

# Scaling Location Data in Australia and New Zealand

## The R&D Behind It

Peter Woodgate, CEO, Cooperative Research Center for Spatial Information



▲ Peter Woodgate



**BACKGROUND** Australia and New Zealand have developed a forward thinking public-private partnership incubator for spatial information innovation. It's called the Cooperative Research Center for Spatial Information (CRC SI). It is a joint venture of 110 organizations – a combination of private companies, government agencies, and academic institutions with \$160 million under investment to solve and commercialize solutions to complex spatial research and development issues. Spatial innovation is critical to Australia and New Zealand's economic, environmental and national security. In addition, one of the largest constellations of Global and Regional Navigation Satellites will in a few short years pass directly overhead. Australia is uniquely positioned to take advantage of the enormous potential of these new and emerging technologies.

**LBX** Tell us a little about CRC SI and why spatial information is so critical to both the public and private sectors in Australia and New Zealand.

**WOODGATE** The CRC SI has been set up as a long-term research engine to tackle grand challenges that can only be addressed through the unique cooperation of the private, public and research sectors.

Spatial technologies and the information they generate underpin the Australian economy. Let me give several examples. Firstly, Australia's largest export industry is mining and minerals exploration, which relies heavily on spatial technologies. Secondly, all property transactions rely on detailed

### Summary

In this interview, Peter Woodgate discusses:

- ▶ Australia and New Zealand's \$160 million spatial incubator
- ▶ The vision for a spatial marketplace
- ▶ The role of government, the private sector and academia in collectively developing critical spatial technologies and infrastructure to support a location-referenced world.
- ▶ Solving location data challenges at scale

data found in cadastre files held by government agencies (these include property boundaries, titles, ownership, land values, parcel, and location data). Thirdly, for a more macro example, Australia is extremely vulnerable to floods, bushfires, and cyclones. Our ability to rapidly respond to these natural disasters impacts the health of the national economy and crucially depends on a range of data from airborne and satellite sources.

Tens of thousands of spatial datasets exist, especially in the public sector, but relatively few of them are readily available. Through our research projects we intend to revolutionize the availability and therefore value of these data.

Moreover Australia has decided to drive toward the establishment of a National Positioning Infrastructure (NPI) that will deliver 2-cm accurate positioning anywhere outdoors in real-time. This can only be accomplished by taking advantage of the existing GPS system and the new and emerging systems of Galileo (EU), GLONASS (Russia), Compass (China), QZSS (Japan) and IRNSS (India). Australia is uniquely positioned to take advantage of these constellations from a research and development perspective. The CRC SI's research will underpin the NPI vision. Economic modeling that we commissioned suggests that we can add at least \$32 billion to the Australian economy over the next 20 years with an NPI.

**LBX** What makes the CRCStI unique among technology incubator models around the world?

**WOODGATE** Well we are not quite unique. There are similar research centres in Canada (GEOIDE), Korea (KLSG), Mexico (CentroGeo), Sweden (FPX) and Ireland (NCG). What makes these unique is the collaboration they engender between the public, private and research sectors. They all have significant resourcing allowing them to tackle large and complex spatial challenges in a true spirit of inter-sector and inter-disciplinary cooperation.

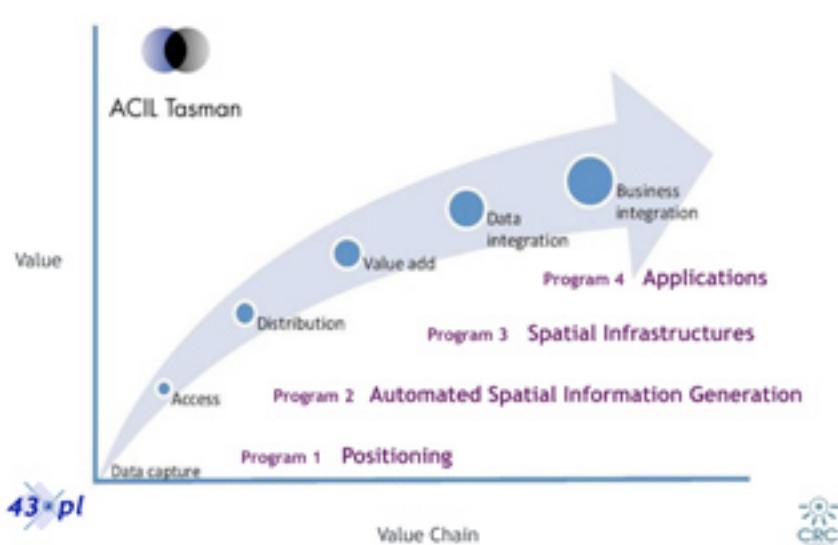
CRCStI and these five other research centers also have strong education programs that seek to grow the much needed skilled capacity in spatial technology, thinking, and applications of our respective nations.

While there are many national mandates around the world for the use of spatial/geographic data, there are relatively few committed and coordinated national investment plans incorporating a comprehensive strategic R&D roadmap.

**LBX** There's no shortage of seed and venture capital going into location-based technologies, especially on the consumer side. Why is the CRCStI model so critical to market acceleration?

**WOODGATE** The CRCStI brings critical mass to the effort to remove barriers to progress and adoption. For example no one organization can create a fully functioning marketplace or a single nationwide, fully integrated positioning infrastructure. It is a complex task establishing and maintaining relationships between 110 organizations, spanning two nations and three sectors (government, private and research). Gaining consensus on the issues that we should tackle together, agreement on the considerable co-investment, explaining the value proposition and sourcing the best researchers represent the keys to success. There are institutional barriers that are being overcome because the partnering organizations have faith in the CRCStI due to its sheer size and reach.

**LBX** You mentioned that CRCStI has a well-defined prospective portfolio and tackles complex spatial research problems. What are the top three problems CRCStI seeks to solve and commercialize with its current round of funding?



▲ **FIGURE 1.** This chart illustrates the spatial value chain from data capture to applications and the foundational technologies required to move along the value chain.

**WOODGATE** The three main focus areas are:

- Resolving signal processing problems: To deliver the 2-cm positional accuracy I mentioned earlier requires resolving signal processing problems between all of the satellite navigation systems referenced. Especially important is the development of improved integer inference theory that will enable finer accuracy and subsequent integration of these new systems, together with the development of a single network available to all end users to provide this unprecedented accuracy and real-time positioning solution.
- Developing a "Spatial Marketplace": Tens of thousands of spatial datasets exist, especially in the public sector, but relatively few of them are readily available. The first problem to solve is to unlock access to the spatial data that resides in government agencies. There are a number of licensing and interoperability issues to resolve, along with identifying the open source platform requirements. Australia and New Zealand have decided to set up a spatial marketplace to facilitate discovery and access to these data and to encourage the development and use of value-added applications and services. The CRCStI's research will help underpin the marketplace. We know that the spatial information industry contributes about \$10 billion to Australia's GDP and at least \$1 billion to New Zealand's. We expect that the systematic development of the marketplace will add several billion dollars more to this figure.
- Enabling data fusion and automated feature extraction of spatially sourced information in five application areas:

- Agriculture and natural resources affected by climate change
- Defense
- Energy and utilities
- Health
- Sustainable urban planning

**LBX** *How are the projects for funding evaluated?*

**WOODGATE** We have a good understanding of the value chain. We have developed a detailed impact analysis that we call a “line of sight” research chain to ensure that the research idea is traced through the entire research chain to

**“Tens of thousands of spatial datasets exist, especially in the public sector, but relatively few of them are readily available.”**



the point of utilization and commercialization. All funded projects need to be within the context of that value chain as illustrated in *Figure 1*. Many companies, researchers, and engineers have a lack of understanding of the complete business value chain of these technologies, so this rigorous process is critical to accelerate market growth and realization of spatial information benefits. It significantly aids the understanding of all involved.

**LBX** *There's a lot of buzz today around a GeoEconomy; what does that mean to you and how is it related to CRCSI's focus on developing a Spatial Marketplace?*

**WOODGATE** There are many issues related to a Spatial Marketplace from market regulation to structural constraints on growth to developing viable business models. The industry has been dominated by the public sector in the past, and it's alien for much of the private sector to think about the fundamentals of the creation of a whole marketplace. Trading data and spatial services, in the knowledge working economies of the future is a relatively new concept and is increasingly happening at scales that traditional spatial professionals are unaccustomed to. This is why the CRCSI is so important; it provides some structure and discipline to help explain what all this means and to help all accelerate the rate of take up of spatial technologies and products in existing and new markets.

**LBX** *Is the main focus of the Spatial Marketplace to unlock government spatial data or all spatial data?*

**WOODGATE** The focus is on all data from any source; however there is so much information locked up in govern-

ment agencies that accessing these data is an important first step.

**LBX** *Can you share your perspective on the variety of geo-spatial data that resides in the government that is relevant to driving location-based applications?*

**WOODGATE** The data ranges from the traditional and well-known sources including the cadastre, topography, aerial and satellite imagery, and environmental data, to the new and emerging spatially enabled datasets like health. The pursuit of more accuracy, for example as we drive down to centimeter precision, means codification of more and more new data. In addition, as the supply and demand for data increases with the move to 3D and time-stamped data, spatial data stores will become phenomenally large.

**LBX** *What is your vision for the Spatial Marketplace? How do you envision it working for spatial stakeholders such as data providers, application providers, data users?*

**WOODGATE** My vision for the marketplace is focused on simplicity; simplicity of discovery, of access and of use. It will see a single catalogue of dataset descriptions, linked via a federated data model to the datasets themselves. So for example, if an analyst needs to put together a map of agricultural biomass for Australia, instead of toiling across individual data sources, she can search the marketplace and find eight agricultural datasets that when joined together cover the country.

She can then combine these data with the most recent NOAA AVHRR (advanced very high resolution) satellite data and run an NDVI (Normalized Difference Vegetation Index) together with say a new tool that she has developed to produce a map of biomass based on these data and some new algorithms they have developed.

The data are sourced via Creative Commons licensing, that in the case of these particular datasets lets others distribute, remix and build upon the work, even for commercial purposes, as long as they credit the original creators and license any new creations based on the work under the same terms (known as an Attribution-Share-Alike or CC BY-SA license). This truly liberates spatial data. Like the data, the apps that enable easy searchability and creation of maps are also under a Creative Commons license and are readily available from the marketplace as well.

Accuracy and authentication are critical to success, so we will be encouraging a single custodian to act as a steward for each dataset offering a single point of truth.

Finally, the industry is set to benefit greatly from the combination of the move to open standards and Creative Commons licensing, together with high speed broadband and the increasing availability of open access data. □