct funding through a CRCSI Scholarship per se.

Brendan Cosman — Copyright and Digital Content

Degree	Doctorate
Supervisor	Prof Brian Fitzgerald, QUT Prof Anne Fitzgerald, QUT
Commencement Date	1 July 2007
Support	
CRCSI project affiliation	Project 3.05

Johannes Fellner — Height systems and vertical datums

Degree	Doctorate
Supervisor	Dr Michael Kuhn, Curtin Uni
Commencement Date	tba
Support	
CRCSI project affiliation	Project 1.08

Jennifer Joi Field — Mapping Indigenous Knowledge; developing a best practice SIT (spatial information technology) methodology that facilitates people doing it for themselves

Degree	Doctorate
Supervisor	A/Prof Bert Veenendaal, Curtin Uni Dr Peter Woodgate, CRCSI
Support	independent

Mick Filmer — A re-examination of the Australian Height Datum realised within a Global vertical datum

Degree	Doctorate
Supervisor	Prof Will Featherstone, Curtin Uni
Commencement Date	26 February 2007
Support	APA TIGeR top up
CRCSI project affiliation	Project 1.08

Brooke Phelps — An Assessment and Evaluation of Current PA tools: Commercial Broad Acre Applications to the Irrigated and Rain-fed, Cotton and Grains Industry in Northern NSW and Southern Qld

Degree	Masters
Supervisor	A/Prof David Lamb, UNE
Commencement Date	
Support	CCC (Cotton Catchment Communities) CRC
CRCSI project affiliation	Project 6.07

Subhash Sharma	tba	
	Degree	Masters
	Supervisor	Prof Ian Bishop, Uni Melb
	Commencement Date	Feb-Oct 2008
	Support	Occupational Trainee
	CRCSI project affiliation	Project 5.04
Jun Wang	tba	
	Degree	Doctorate
	Supervisor	Dr Yanming Feng, QUT Dr Maolin Tang, QUT
	Commencement Date	August 2008
	Support	
	CRCSI Project Affiliation	Project 1.04

5 Additional Requirements for some CRCs

5.1 Third year Reviews – 2002 Round CRCs

The CRCSI has fully adopted and implemented the recommendations of the Third Year Review. The Board is of the view that it has addressed the three points within the CRC Program response of 22 June 2007 to the Review report, in that the CRCSI has:

- struck an appropriate balance for a CRC in its portfolio of 'fundamental' and 'applied' research and carried this through into its planning for a new CRCSI in Round 11
- satisfied the requirements for the board of directors to balance stability with new inputs, and has in place agreed structures for the new CRCSI that have been designed with the participants to ensure effective board functioning
- restructured SISL in the light of the new CRCSI and contemporary business requirements

Recommendation	Implemented?	If not, why not?	Implementation Strategies
1 - Need a clear vision of the proportion of effort going to fundamental research and that being directed to applied research.	Yes	-	Continual review through portfolio analysis
2 - How the outputs from the Virtual Australia (VA) Committee are to be integrated into the research agenda needs to be clarified as no clear process is evident.	Yes	-	REAC absorbed the output of the VA Committee in recommending future research. This has been absorbed into the Round 11 new bid Program 3 "Spatial Infrastructures" and its research agenda setting processes
3 - An external peer review process should be established for cutting edge research projects.	Yes	-	Generally coinciding with the Annual CRCSI Conference an international panel is invited to review the research portfolio. This is further tested through extant international networks eg with GEOIDE and NfN relationships
4 - The CRC Board should review the 'college' electoral system to see whether it is the most appropriate for the next stage of the CRC 's development.	yes	-	Colleges approved the structure and process in place and have recommended similar for Round 11
5 - The CRC Board seek legal advice about its current commercialisation decision making processes to ensure that its structure achieves the intended objectives of having a faster, sharper, smaller Board (SISL) with commercial focus and of insulating the CRC (and its research funds) from the risks arising in some commercial transactions.	yes	-	Legal advice was gained and no action was required
6 - The CRC continues to use its resources including its links with industry and professional bodies to focus on attracting the highest calibre students to participate in the post graduate program.	yes	-	The postgraduate program was expanded in number and greater efforts put into seeking high quality graduates, and enrichment programs put in place to retain them.
7 - Consideration should be given to increasing significantly the financial contribution of 43pl to the CRC given the broad benefits they now derive from the CRC structure and its research	yes	-	Fees for 43pl membership were raised. Note that 43pl in Round 11 is contributing twice the cash it pledged in the first CRCSI
8 - The CRC ensures that scientific program leaders and other leaders promulgate to all researchers their big picture vision for the application of the research, including its commercialisation.	yes	-	Achieved and resulting in the new program of the Round 11 bid
9 - The current number of PhD students involved in projects is considered low given the large number of researchers involved and the breadth of science areas that underpin the CRC programmes. The CRC should explore avenues for increasing the number of high calibre postgraduate students included in its programmes.	yes	-	Scholarship offerings and student involvement were increased and we have now exceeded end year 7 targets already with more graduates "in the pipeline"

5.2 Performance Measures 08-09

CRCSI Board Indicators

KPI 1: Annual external earnings above $1,240,000 (Overall 7 year Commonwealth Agreement target is to generate $5.3 million of new revenue from consulting, new grants, partners, commercialisation, and interest). Meet Commonwealth inkind target of $10.33 M.

ASSESSMENT: Met
The new funds revenue target for Year 6 of $1.240M has been exceeded by $3.867M bringing the external earnings to $5.107M. This is due in part to funding received from Department of Climate Change for the both the UDEM project and the new International Global Carbon Monitoring Scheme project. The inkind target of $10.33M was exceeded by $2.59M bringing the total to $12.922M. The CRCSI has now exceeded its 7 year targets for cash and inkind at the end of year 6, one year early.

KPI 2: Product pipeline (complete 3 licences / company start-ups).

ASSESSMENT: Partially Met
A licence and commercialisation agreement with NSI, the commercialisation arm of the University of New South Wales, was completed in Oct 2008. Development of the spinoff, NS7, is continuing. This brings to 3 the number of spin-offs with which we hold equity. We continued to make licence sales of our image analysis software package Barista.

KPI 3: World class research and education program. It will be assessed by independent experts. It will have 14 PhD and Masters students completed or underway (comprising 2 students who have passed examination and a current load of 12 postgraduate students. The publications target will be 75 comprising books, book chapters, refereed journals and conference publications).

ASSESSMENT: Met
The CRCSI has so far enrolled 36 PhD and Masters students and there have been 20 successful PhD and 5 Masters completions to date. Currently, there are 15 students receiving scholarships, and there are another 7 who are directly involved in CRCSI projects. We published 131 papers, books and book chapters and conference proceedings.

KPI 4: High shareholder and partner satisfaction. The CRCSI participants have obtained significant tangible and intangible benefits as a result of their participation. This will be measured through the annual stakeholder survey. It should show that at least 75 percent of respondents meet this measure. Participants can determine their own definition of the term ‘direct and significant tangible and intangible benefit’.

ASSESSMENT: Met
A good measure of the current state of partner satisfaction may be found through the response to the rebid. Our partner numbers have increased from about 70 to about 115. The average partner contribution has more than doubled. The number of 43pl partners has grown from 55 to over 70. We have expanded the number of government agencies and large corporates and lost none of our existing members in these categories. The number of Australian university partners is still six, although only four of these are cash contributors. We have lost UNSW (who will provide contract research) and CSU but gained RMIT University and Swinburne University, the later two being inkind contributors only.

Internationally we have gained the Technical University of Delft (Netherlands), Wuhan University (China), Leibniz University of Hannover (Germany), Mysore University (India) and McGill University (Canada) as partners. All up, we have 115 partners in the rebid compared with 70 in CRCSI-1. In tight financial times, this growth is very pleasing and is a broad reflection of support.

KPI 5: Submission of a new CRCSI bid to the Federal Government.

ASSESSMENT: Met
The submission for CRCSI-2 was successfully lodged on 20 March 2009. The successful bid was announced by Minister Carr on 7 August 2009.

KPI 6: Facilitate the development of the Australian Spatial Consortium.

ASSESSMENT: Met
The ASC Steering Committee continues to meet monthly and is making good progress. The ASC has formally expressed its desire to become the parent of the CRCSI in due course and to help it transition to a permanent entity beyong the CRC Program. A web presence is in place awaiting ramping up of ASC activities in due course.

DIISR Table: Progress on Performance Measures (2002 Round CRCs)

PERFORMANCE MEASURE	07-08 ACHIEVEMENT	08-09 ACHIEVEMENT
CRC Programme Objective 1: To enhance the contribution of long-term scientific and technological research and innovation to Australia's sustainable economic and social development		
Centre Objective 1.1 Position the SI industry as playing a key role in supporting the delivery of economic development, environmental management and social equity in Australia		
Recognition of the CRCSI role within a longitudinal study of the uptake and impact of SI in the wider community	ACIL Tasman (2008) report on the economic impact of Spatial information to the Australian economy finds that "the spatial information industry contributed between $6.4-$12.6 billion to GDP (0.6%-1.2%), increased household consumption by between $3.6 - $6.9 billion, increased investment by between $1.8-$3.7 billion, had a positive impact on the balance of trade with exports increasing by up to $2.3 billion, and increased real wages by between 0.6% - 1.2%."	Round 11 bid attracted double the numbers of entities and double the cash and inkind contributions and expanded applications into new areas like health All the major SI bodies in Australia support the CRCSI – viz • ANZLIC • SSSI • SIBA • SEAC • ASC
Key role played in the ICT CRC Council	CRCSI CEO Deputy Chair CRC Association	CRCSI CEO Deputy Chair CRC Association
Centre Objective 1.2 To provide innovative World-class research which will provide the science and technology infrastructure to enable applications to develop and expand		
Invitations and paper presentations at national and international forums (2 in Yr 1, an average of 3 per year thereafter)	Invited keynotes presented by CEO at several conferences 30 other invited keynote presentations 6 book chapters; 21 published or accepted refereed articles; 25 refereed conference papers;	Invited keynotes presented by CEO at several international conferences; and numerous international and national meetings 131 refereed papers and conference presentations including 11 book chapters
International recognition and participation in international programs of benefit to Australia and the region (5 in total)	Founding member of the Global Network of Networks for Spatial Research Organisations, an international chain of 8 R&D organisations in Spatial Information. Alliances with Chinese Academy of Sciences; GEOIDE Canada International speakers at every CRCSI Annual Conference eg Director of Microsoft Virtual Earth in 2007	Founding member of the Gloabal Network of Networks, an international consortium of [now] 5 key R&D organisations in Spatial Information. Strengthened alliances with Chinese Academy of Sciences through the jointly directed CEODE; GEOIDE International speakers at every CRCSI Conference eg Prof Nick Chrisman Director of GEOIDE and Senior Chinese Scientists in 2008

Recognition as "an outstanding CRC"	CRC Program 2007-08 STAR Award for Small Business Engagement Education targets exceeded 43pl SME consortium widely recognised as a stand-out – with 7 formal briefings on its operations requested by and given to other CRC ventures	3 national APSEA Awards including the most eminent SI award the "JK Barrie award for Excellence" Success in the Round 11 bid [although this was awarded after the end of the FY]
Centre Objective 1.3 To enhance the growth and use of spatial data infrastructures at all levels for national benefit		
Research outcomes which inform the policy and regulatory framework (a formal position on at least one of the ANZLIC working parties)	Key role in forming the Australian Spatial Consortium Major input to and from ANZLIC policy makers at CRCSI Annual Conference Contribution to the National Innovation Systems Review and the CRC Program Review	Key role in the development of the Australian Spatial marketplace Key role in establishing the Australian Spatial Consortium Important submissions to key national inquiries of various kinds eg Senate Space policy Inquiry; Bushfires Royal Commission
Centre Objective 1.4 To support the objectives of the Australian Spatial Information Industry Action Agenda (ASIIAA) "Positioning for Growth" 2001		
Annually monitor the output of the CRCSI against the objectives of the Industry Action Agenda	Covered within the CRCSI Strategic Plan for the year, which has had all targets met or exceeded	Covered within the CRCSI Strategic Plan for the year, which has had all targets met or exceeded
Involve external assessors to provide qualitative feedback biennially	Prof Mike Goodchild visit March 2008; Dr Vincent Tao [Microsoft] September 2007; Prof Nasser El Sheimy et al [Canada] May 2008	Prof Nick Chrisman Canada; Prof John Shi Hong Kong; Dr Ershun Zhong China
CRC Programme Objective 2: To enhance the transfer of research outputs into commercial or other outcomes of economic, environmental or social benefit to Australia		
Centre Objective 2.1: To investigate and develop appropriate policies to address current legal, regulatory and institutional limitations to the access and use of SI		
Number of policy recommendations or standards developed on improving access and use of SI	Major impact in area of Public Sector information access and Digital Rights Management ACIL Tasman study and the CRCSI Conference contributing to the thinking of ANZLIC policy makers	Major new program in standards devised for Round 11 bid ACIL Tasman Economic study repeated in New Zealand Data Access and Pricing study initiated for Australia
Centre Objective 2.2: To foster industry capabilities and growth, and the level of commerce in SI in Australia		
At least two stakeholders participating in each program	Achieved in almost all projects with the majority having more than three, and all including end-users [particularly 43pl companies]	Achieved in almost all projects with the majority having more than three, and all including end-users [particularly 43pl companies]
7 initiatives developed or initiated by the CRC taken up by stakeholders	Standout potentials are the start-ups Scanalyse Pty Ltd and iintegrate Systems Ltd and SKM with Barista.	MillMapper (Scanalyse) HazWatch (iintegrate) i-loka (Geomatic Technologies) radar services (NS7) Conferences aimed at end-users (spatial@gov) Education Portal (SEAC) New Zealand adopting CRCSI node model
Contribution to sustained industry growth of 10% pa averaged over the next 7 years	KPMG annual financial benchmarking survey of 43pl companies shows growth in excess of this level. ACIL Tasman report on the economic impact of Spatial information to the	CRCSI rebid develops a major program to improve access to information. ANZLIC, the peak government body for spatial information adopts a policy of creating

	Australian economy finds that "the spatial information industry contributed between $6.4-$12.6 billion to GDP (0.6%-1.2%), increased household consumption by between $3.6 - $6.9 billion, increased investment by between $1.8-$3.7 billion, had a positive impact on the balance of trade with exports increasing by up to $2.3 billion, and increased real wages by between 0.6% - 1.2%." It also found that this contribuition could be up to 50% greater if access to information were improved.	a new Australian Spatial Marketplace for trading spatial information. ANZLIC chooses the CRCSI to be its primary research provider.
Centre Objective 2.3 To be a player of significance in the international SI community, both in technology development and commercial innovations		
$3.125m of additional research and consulting contracts attracted by the CRCSI over the life of the centre (consistent with Schedule 3 Table 2)	We are at $1,127,000 (cash) against the 2008 FY target of $1,100,000 8 research contracts & consultancies to the CRCSI worth $335k plus the award of the coastal Vulnerability study at $1,600,000 in May 08	The target for Year 6 of $1.240M has been exceeded by $3.867M bringing the external earnings to $5.107M. This is due in part to funding received from Department of Climate Change for the both the UDEM project and the new International Global Carbon Monitoring Scheme project. The inkind target of $10.33M was exceeded by $2.59M bringing the total to $12.922M
Centre Objective 2.4 To provide education and training to support an internationally competitive SI industry		
70 students, researchers, industry & end users attending courses on average pa	18 technology transfer workshops 175 attended the 2 day Annual [technology transfer] CRCSI Conference in Sydney 25 students [and 3 early career researchers] attended the Student Day in Sydney in September 2007 and the Annual Conference	Many informal tech transfer workshops and short courses connected with projects 200 attended 2 day Annual Conference 24 students attended the 2008 Student Day at the Annual Conference WALIS Forum and spatial@gov conferences attracted 800 and 300 delegates respectively, mostly end users (and about 80 teachers) SSSI courses co sponsored by CRCSI attracted several hundred users Education portal accessed by 600 users per month on average incl schools
CRC Programme Objective 3 To enhance the value to Australia of graduate researchers		
Centre Objective 3.1 To develop the research capability, capacity, skills base and research talent pool to develop and enhance applications and to support the adoption of SI as required for internationally competitive business		
Number of graduate students completing PhDs and Masters degrees in the CRCSI (total 25 by year 7)	18 Completions 18 underway [with 2 on leave] 5 Affiliated students	20 Completions 15 underway 7 Affiliated students
90% of graduate students produced by the CRCSI who wish to be employed are employed by user and end user stakeholders	Over 90% completed students now working with 43pl companies or CRCSI end users	11 out of 17 (65%) known workplaces are industry/end-users, the others are research postings (2 yet to take up job offers; 1 unknown since return to Pakistan)
Centre Objective 3.2 To increase the efficiency of research training through effective collaboration between universities, government and the private sector		

Over 90% of graduate students having joint supervision and/or close interaction during their research training with stakeholders	60% co-supervised (others still to be advised as at early stage of engagement) 100% end user interaction	80% completions were co-supervised; and over 50% of the current scholarships (others still to be advised as at early stage of engagement) 100% end user interaction
100% projects with key stakeholder input	100% end user interaction	100% end user interaction
CRC Programme Objective 4 enhance collaboration among researchers, between researchers & industry or other users, to improve efficiency in the use of intellectual and research resources		
Centre Objective 4.1 To create long term partnerships of SI providers and users, and of the private, government and academic sectors		
More than 95% of projects involving different categories of participant	100% achieved	100% achieved
Centre Objective 4.2 To provide an innovative environment for commercialisation of new SI technologies		
4 new SI technologies incorporated into commercial ventures due to the CRC	On target – Barista; MillMapper through Scanalyse; HazWatch through iintegrate Systems; i-loka through Geomatic Technologies; Radar Services through a start up company to be established. Other technologies under review.	On target – Barista sales increased; MillMapper through Scanalyse now in Chile and USA; HazWatch through iintegrate Systems (as IndjiWatch) moving into USA; i-loka through Geomatic Technologies; radar services through a start up company "NS7" being established. Other technologies under review.

Selected conclusions of the CRCSI Third Year Review

"Given the ill-defined and fledgling nature of the Spatial Information industry sector, it is commendable that more than half of the research users believe that the CRCSI has a high level of understanding of the industry's research needs" [Conclusion 7]

"… the best thing about the CRCSI's research is its end-user focus" [Conclusion 14]

"70% of users, and particularly the SME end users, are well satisfied with their level of access to CRCSI's research and expertise" [Conclusion 5]

"At least ten organisations are implementing new ideas from the CRC" [Conclusion 8]

"… the CRCSI is very well placed to deliver economic benefit through 43pl Members to the SI industry" [Conclusion 9]

"CRCSI's research users highly value the increased networking opportunities provided by the CRCSI. The Annual Conference remains a highlight of the research user's networking strategy and the CRC's communication mechanisms are highly regarded. [Conclusion 18]

The CRCSI is seen as being vital to the organisation of the fledgling SI industry, and as creating a cross-sectoral collaborative framework that will lead to economic and social benefits to the nation in the longer term. [Conclusion 6]

Glossary and Acronyms

43pl	43 Pty Ltd, a company representing the CRCSI's national SME consortium
ACC	Audit & Compliance Committee
ANZLIC	ANZLIC - the Spatial Information Council … formerly known as the Australia and New Zealand Land Information Council
ARGN	Australian Regional GPS Network
SIBA	Spatial Industries Business Association
ASC	Australian Spatial Consortium
CEODE	Centre for Earth Observation and Digital Earth
CORS	Continuously Operating Reference Station
CRC	Cooperative Research Centre
CRC Program	Secretariat of the DSIIR CRC Program
CRCSI	Cooperative Research Centre for Spatial Information
DEM	Digital Elevation Model
DInSAR	Differential Interferometric Synthetic Aperture Radar
DIISR	Department of Innovation, Industry, Science & Research
GB	Governing Board
GFI	Global Forests Initiative
GIS	Geographical Information Systems
G-NAF	Geocoded National Address File
GNSS	Global navigation Satellite Systems
GPS	Global Positioning Satellites
IACC	Industry Advisory & Commercialisation Committee of the CRCSI
INS	Inertial Navigation Systems
InSAR	Interferometric Synthetic Aperture Radar
MOU	Memorandum of Understanding
NfN	Network for Networks – an international consortium of CRCSI like organisations
PSInSAR	Permanent Scattered Interferometric Synthetic Aperture Radar
REAC	Research & Education Advisory Committee of the CRCSI
Round 11	The 2009 CRC Program funding Round
SDI	Spatial Data Infrastructure
SEAC	Spatial Education Advisory Committee of Australia
SISL	Spatial Information Systems Ltd
SME	Small to Medium [sized] Enterprises
SSSI	Surveying & Spatial Sciences Institute

FURTHER INFORMATION
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Appendix 1 - Publications

Book chapter [11]

Benke, K, C Pelizaro & K Lowell. 2009. Uncertainty In Multi-Criteria Evaluation Techniques When Used For Land Suitability Analysis. In: Crop Modeling And Decision Support, W. Cao, J. W. White And E. Wang (Eds), pp 291-298, Springer Press, Berlin (2009).

Boin, A.T. & G. J. Hunter. 2008. What Communicates Quality To The Spatial Data Consumer?. Research Book Chapter: Quality Aspects In Spatial Data Mining, A. Stein, J. Shi And W. Bijker (Eds), Crc Press: New York, pp. 285-296.

Boin, A.T. & G. J. Hunter. 2008. What Communicates Quality To The Spatial Data Consumer?. In Quality Aspects In Spatial Data Mining, A. Stein, J. Shi And W. Bijker (Eds), Crc Press: New York, pp. 285-296.

Broomhall, M, B Mcatee & S Maier. 2009. An Investigation Of The Remote Sensing Of Aerosols Based On Modis Data For Western Australian Conditions. Lecture Notes In Geoinformation And Cartography (Editors: S. Jones, K. Reinke ISBN: 978-3-540-88265-7) June 2009).

Feng, Y & C Rizos. 2008. Geometry-Based Tcar Models And Performance Analysis,. Observing Our Changing Earth, M.G. Sideris (Ed.), IAG Symposia Series Vol.133, Springer-Verlag Berlin Heidelberg,. ISBN 978-3-540-85425-8, P645-654

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