

2013 GIS IN LOCAL GOVERNMENT BENCHMARK STUDY

AUGUST 2013



Pictured: A view of Perth's CBD.

SUPPORTED BY:
Surveying & Spatial Sciences Institute and Esri Australia





The information contained in this document is the exclusive property of Surveying & Spatial Sciences Institute (SSSI) and Esri Australia. This work is protected under Australian copyright law and other international copyright treaties and conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as expressly permitted in writing by SSSI and Esri Australia jointly.

Surveying & Spatial Sciences Institute (SSSI) ABN 22 135 572 815 **Esri Australia Pty Ltd** ABN 16 008 852 775

Copyright 2013 SSSI & Esri Australia Pty Ltd

CONTENTS

P. 4 Foreword
.....

P. 10 Introduction
.....

P. 12 Local Government Landscape
.....

P. 32 GIS and Sustainable Futures
.....

P. 46 GIS and Gov 2.0
.....

P. 64 GIS and Emergency
Management
.....

2013 GIS IN LOCAL GOVERNMENT BENCHMARK STUDY

AUGUST 2013

P. 74 GIS and Policy Making

.....

P. 78 Looking to the Future

.....

P. 83 Acknowledgements

.....

P. 84 Study Sponsors

.....

“...the Study was conducted over February 2013 and focused on the key areas of: Gov 2.0; GeoDesign and sustainability; Web 2.0 technologies; and emergency management.”

Alicia Kouparitsas, Editor, 2013 GIS in Local Government Benchmark Study

State of the nation



RECENT FORECASTS VALUE AUSTRALIA'S SPATIAL INDUSTRY AT MORE THAN \$2.1 BILLION.

I expect this to be a figure very few within the industry would be surprised to learn.

Across the country, organisations are realising what spatial professionals have known for years. GIS technology is not just a mapping and visualisation solution; rather the technology is a powerful information management platform that delivers an analytic vantage point unattainable through any other tool.

Within Australia, the growing rate of adoption of spatial technology appears to be second only to the growing rate of awareness of the value of GIS technology.

I firmly believe Australia's councils are the ones driving this market enlightenment.

Standing testament to this is the phenomenal amount of interest the 2013 GIS in Local Government Benchmark Study has received – not only from the 150 professionals who contributed to the research; but also from the highest reaches of government and across the broader commercial sector.

Beyond our borders, the Study has received significant interest from as far as the Asia Pacific region, United States and United Kingdom.

Look between the lines of the Study and it's not difficult to understand what's fuelled this demand.

The Study found 68 per cent of respondents believe the value of GIS technology is becoming widely understood in their organisations.

I have no doubt it is the geospatial professionals working within councils who have been instrumental in facilitating this understanding.

By serving as technology advocates and experts in their field, geospatial professionals are successfully raising awareness of the value of spatial insight within their organisations.

It is also interesting to note local government is embracing new advancements to geospatial technology, including cloud-based GIS services, mobile roll-outs and crowdsourcing.

Staying abreast of these emerging trends will be critical for geospatial professionals, who must draw on their knowledge and experience to drive value for their organisations.

As such, geospatial professionals must build further on their existing skill base, to ensure they can keep pace with changing technology. This calls for ongoing investment in training and development of geospatial personnel to harness the opportunities that lie ahead.

The Surveying and Spatial Sciences Institute (SSSI) will continue to play an important role in ensuring our industry's professionals have the

right knowledge-base, research opportunities, collaboration platforms and certifications on-hand, to maintain a high level of skill in these emerging areas.

The SSSI – together with Esri Australia – is pleased to deliver this Study; which allows us to reflect on where the industry is positioned currently, and where it is going in the future.

By doing this, we hope to ensure industry participants can identify and better understand future workforce opportunities in an ever-changing business environment.

Gary Maguire

President

Surveying and Spatial Sciences Institute (SSSI)

Pictured: Iconic Sydney Opera House and Harbour Bridge contrasted by shifting dusk sunlight.



“By serving as technology advocates and experts in their field, geospatial professionals are successfully raising awareness of the value of spatial insight within their organisations.”

Gary Maguire, President, Surveying and Spatial Sciences Institute (SSSI)

foreword

The next horizon

.....



“...when it comes to GIS usage – where local government goes, the broader user community invariably follows.”

Brett Bundock, Managing Director, Esri Australia

AS THE FINDINGS OF THE 2013 GIS IN LOCAL GOVERNMENT BENCHMARK STUDY ATTEST, THE PAST FEW YEARS HAVE SEEN SIGNIFICANT CHANGE ACROSS THE SPATIAL INDUSTRY, BROUGHT ON LARGELY BY THE GROWING DEMAND FOR GIS CAPABILITIES.

The deployment of Cloud-based solutions; enhanced mobile capabilities; and the use of crowdsourced data are typical of the advancements fuelling this demand.

Collectively, Australia's local governments represent the largest user of GIS technology in the country.

Our decision to partner with SSSI to develop the Benchmark Study was part of a joint effort to recognise the important contribution Australia's councils make to the broader spatial community.

Local governments have traditionally been early adopters of GIS advancements - driving innovation in spatial technology deployments.

The Benchmark Study sought to explore these achievements – and throw a light on 'where to next' for Australia's local governments.

Judging from the Study's findings, it's clear the new frontier for Australia's local governments is integration – whether that's integrating GIS with core business systems; integrating departmental data silos; or integrating data across all levels of government.

By integrating GIS capabilities into core business systems – such as SAP, Microsoft Office and IBM Cognos – users can leverage the technology in a way that is non-disruptive to normal workflows.

In Australia, we are starting to see this kind of ready-at-hand capability becoming a priority. For example, Gold Coast City Council was the first organisation in Australia to start implementing a fully-integrated, geo-enabled SAP system; and since then many organisations around the country have followed suit.

What we are witnessing is that GIS is no longer considered a stand-alone system or 'add-on'. It is fast becoming a critical component – and a standard feature – of core business systems.

And as a result of this shifting paradigm – we're seeing the profile of the technology within councils rise.

The Benchmark Study indicated 68 per cent of participants believe the value of GIS technology is becoming widely understood within their organisations. Couple this with the statistic showing 85 per cent of all councils surveyed provide organisation-wide access to GIS capabilities, and it is clear the role of the technology is growing.

On its current path of deployment, GIS technology has the potential to become the mechanism that unlocks the door to uninhibited collaboration between all layers of government.

While cross-government information sharing is considered one of the enduring challenges facing councils, encouragingly the collective view of the Study's participants is multi-agency collaboration – facilitated by GIS technology – is inevitable.

Personally, I think the capabilities of the technology, combined with the Study participants' appetite to eliminate information silos, carries all the markings of an exciting new chapter for Australia's local government sector.

The 2013 *GIS in Local Government Benchmark Study* foreshadows a promising future for the spatial industry, as when it comes to GIS usage – where local government goes, the broader user community invariably follows.



Brett Bundock
Managing Director

Esri Australia

Pictured:
Brisbane's spectacular Story Bridge lights up at night.

Striving towards a national approach to data

By Helen Owens

General Manager, Office of Spatial Policy

THE 2013 GIS IN LOCAL GOVERNMENT BENCHMARK STUDY IS AN EXTREMELY VALUABLE PIECE OF INDUSTRY RESEARCH BECAUSE IT HIGHLIGHTS THE IMPORTANCE OF SPATIAL INFORMATION, NOT ONLY IN THE LOCAL GOVERNMENT SECTOR, BUT ALSO ACROSS THE BROADER AUSTRALIAN COMMUNITY.

One of the Study's most compelling insights is local government's thoughts on data management and sharing. Of those that responded, 95 per cent indicated there should be a greater capacity for councils to share information with other councils and with other government departments.

This finding speaks to the heart of the Australian Government's Open Public Sector Information and Digital Economy Policy agendas - which are built on the democratic premise that public sector information is a national resource that should be available for open community access and use.

From a spatial information perspective, the work ANZLIC – the Spatial Information Council is undertaking (in collaboration with the Office of Spatial Policy and Geoscience Australia) in establishing the Australia and New Zealand Foundation Spatial Data Framework, is specifically aimed at achieving ubiquitous spatial information sharing across organisational and jurisdictional boundaries.



The benefits to government and the community are immeasurable.

We recognise that in many instances the spatial data generated in local government serves as a foundation for the information that we will use to create Australia's national foundation spatial data sets.

As we strive towards a national open approach to government spatial information management, it's encouraging to me that many in the industry and in local government are already on-board and are demanding greater levels of openness and sharing - which is precisely what we hope to achieve.

Pictured: (Top) Beautiful park lands overlook Brisbane city.

Pictured: (Bottom) City commuting made easy with bike paths.

Pictured: (Opposite) The Australian War Memorial and Canberra's Lake Burley Griffin.



“...it’s encouraging to me that many in the industry and in local government are already on-board and are demanding greater levels of openness and sharing...”

Helen Owens, General Manager, Office of Spatial Policy



Helen Owens

General Manager,
Office of Spatial Policy

Helen Owens joined the Department of Resources Energy and Tourism (RET) as the General Manager of the Office of Spatial Policy in January 2012. The Office of Spatial Policy’s key role is to strengthen the whole-of-government spatial data policy leadership in Australia, and to facilitate continued innovation and growth in the spatial sector.

GIS in local government

.....

THE 2013 GIS IN LOCAL GOVERNMENT BENCHMARK STUDY IS A JOINT INITIATIVE OF AUSTRALIA'S SPATIAL PROFESSIONALS ASSOCIATION – THE SURVEYING & SPATIAL SCIENCES INSTITUTE (SSSI) – AND LEADING GEOGRAPHIC INFORMATION SYSTEM (GIS) CAPABILITIES PROVIDER, ESRI AUSTRALIA.

The Study was conducted by independent research agency, Ardjuna, and overseen by respected analyst Dr Roland Simons.

The Study was conducted over February 2013 and focused on the key areas of: Gov 2.0; GeoDesign and sustainability; Web 2.0 technologies; and emergency management.

This report contains a detailed outline of these findings; industry commentary on the role of spatial technology in the sector; and best practice examples of how local governments across Australia – and around the world – are already using GIS to better meet the needs of their communities.

Picture: A view of Perth's CBD, on the banks of the Swan River.



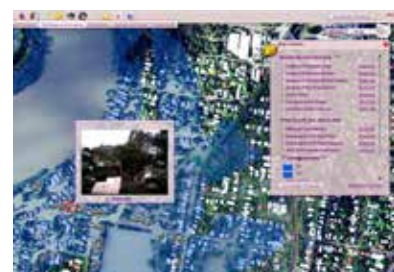
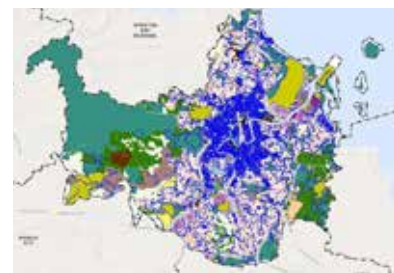


Pictured: Urban planning is revolutionised through 3D modelling.

Pictured: GIS helps predict areas likely to be affected by Tropical Cyclone Yasi.

Pictured: GIS in action – Brisbane City Council's draft new City Plan.

Pictured: Identifying and tracking flood affected properties during Brisbane's 2011 floods.

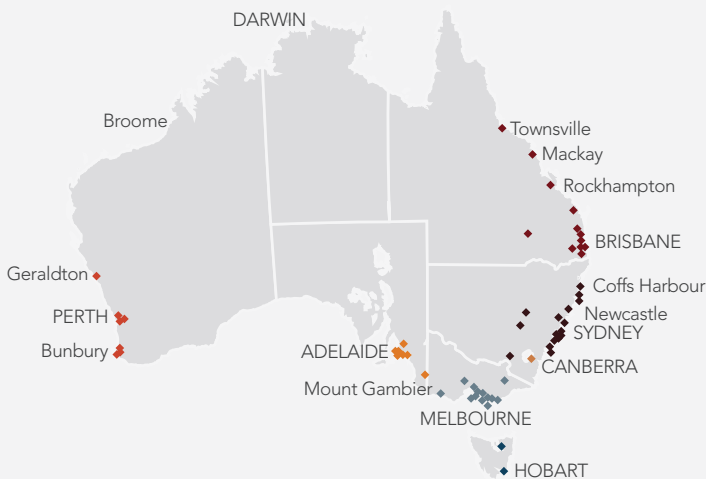
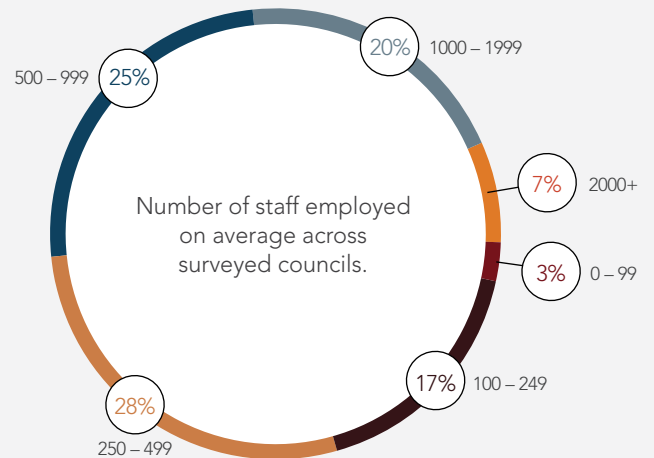
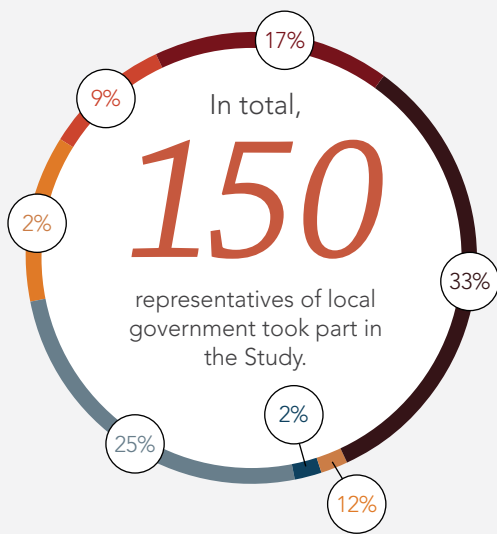


Please note: the statistics provided throughout this report do not take into consideration attrition rates. All statistics provided are calculated on the total number of respondents per question. Attrition rates are as follows: 1 per cent by one-quarter completion (Q7), 7 per cent by halfway completion (Q15), 19 per cent by three-quarter completion (Q22), and 21 per cent by full completion (Q30).

Local Government Landscape

APPROXIMATELY, HOW MANY STAFF DOES YOUR COUNCIL EMPLOY?

Councils of varying size – from four staff through to 7,000 – were represented. The average organisational size was 840 employees.

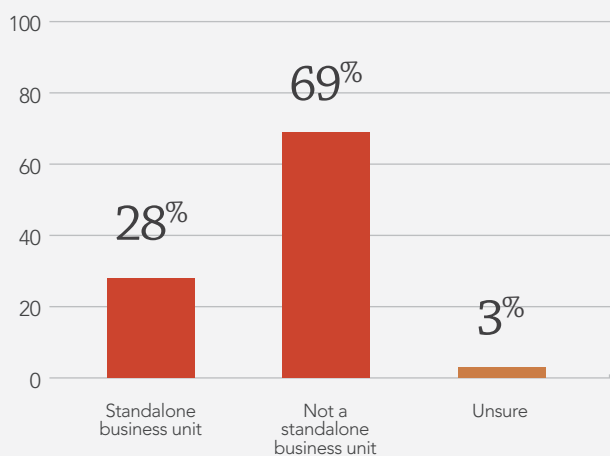


KEY

- ◆ Participating councils
- ◆ QLD (17%)
- ◆ NSW (33%)
- ◆ ACT (2%)
- ◆ WA (9%)
- ◆ SA (12%)
- ◆ VIC (25%)
- ◆ TAS (2%)

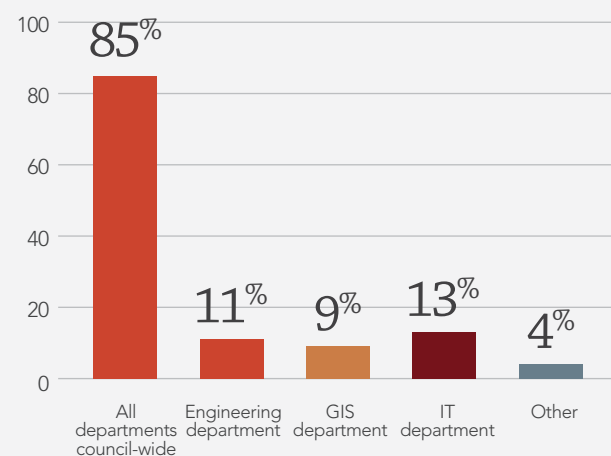
IS YOUR COUNCIL'S GIS DEPARTMENT A STANDALONE BUSINESS UNIT?

28 per cent of the respondents' GIS departments are standalone business units – with the majority indicating the GIS function falls within the broader IT department.



WHICH DEPARTMENTS CURRENTLY ACCESS GIS?

127 respondents indicated that all departments within their organisation currently access GIS technology.

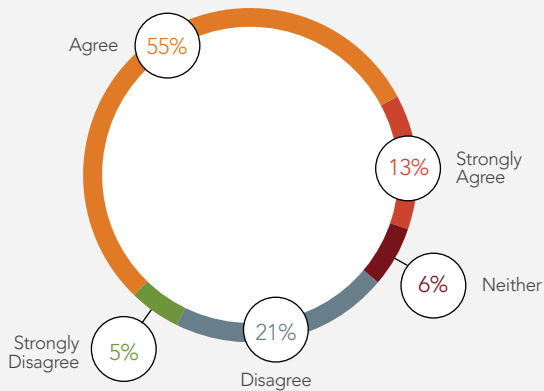


“All departments access Dekho, IT, asset management and engineering systems via ArcGIS Desktop.”

Stephen Yates, Senior GIS Officer, City of Charles Sturt, SA

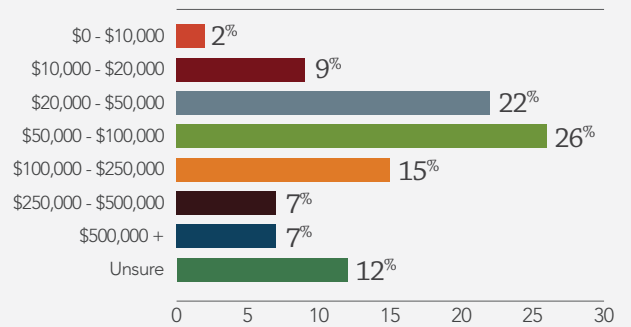
THE VALUE OF GIS IS WIDELY UNDERSTOOD WITHIN MY COUNCIL.

68 per cent of respondents believe the value of GIS technology is widely understood within their council.



APPROXIMATELY, HOW MUCH DOES YOUR COUNCIL INVEST IN GIS ANNUALLY (INCLUDING SOFTWARE, MAINTENANCE AND SERVICES)?

The majority of participating councils invest \$50,000 - \$100,000 in GIS annually.

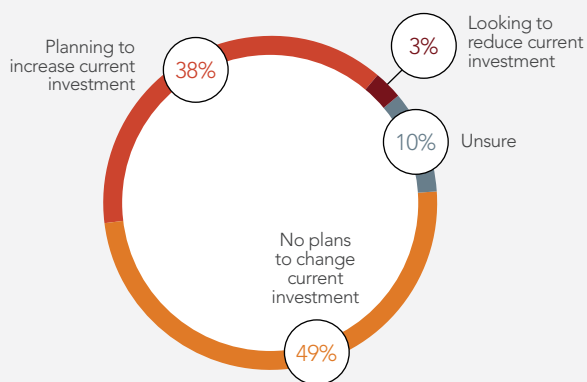


“They are slowly coming to realise and understand the importance of GIS.”

Emily Brown, GIS Development Officer,
Hobart City Council, TAS

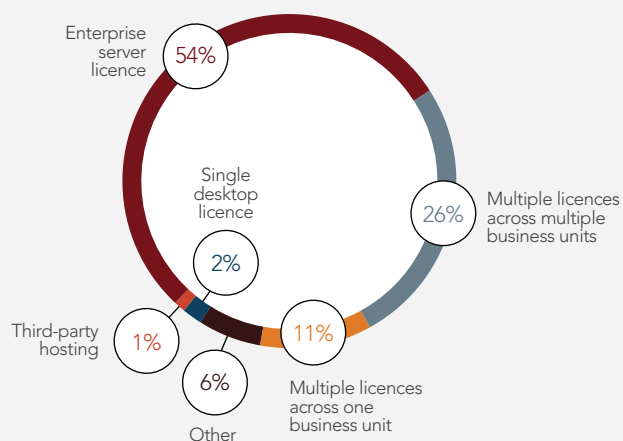
COUNCIL INVESTMENT IN GIS TECHNOLOGY

Almost half the respondents indicated they had no plans to change their current GIS investment; while 38 per cent are looking to increase their investment.



HOW DOES YOUR COUNCIL CURRENTLY DEPLOY GIS?

More than half the respondents indicated they currently deploy GIS with an enterprise server licence. The next most common method is multiple licences across multiple business units.

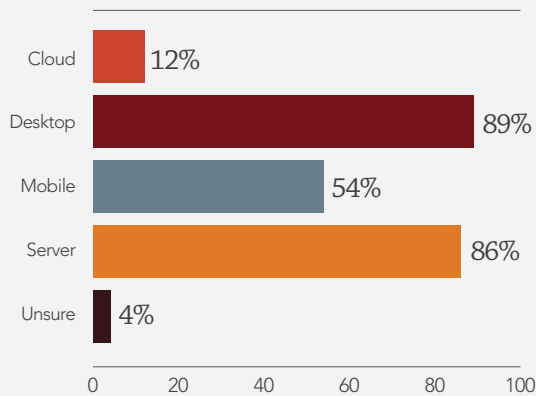


“GIS has not been given a high profile in recent years, however this is now changing.”

Tom Mesilane, GIS Coordinator, Latrobe City Council, VIC

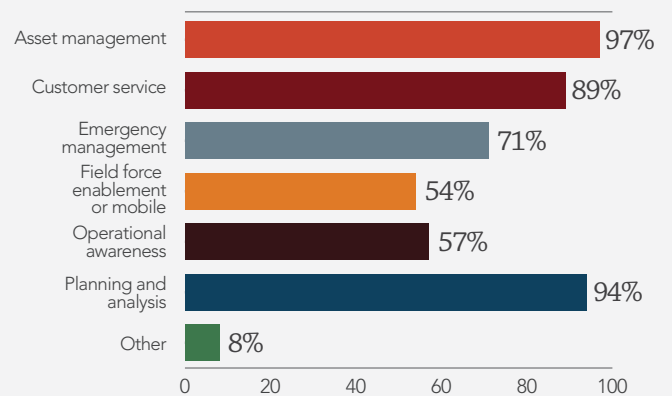
WHAT GIS PLATFORM(S) DOES YOUR COUNCIL CURRENTLY UTILISE?

The Study results indicate the majority of councils utilise GIS across multiple platforms, with Desktop and Server being the most commonly used.



FOR WHICH OF THE FOLLOWING BUSINESS PURPOSE(S) DOES YOUR COUNCIL USE GIS TECHNOLOGY?

Respondents indicated they use GIS technology for multiple business purposes, with the most common areas being asset management, and planning and analysis. This is closely followed by customer service and emergency management.



“Yes, location is essential to the delivery of all Council services.”

Stephen Males, Land Information Business Partner,
Fairfield City, NSW

Pictured: Stunning Melbourne viewed over the Yarra River at dusk.



Doing more with maps and data

By **Cassandra Barker**

General Manager, MapData Services

IF GEOGRAPHY IS AT THE HEART OF LOCAL GOVERNMENT; LOCATION-BASED DATA IS A COUNCIL'S LIFEBLOOD.

After all, whether it's responding to a resident's requests for graffiti removal, managing risk in relation to an uneven footpath, or knowing when an arborist needs to trim a tree branch – it is vital for councils to have access to accurate location-based data.

For many councils, data collection has traditionally been managed in-house; but increasingly, local governments are looking to outside sources to enhance their existing information reservoirs.

For example, authoritative foundation maps are improving internal efficiencies – by eliminating the need for GIS managers to spend copious amounts of hours creating base maps from scratch.

In turn, smart geo-demographic datasets are providing planners with a more detailed level of insight into the unique needs of their communities; and cutting-edge 3D imagery means councils can now transform their existing 2D data into highly realistic virtual worlds.

Drawing on these state-of-the-art data sources, Australia's councils are doing more with GIS technology than anyone thought possible.

For instance, the multi-dimensional insight to be gained when councils use GIS technology to mash up their own data with these other information sources – such as property, natural hazard risk or crowdsourced datasets – is leading to real-time responses to resident concerns, improved community services, and internal workflow efficiencies.

We are now seeing groups such as Adelaide and Gold Coast City Councils release location-aware smartphone apps that enable rate payers to provide geo-tagged feedback – directly to their Council's customer service centres.

Establishing this kind of '360 degree' feedback channel is resonating with councils nation-wide – with more than half the respondents in the Benchmark Study indicating it's likely they'll deploy these capabilities over the next two years.

In addition to the very real customer service improvements GIS technology delivers to rate payers, rapid advancements in data collection methods are facilitating noteworthy benefits for field force enablement.

Instead of returning to the office to complete paperwork, staff now have the mobile tools they require to collect and log information in real-time, creating further cost and time efficiencies.

In some cases, traditional field force activities are even being superseded. With 3D data collection tools now a reality; entire cities can be recorded in a startling level of detail.

This means rather than physically sending a crew to do an asset check or site inspection, users can: conduct a virtual 'fly through' of a property; pan up and down the street to examine assets; and understand how a proposed home extension or property development may impact the residential streetscape. All without leaving the office.

As you can imagine, as well as increasing workforce efficiencies this also leads to greater levels of occupational health and safety.

In short, the applications of GIS technology and location-based data are limited only by what the mind can conceive. And when it comes to creative applications of GIS, Australia's councils are really pushing the envelope.

Pictured:
Melbourne CBD
lights up.

“With 3D data collection tools now a reality; entire cities can be recorded in a startling level of detail.”

Cassandra Barker, General Manager, MapData Services



Cassandra Barker

.....
General Manager,
MapData Services

Cassandra Barker is the General Manager of MapData Services, one of Australasia's leading authorities in digital mapping and location-based data. A passionate GIS and cartography specialist, Cassandra's career in the spatial industry spans sixteen years.

Brisbane City Council extends the reach of GIS

.....

RESPONSIBLE FOR A POPULATION OF MORE THAN ONE MILLION RESIDENTS, AND AN AREA COVERING MORE THAN 1,300KM², BRISBANE CITY COUNCIL (BCC) IS ONE OF THE LARGEST LOCAL GOVERNMENTS IN THE WORLD.

BCC has been using GIS technology for almost two decades. During that time, BCC has established several highly successful GIS platforms, including the Tools of Trade system – which integrates spatial capabilities with their other core business systems.

Managed and maintained by BCC's Information Services Branch, GIS technology has delivered benefits and capabilities to many other areas of the organisation, including: conveyance, architectural, waste, property, planning and development, flood mitigation, physical infrastructure assets and operational management.

The challenge:

Increased demand for GIS technology capabilities and a growing appetite for spatial information within BCC was causing mounting pressure on its resources.

The council had an existing, legacy system that provided some staff with access to GIS – however the system was out-dated and underperforming.

BCC sought a more efficient solution that would see GIS capabilities and information made readily available across their entire organisation.

Specifically, they required a technology solution that would:

- » Extend the reach of their existing GIS technology to more than 4,000 personnel (400 concurrently).
- » Integrate with BCC's other core business systems, such as: property and rating; asset management; and development assessment programs.
- » Provide intuitive access to more than 1,200 map layers of information – some specific to certain BCC divisions and some applicable to all divisions.
- » Streamline workflows by providing users with access to the information they require – regardless of where it is stored – via a single interface, removing the need for users to continuously switch between different systems.

- » Allow large numbers of users to easily print off high quality maps, while minimising impact on server performance or network bandwidths.
- » Empower users to extract data as 'intelligent' layers for use in CAD applications.
- » Scale to meet BCC's evolving needs and user-base requirements.

The solution:

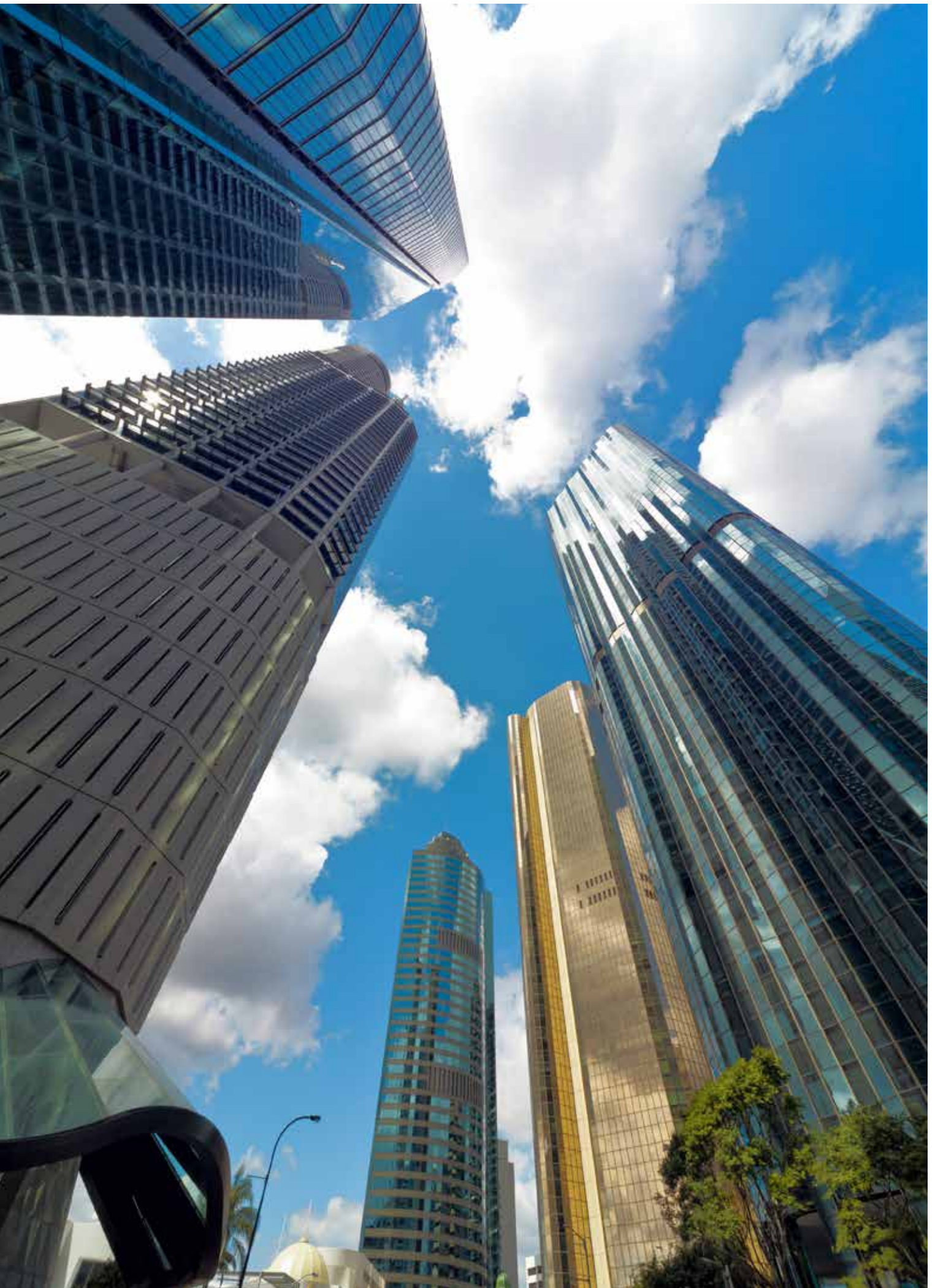
BCC was presented with two alternatives: a commercial-off-the-shelf (COTS) solution; and a custom-developed solution. After trialling a proof of concept of each, BCC selected the COTS solution as the most cost-effective and viable option.

The council implemented a geographic web application server to provide organisation-wide access to their existing GIS technology via a user-friendly, web-based map interface.

Integrating seamlessly with BCC's existing GIS platform, the technology streamlines workflows by linking advanced visualisation and analysis capabilities to core business

Pictured:

Brisbane city – the centre of one of the largest local governments in the world.



“Staff can now instantly access data that previously wasn’t available.”

Cr Julian Simmonds, Chairman Finance,
Economic Development and Administration Committee.

systems, such as their property and rating, asset management, and development assessment programs.

By presenting information in the user-friendly geographic context of an online map, the solution translates data into clear visual presentations, enabling staff at all levels – and in all departments – to make informed decisions confidently and in a timely manner.

Additionally, the solution helps strengthen data integrity by acting as a single-point-of-truth. Staff can rapidly access and/or analyse information pertaining to physical infrastructure and environmental assets, services, planning and development by simply clicking its location on a map.

The innovations:

While based on a COTS solution, the project saw the development of two new technical innovations.

1. Efficient large-scale printing

BCC required the capability to print high volumes of quality maps – without affecting server performance. As with many enterprise web systems, the COTS printing function is managed at a

server level. To ensure the server doesn’t overload, and print job queues aren’t an issue, developers created a purpose-built printing tool that allows users to print jobs directly from their own systems – rather than at a server level. Now, the number and quality of maps that can be printed is significantly higher. The innovation has minimised server Central Processing Unit (CPU) utilisation and network traffic; ultimately providing BCC users with fast, high quality printing of maps at all scales.

2. Creation of a single user profile

The solution features more than 1,200 map layers of information – and BCC needed to ensure the most relevant layers would load and display quickly. To meet this



requirement, the development team undertook a period of performance testing to capture and optimise staff interaction with the system. In doing so, they were able to establish an optimal single user profile for BCC staff. The profile incorporated settings that met the majority of BCC staff’s needs and put relevant information at their fingertips – so staff don’t need to continually switch between programs or profiles.

The outcomes:

- » **Enterprise-wide access to GIS.**
The solution provides more than 4,000 BCC staff with reliable access to web-based GIS capabilities – with 600 users accessing the system on a regular basis. Chairman Finance, Economic Development and Administration Committee, Cr Julian Simmonds, said for this reason, the system had become the main “go to” tool for many departments, including customer service, environmental management, and infrastructure and physical asset management.





Pictured: (Top) Abstract wall mural highlights a Brisbane bike path.

Pictured: (Top left) Roma street station – Brisbane’s public transport hub.

Pictured: (Left) Sunset over busy and ever growing Brisbane city.

- » **Streamlined workflows.** The system delivers information – sourced from multiple applications – through one interface, allowing users to effectively operate across several platforms simultaneously. A specially designed user profile means information most relevant to staff can be instantly loaded and accessed – eliminating the need to constantly switch between programs. “Staff can now instantly access data that previously wasn’t available,” said Cr Simmonds.
- » **Strengthened data integrity.** The solution’s advanced information management capability has strengthened BCC’s data integrity. By connecting GIS to other business systems, the technology effectively acts as a single-point-of-truth.
- » **Improved efficiency.** The solution’s user-friendly and ‘self-serve’ data capability means BCC staff no longer have to rely on specialist technical resources for access to spatial data and capabilities. This has improved efficiency across the board – and facilitated much greater capacity for the organisation’s GIS specialists. “It has reduced administrative pressure on BCC’s spatial technical team, allowing them to redirect their skills towards creating new, innovative solutions and projects,” said Cr Simmonds.
- » **Greater flexibility.** The solution meets BCC’s existing needs – and can be easily tailored to meet their ongoing requirements. All system improvements can be performed through an easy-to-navigate administration interface, and no coding is required. Cr Simmonds said the system’s “agility” is “astonishing”.
- » **Cost savings.** For BCC, the COTS web mapping solution represented the most cost-effective way of significantly extending the reach of GIS technology. “It provides more users with access to our existing GIS technology – which means Council has saved money by not needing to purchase additional hardware,” said Cr Simmonds.

King County documents ROI of GIS

.....

KING COUNTY – A LOCAL GOVERNMENT AUTHORITY IN THE UNITED STATES – UNDERTOOK A COST-BENEFIT ANALYSIS OF THEIR GIS TECHNOLOGY INVESTMENT, AND UNCOVERED MORE THAN \$776 MILLION IN SAVINGS.

Home to Microsoft, Amazon.com, and Starbucks; King County in Washington has a population close to two million people – and the region's local government sees GIS technology as critical to serving these citizens.

And following a recent study conducted by an economist at the University of Washington, the county now has the evidence to prove it. The study – which measured the return on investment (ROI)

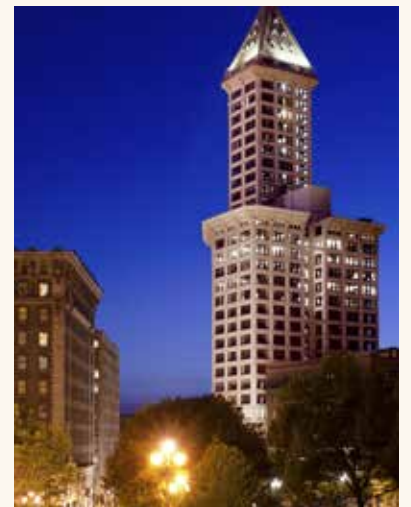
generated from GIS – indicated that over an 18 year period, the county accrued net benefits between \$776 million and \$1.7 billion.

In terms of the role the technology holds in the local government; GIS is used across a wide range of departments, including the Department of Natural Resources and Parks (DNRP) and the Department of Community and Human Services.

Citizens also access GIS capabilities frequently through public-facing maps such as *My Commute*, which shows road closures and traffic conditions. The county estimates that its popular *iMap* – which allows users to create customised views of spatial information – receives almost 15 million hits a month.

In addition to traditional GIS applications, the local government also uses GIS to support key campaigns like the *Equity and Social Justice Initiative*, which aims to ensure services are distributed equitably.

For example, GIS technology helps county leaders determine whether communities have enough parks and if social services are distributed fairly to all neighbourhoods. GIS



technology is also used to position waste transfer stations, to ensure the right services are in the right places.

With the technology providing such a broad range of services to the community, the county wanted to determine exactly how much value GIS delivered. As such, Greg Babinski – King County GIS Centre Finance and Marketing Manager – requested an ROI study be conducted with an independent economist.

Dr. Richard Zerbe, a renowned economist at the University of Washington, was enlisted to conduct cost-benefit analysis work. The study was funded by King County and the State of Oregon.

The study focussed on an 18 year period – from the beginning of the local government's GIS program in 1992, until 2010. Interestingly, an extensive literature review conducted

Pictured:
(Top) Seattle's Smith Tower.

Pictured: (Right)
The Seattle skyline.

Pictured:
(Opposite) A screenshot of King County's successful MyCommute system.



“We had our own anecdotal evidence of the value of GIS, but now we have solid evidence of that value.”

Mr Gary Hocking, Information Technology Service Delivery Manager, King County

for the study indicated that no research to measure the accrued ROI for an enterprise GIS program had ever been completed before.

The research process was extensive and involved face-to-face interviews with 30 county employees, and a general survey of 175 staff.

The savings in time and effort were monetised based on salary figures and full-time employee statistics to determine: what it would cost agencies to replicate their pre-GIS level of output with GIS technology; as well as the cost of replicating current GIS-aided production levels without GIS technology. In this regard, the study used a “with versus without” approach.

In 2010, for example, they determined that the cost of GIS was \$14.6 million and the net benefit was approximately \$180 million.

“It’s important in this day and age in government to be able to validate your benefits and provide cost-benefit analysis for investments,” said Mr Gary Hocking, King County Information Technology Service Delivery Manager.

“We had our own anecdotal evidence of the value of GIS, but now we have solid evidence of that value.”

King County Chief Information Officer Bill Kehoe said armed with the results, the county can now prove their GIS service is an industry leader for IT-based activities within local government.

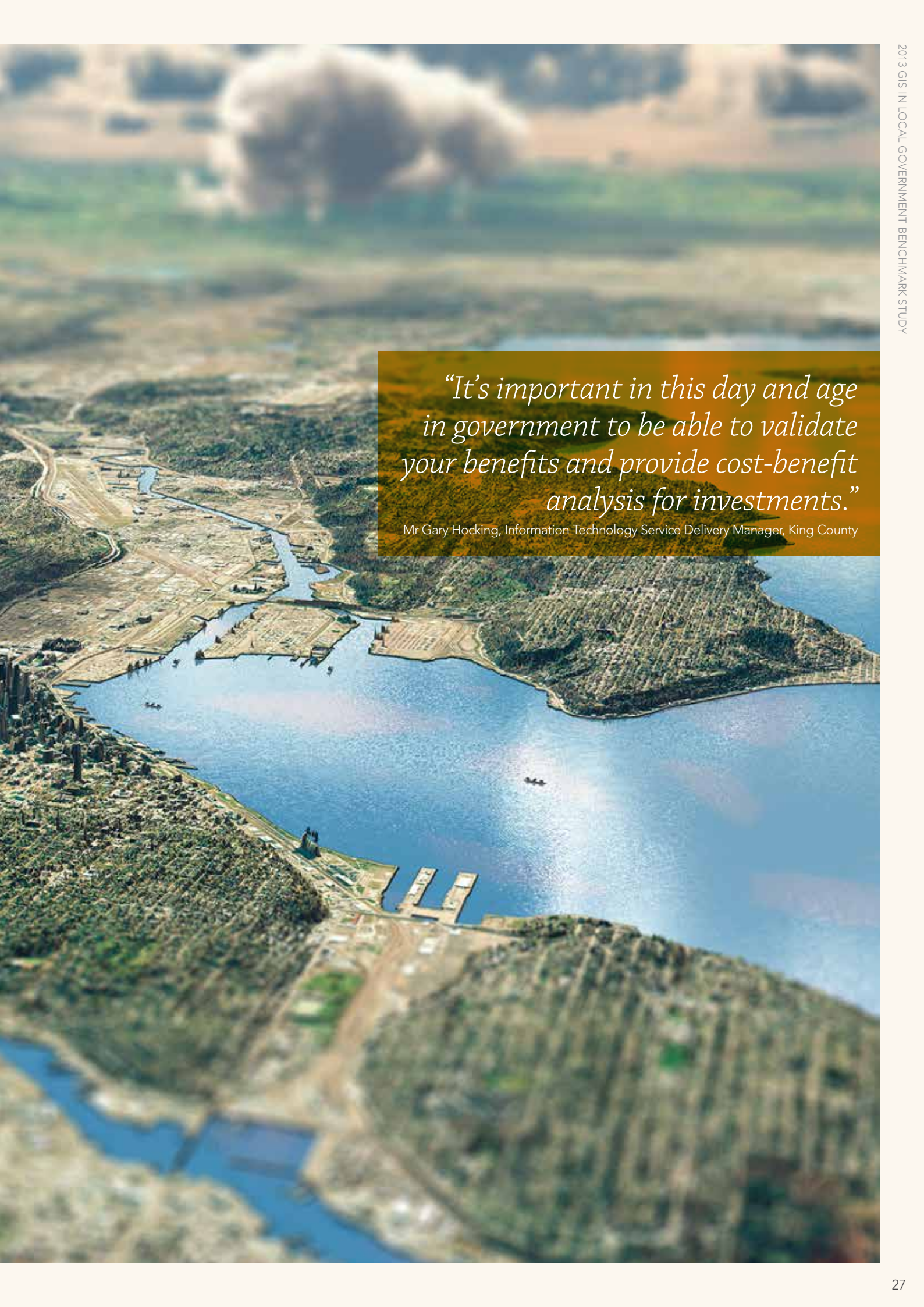
“Our GIS service is an example of a high-performing IT service that is providing a large amount of customer efficiency for the investment,” said Mr Kehoe.

“The GIS service is a model that we want all our services within King County IT to aspire to.”

The ROI study doesn’t just validate King County’s investment in GIS; it also provides strong evidence for other government departments to show how GIS can improve government operations and deliver significant value.







*“It’s important in this day and age
in government to be able to validate
your benefits and provide cost-benefit
analysis for investments.”*

Mr Gary Hocking, Information Technology Service Delivery Manager, King County

Improving efficiency with enterprise GIS:

London Borough of Hammersmith and Fulham

.....

THE ENGLISH LOCAL GOVERNMENT OF LONDON BOROUGH UNDERTOOK AN AMBITIOUS PROGRAM TO IMPLEMENT AN ENTERPRISE-WIDE GIS SOLUTION – AND THE TECHNOLOGY NOW UNDERPINS THE ACTIVITIES OF ALL THE COUNCIL'S DEPARTMENTS.

The London Borough of Hammersmith and Fulham is responsible for an area of Greater London that is only 6.3 square miles, but contains over: 180,000 residents; 105,000 properties; 1030 streets; and 22,000 road signs. As such, GIS technology has long been an important aspect of the local government's data management, but it was managed by different departments on separate systems.

The challenge:

Traditionally, Hammersmith and Fulham used a number of different GIS and Computer Aided Design (CAD) drawing tools. While these solutions performed adequately, they only benefited specific individuals in single departments.

Therefore, the Council decided to develop and deliver an

enterprise-wide GIS strategy, with the goal of establishing a corporate geographic information standard that could be used across the authority.

Ultimately, Council aimed to make geographic information available to all 7,000 of its employees and incorporate GIS into a broad range of Council activities and services.

"We recognised how GIS could help to modernise many processes, drive efficiency and improve service, but achieving this meant a total change in attitude towards GIS," said Tina Dawson, GIS Manager for the London Borough of Hammersmith and Fulham.

The solution:

Hammersmith and Fulham rolled out an enterprise-wide GIS solution that integrated with its land and property systems, to serve as a central database of spatial information. Employees were given intranet access to a broad range of mapping capabilities and the organisation's data – which incorporated everything from planning applications to street furniture. Sensitive data is handled via a secure, password-controlled mapping resource.

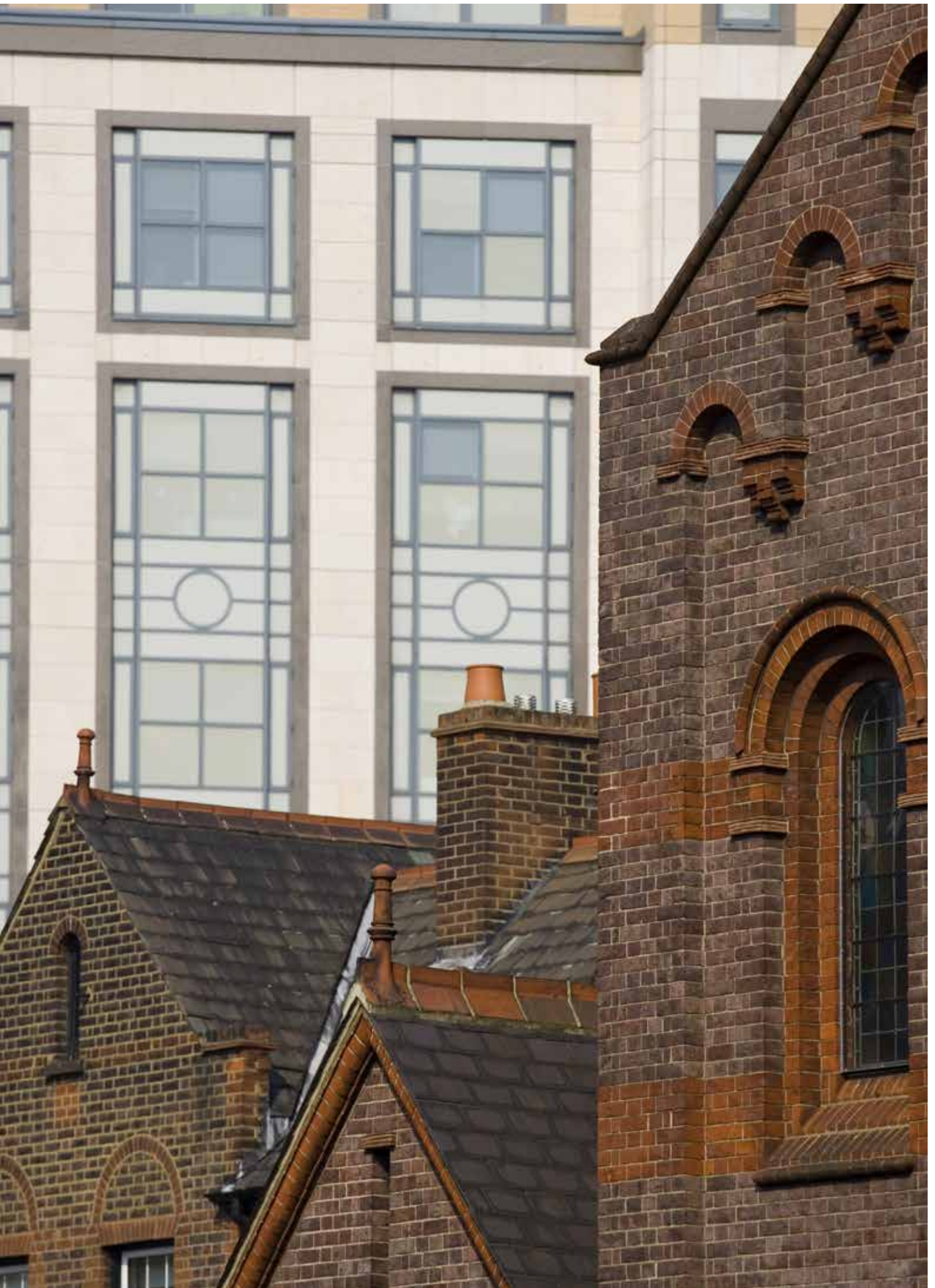


Pictured: (Right) Hammersmith Bridge.

Pictured: (Opposite) An old church contrasts with modern development in Hammersmith.

The enterprise solution also gives the Borough's residents access to geographic data via online maps and applications, so they can more easily locate and access Council services.

Today, Hammersmith and Fulham's geodatabase holds around 100 gigabytes of data and supports up to 1,250 concurrent users. As many as 200,000 maps are generated every month and this figure continues to increase.



The outcomes:

All Hammersmith and Fulham staff now benefit from enterprise-wide GIS – from the Chief Executive Officer, to planning officers and call centre agents. The local government's information is now seamlessly shared across departments and amongst personnel.

Key areas improved include:

- » **Parking suspensions and skip licences.** It is easy for staff in the Planning Department and Highways Department to check each other's records to ensure that requests are

granted or denied promptly and appropriately.

- » **Planning applications.** Council has experienced faster processing of around 3,000 planning applications and thousands more enquiries per year.
- » **Highways maintenance.** The GIS stores the precise location and state of repair of assets on multilevel, interactive maps, enabling strategic maintenance planning.
- » **Emergency planning.** CCTV camera sites, hospitals, electricity substations and potential

evacuation centres are mapped and stored for rapid despatch to emergency services.

- » **Environment enquiries.** Call centre operators can quickly zoom to specific streets and addresses to pinpoint the location of a problem and contact the most relevant department to handle it.

The future:

The success of Hammersmith and Fulham's GIS means the Borough plans to keep expanding its use of the technology – until it underpins the work of every single department within the organisation.



“GIS is now recognised as a key component of our business systems,” said Ms Dawson.

“Many parts of the Council simply couldn’t operate without GIS now, and our aim is to integrate it with all business processes within the council – we want to put GIS at the heart of everything we do.”

In the future, the Council plans to run training courses for staff and will work with departments that use GIS minimally to identify how it might further help improve their service delivery.

It also plans to make GIS data available to local schools and share emergency planning GIS data with neighbouring boroughs, eventually creating a comprehensive map-based resource that could be used in the event of a major incident in London.

Pictured: The Hammersmith Bridge illuminates the River Thames.

“Many parts of the council simply couldn’t operate without GIS now, and our aim is to integrate it with all business processes within the council – we want to put GIS at the heart of everything we do.”

Tina Dawson, GIS Manager, London Borough of Hammersmith and Fulham



GIS and Sustainable Futures

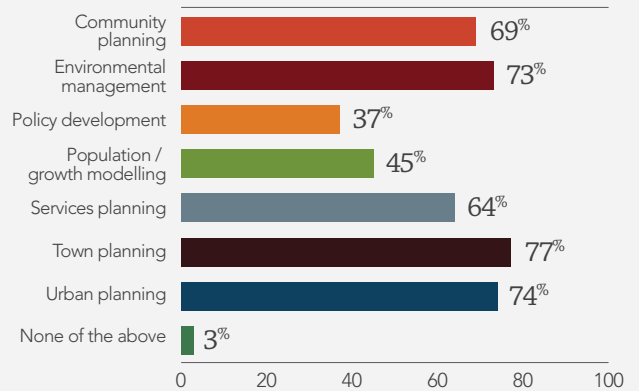
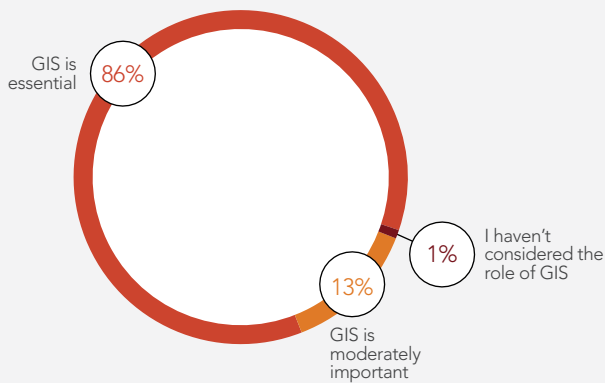
THE TERM 'SUSTAINABLE FUTURES' REFERS TO PLANNING AND DEVELOPMENT INITIATIVES THAT MEET CURRENT COMMUNITY NEEDS WHILE PROTECTING THE INTERESTS OF FUTURE GENERATIONS.

HOW IMPORTANT DO YOU BELIEVE GIS TECHNOLOGY IS IN PLANNING FOR A SUSTAINABLE FUTURE?

99 per cent of respondents indicated GIS technology is important in planning for a sustainable future – with 86 per cent deeming it 'essential'.

HOW DOES YOUR COUNCIL LEVERAGE GIS TECHNOLOGY WHEN PLANNING FOR A SUSTAINABLE FUTURE?

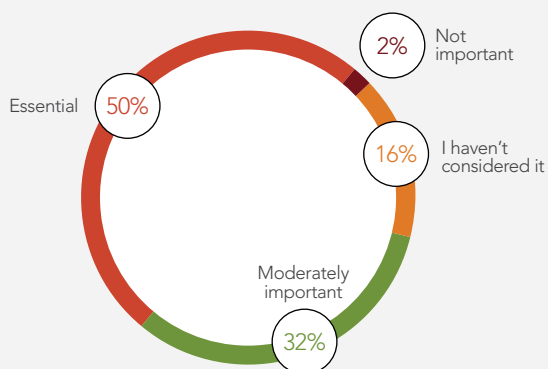
When planning for a sustainable future, the most common areas where councils currently use GIS include: town planning, urban planning and environmental management.



IN RELATION TO PLANNING FOR A SUSTAINABLE FUTURE, HOW IMPORTANT IS GEODESIGN?

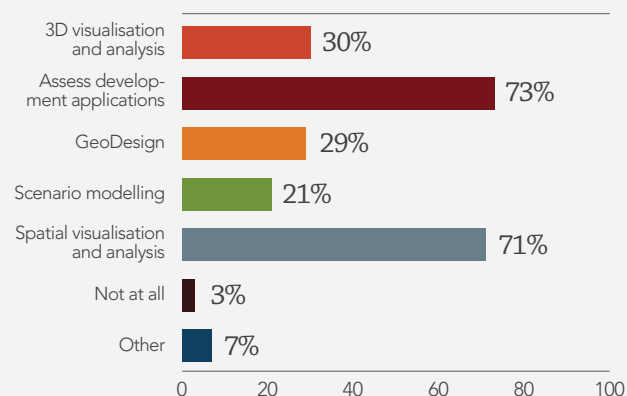
82 per cent of respondents indicated the concept of GeoDesign is important when planning for a sustainable future – with 50 per cent deeming it ‘essential’.

The term ‘GeoDesign’ refers to the practice of using GIS technology to understand how a proposed development will impact the community.



HOW DOES YOUR COUNCIL CURRENTLY USE GIS TECHNOLOGY FOR URBAN AND / OR TOWN PLANNING PURPOSES?

Most respondents indicate they currently use GIS technology across various areas of planning – with more than 70 per cent indicating they use it to assess development applications, or to conduct spatial visualisation and analysis.



Sustainability stands tall with 'Big Bob'

Pictured: (Right) Conondale National Park, on Queensland's Sunshine Coast.

Pictured: (Opposite) 'Big Bob' – an icon uncovered through LiDAR technology.

WHEN IT COMES TO THEIR SUSTAINABILITY EFFORTS, QUEENSLAND'S SUNSHINE COAST COUNCIL FOUND ITS BIGGEST WIN WHEN IT USED GIS TECHNOLOGY TO UNCOVER AN ENVIRONMENTAL ICON HIDDEN AMIDST THE PRISTINE RAINFORESTS OF CONONDALE NATIONAL PARK.

When Sunshine Coast Council (SCC) decided to survey tree heights across the region, no one imagined it would lead to the discovery of a new environmental icon: Queensland's tallest tree.

Dubbed 'Big Bob' – in honour of long-serving Sunshine Coast councillor and mayor Bob Abbot – the 73 metre giant was found hidden in the rugged forest of Conondale National Park, using a combination of GIS and LiDAR technology.

LiDAR – short for Light Detection and Ranging – is a remote sensing technology that uses lasers to measure the distance between two points.

The technology generates highly accurate tree height and terrain



property measurements, by using aircraft sensors to determine the exact distance between the aircraft, the tree canopy and the forest floor.

Traditionally, LiDAR has only been able to produce simple, 2D images that were useful only to highly trained technicians.

However when coupled with GIS technology, 2D LiDAR imagery can be mapped and transformed into exceptionally detailed, highly interactive 3D maps.

Sunshine Coast Council Geospatial Analyst Toby Clewett said the resulting view is an accurate picture

of what Conondale National Park actually looks like – right down to the rocks and shrubs on the forest floor.

"The technology effectively created a digital forest – with different colours representing varying tree heights and canopy levels," said Mr Clewett.

"It was by viewing information in this way that we first identified Big Bob, which has since been confirmed as the highest tree on record in Queensland."

With the Sunshine Coast's reputation for environmentally sound development, Big Bob has since become a symbol of the Council's efforts to make the Coast Australia's most sustainable region.

"The existence of tree specimens this unique represents the pinnacle of environmental sustainability and underlines the work SCC is doing to conserve the region's heritage," Mr Clewett said.

"The results achieved through the GIS analysis have since been integrated into the new Sunshine Coast Planning Scheme and the Biodiversity Report Card for comprehensive baseline habitat mapping.



“This has helped us identify areas that require protection or other types of intervention during development applications.

“It will have wide-ranging positive effects on the future of biodiversity on the Sunshine Coast and ensure we remain true to our heritage for generations to come.”

The project has been recognised as best practice in environmental management, with numerous energy providers, insurance agencies, forestry operators and State Government agencies looking to take a ‘leaf’ out of Big Bob’s book.

“The existence of tree specimens this unique represents the pinnacle of environmental sustainability and underlines the work Council is doing to conserve them.”

Toby Clewett, Geospatial Analyst, Sunshine Coast Council

GIS model gives town planning an extra dimension

.....

A 3D MODEL OF TOWNSVILLE IS PROVIDING ITS RESIDENTS WITH A GLIMPSE INTO THE FUTURE OF THE CITY; WHILE DRIVING TOWN PLANNING ACTIVITIES FOR COUNCIL BEHIND-THE-SCENES.

Historically, local government planning schemes have been thick, almost impenetrable tomes: hundreds of pages of hardcopy maps, plans and text that often sat dust-covered in the furthest reaches of council offices.

Not in Townsville, however, where instead residents can access an intuitive, digital 3D model of the region to discover how their city will take shape over the coming decades.

Created by Townsville City Council using 3D and GIS technologies, the virtual map of the state's unofficial northern capital is a first for regional Queensland.

Built to encompass Council's new planning scheme, the 3D mapping application enables residents to 'fly through' the maps of the town and examine a range of virtual structures.



The result is a dynamic preview of how the city's variously zoned areas may look in the future.

For example, in areas zoned 'medium density residential', the map may display virtual three storey buildings to illustrate the type of structures that are permissible in that zone.

Townsville City Council's Geospatial Solutions Manager Kenneth Melchert said there are also plans to expand applications of the 3D model as part of Council's wider spatial 3D modelling and visualisation strategy.

"Key among these is integration into Council's development assessment processes," said Mr Melchert.

"Council planners and residents alike will then be able to conduct interactive simulations to enhance assessments of how proposed developments will impact existing structures and environments.

"For example, by adding proposed buildings to the model, planners can quickly determine how developments will affect the city's skyline and other residents' line of sight, as well as the shading impact on other buildings."

The model itself is also an invaluable visualisation tool for planners to communicate development guidelines and legislation to members of the public in an easy-to-understand and intuitive way.

Beyond town planning, Council has plans to extend the use of the 3D GIS technology to environmental modelling, disaster management and hazard assessment.

Mr Melchert said GIS technology would enable town planners to answer a range of critical questions



and perform complex calculations at a speed unthinkable in the old world of 2D paper-based maps.

"A vast range and depth of data can now be entered into 3D GIS technology, making it possible to create highly realistic virtual worlds," Mr Melchert said.

"The 3D models generated can display everything from a city's

geological terrain, to its road networks, to its underground infrastructure, to building heights and the flight paths above it.

"They contain everything Council planners need to know to begin to model the shadows of multi-storey building proposals or anticipate the effects of varying flood levels on city infrastructure.

"Better still, the 3D models are 'living' files, and as Council gathers and adds more information about Townsville, the 3D model becomes more detailed and comprehensive.

"In this way, our approach will continually evolve to ensure GIS technology remains an integral part of our city for many years to come."

Pictured:
(Above) 3D modelling brings a new approach to planning Townsville's future.

Pictured:
(Opposite) – A detail of Townsville's new 3D model.

"...the 3D models are 'living' files... and will continually evolve to ensure GIS technology remains an integral part of our city for many years to come."

Kenneth Melchert, Geospatial Solutions Manager, Townsville City Council

Singapore's iPLAN is GeoDesigning the future

.....

AS ONE OF THE WORLD'S LEADING FINANCIAL CENTRES – AND FASTEST GROWING CITIES – SINGAPORE LOOKS TO GIS TECHNOLOGY TO ENSURE ITS ONGOING DEVELOPMENT CAN MEET THE NEEDS OF ITS CITIZENS INTO THE FUTURE.

With a population of five million and a limited land area of 710 square kilometres, Singapore faces unique challenges in its urban design. Given its small size, careful planning is critical for the economic growth and future development of the country.

As such, the Urban Redevelopment Authority (URA) – Singapore's national land-use planning and conservation agency – is challenged with finding smart design solutions to ensure the island has enough space to meet its needs.

URA prepares long-term strategic plans, as well as detailed local-area plans, for physical development; then coordinates and guides efforts – in collaboration with the community – to bring these plans to reality.

To meet these challenges, URA underpins their approach with GeoDesign. The Authority has



implemented an enterprise-wide GIS technology solution to establish their Integrated Planning and Land Use System (iPLAN).

Operational since 2006, iPLAN was one of the world's first nation-wide enterprise GIS systems for urban planning. The solution serves as the agency's central information repository and features more than 100 layers of information on areas such as: planning constraints; buildings; roads; developments; approvals; and, land use.

Through the system, more than 200 URA staff can easily store, search and retrieve information relating

to Singapore's urban planning and development – and analyse the data to support their decision-making.

Importantly, iPLAN supports URA's two major programs of work in terms of strategic development: the Concept Plan and the Master Plan.

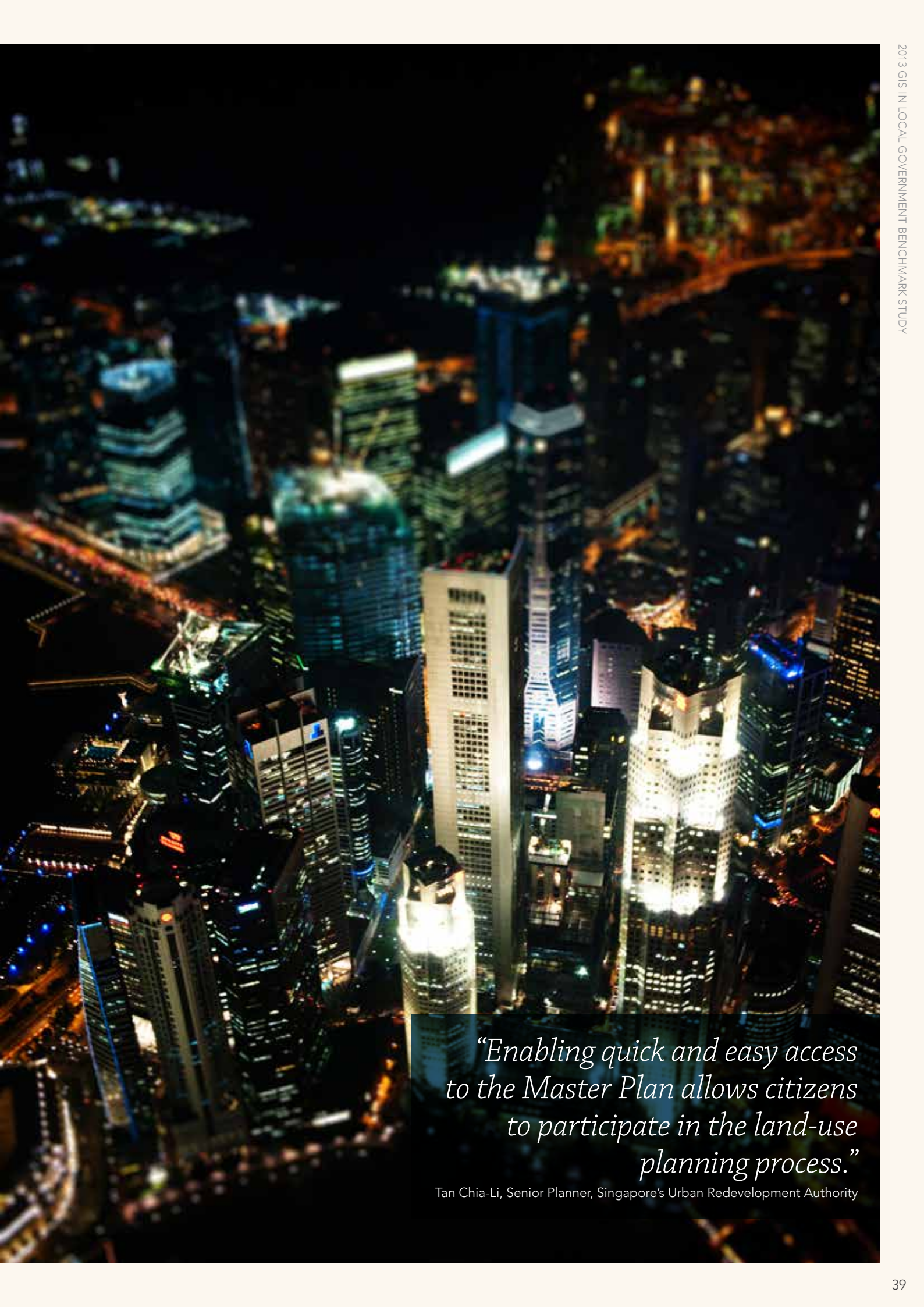
The Concept Plan is Singapore's strategic land-use and transportation plan to guide development over the next 40 to 50 years. It aims to ensure there is sufficient land to meet anticipated population and economic growth projections.

Conversely, the Master Plan guides Singapore's development over the next 10 to 15 years. It translates the broad long-term strategies of the Concept Plan into more detailed, short-term plans to guide Singapore's immediate ongoing development.

URA Senior Planner Tan Chia-Li said iPLAN has played an important role in making the city's Master Plan available to Singaporeans via an online public-facing website.

"Enabling quick and easy access to the Master Plan allows citizens to participate in the land-use planning process," he said.

Pictured: Singapore has grown into one of Asia's most urbanised countries.



“Enabling quick and easy access to the Master Plan allows citizens to participate in the land-use planning process.”

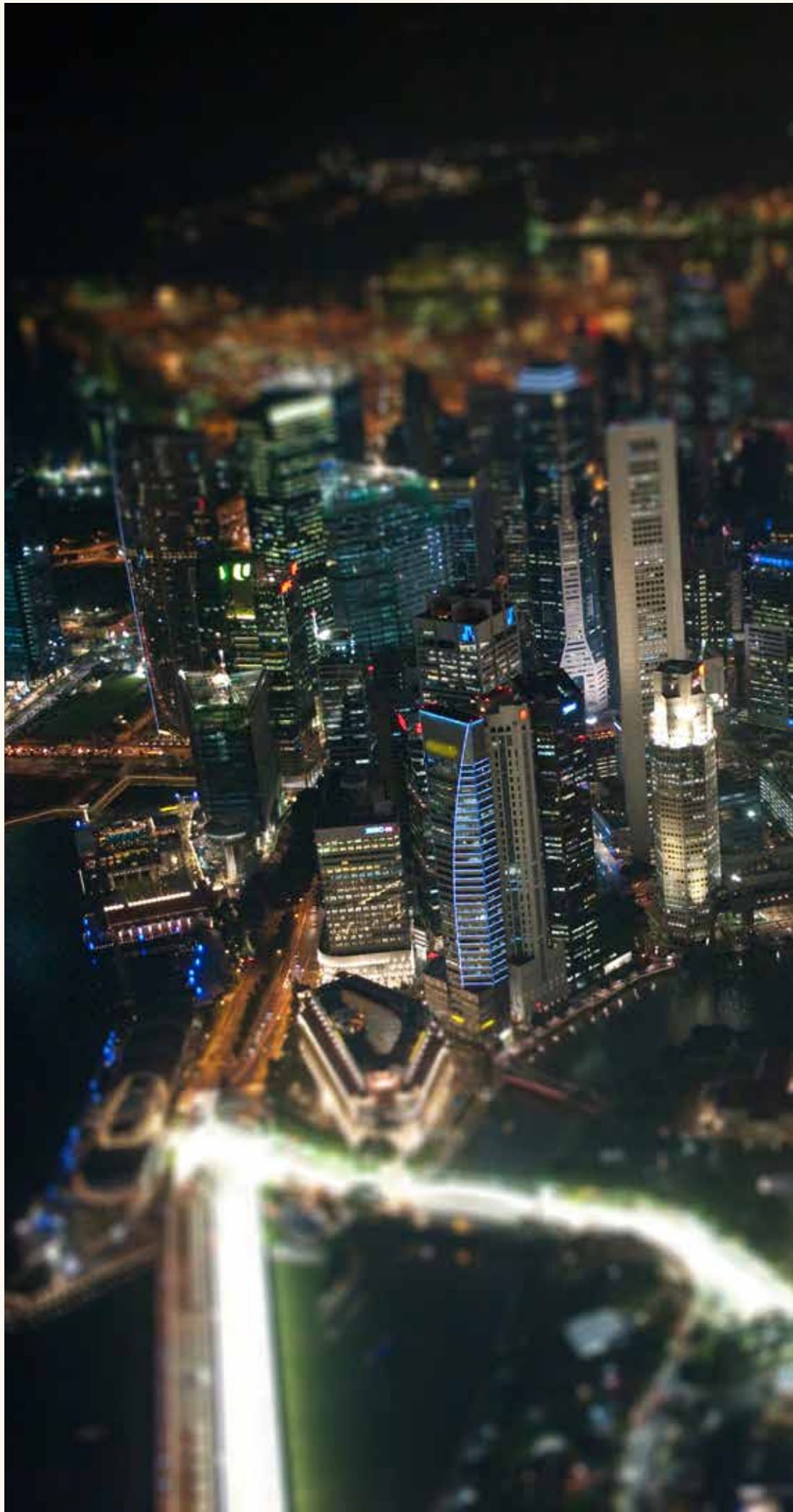
Tan Chia-Li, Senior Planner, Singapore’s Urban Redevelopment Authority

“It also gives them a glimpse of the future developments in the city and the areas where they live.”

The approach has proved successful. In 2008, URA exhibited and published the draft Master Plan 2008 for online public consultation. During the consultation period from May 2008 to December 2008, more than 200,000 people visited the dedicated website to view and provide feedback on the planning proposals.

The Master Plan 2008 was gazetted in December 2008 after incorporating the relevant feedback and suggestions from members of the public and stakeholders.

Moving forward, URA will continue to use GIS technology to support Singapore’s development activities. With GeoDesign, the country’s government believes it is possible for its land-scarce nation to continue to meet development and economic objectives without sacrificing a good quality of life.





Pictured:
Singapore lights.

3D modelling creates elevated rail system landscape

IN THE UNITED STATES, THE CITY OF HONOLULU IS USING GEODESIGN TO BUILD THE CASE FOR A NEW RAIL CORRIDOR.

While Honolulu may be globally renowned as a tropical paradise – it also has a more infamous claim to fame: the worst traffic problem in the United States.

The root of the problem is the city's urban sprawl – citizens have been moving to outlying suburban areas in search of affordable housing; and as they commute into the city daily, the island's traffic problem has been further compounded.

For Honolulu, the effects of urban sprawl go beyond increased traffic demand; with negative impacts including environmental pollution, natural habitat reduction, loss of agricultural land, and even decline in human health and well-being.

In an effort to help alleviate traffic pressure on its roadways, the City and County of Honolulu have approved and begun construction of an elevated rail system connecting two major city centres – East Kapolei to Ala Moana Centre.



The new railway will change the way citizens and tourists travel through Honolulu – and see the introduction of a new approach to town planning known as a transit-oriented development (TOD).

TOD is a mixed-use residential and commercial area designed to maximise access to public transport, and often incorporates features to encourage greater use of public transport. In this regard, a TOD neighbourhood typically has a centre with a transit hub – such as a metro station – surrounded by high-density residential and commercial buildings.

Planners look to TOD as a common solution to accommodate future population growth, control urban sprawl, and decrease traffic demands on communities – as residents have walkable access to commercial and retail amenities.

As TOD is a major change to the way Honolulu is currently designed, the government is required to give its citizens visibility over the complete development process; so they can clearly understand how the changes will impact them.

To this end, Honolulu planners are using advanced GIS visualisation and 3D tools to show residents exactly how the development will impact the city. By drawing on the principles of GeoDesign – that is, incorporating geographic knowledge into design – the Council's GIS department can more effectively analyse, compare, and visualise different scenarios of TOD for the key communities affected by the new development.

To build the case for TOD, the GIS team started by creating visual models of the city to clearly illustrate key information to the public, such as: who would have safe access to rail; how changes to

Pictured: (Right)
Waikiki Beach,
Honolulu.

Pictured:
(Opposite)
High density
development
in the centre
of Honolulu.



the zoning would visually redefine their community; and how the TOD would positively affect the community and region, preventing future urban sprawl.

Key to creating the models was sourcing the correct data sets. Most of the core data – such as roads, zoning, and buildings – was already available in the rich geodatabase that Honolulu has been developing for years.

Since visualisation is a key component of GeoDesign and a powerful tool for persuasive planning support, a 3D model was developed of the transit corridor. Honolulu had a good start to the city model with 3D geometries for the downtown area, including key landmark buildings with textures.

However, the model was not complete and needed to be enhanced in areas, since more than 3,000 buildings were without textures and some were mere footprints.

To simulate the true look and feel of the city, the team collected photos of real facades that were used to “paint” the remaining buildings.

The GIS team also used 3D geometries to convert simple building footprints into complex structures featuring real-life textures.

The last component of the process was the addition of the proposed elevated rail, which was developed from the existing engineering drawings. This completed the 3D urban model of Honolulu.

Once the visualisation was complete, the next step in the GeoDesign process was to analyse the effectiveness of a TOD and create alternative scenarios to convey the benefits of TOD for a given community and the region. A walkability model was established so stakeholders could accurately

determine the travel distance from residences or work to a transit station.

Since the acceptance of TOD in a community must be more convincing than just ridership, the planners were also required to convince members of the public that TOD will benefit Honolulu’s future regardless – whether they utilise the rail or not.

The GIS team supported the planners by creating scenarios based on the projected future – both with and without TOD.

The 3D model showing the future with TOD revealed urban growth concentration around stations with low to medium density buildings and ample undeveloped land. The same models were run against the existing zoning with no TOD, resulting in a sea of houses and significant urban sprawl.

In this way, the benefit of GeoDesign for planners is it equips them with analytic outcomes that can be used to demonstrate to stakeholders and the public how a development may positively impact the community.

In the case of Honolulu, the analytic and visualisation capabilities enabled through GIS have been key to community engagement efforts.

By using GeoDesign, Honolulu planners have been able to show their residents powerful imagery of the benefits of a future with TOD – whether through futuristic 3D holograms or simple web views of TOD scenarios.

Pictured:
Honolulu’s
growing skyline.



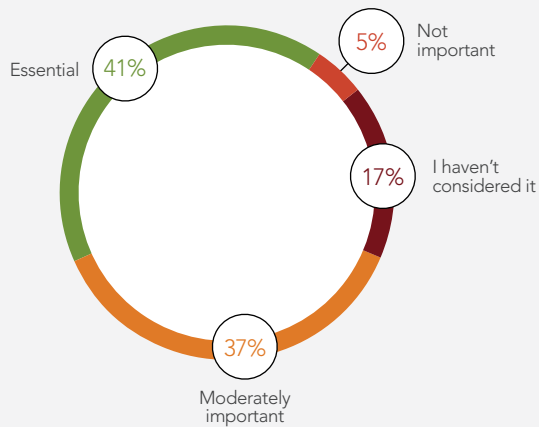


GIS and Gov 2.0

'GOV 2.0' INVOLVES LEVERAGING TECHNOLOGY TO BETTER FACILITATE THE EXCHANGE OF INFORMATION BETWEEN THE PUBLIC AND THE GOVERNMENT – ULTIMATELY IMPROVING LEVELS OF ACCOUNTABILITY AND TRANSPARENCY.

HOW IMPORTANT IS GOV 2.0 TO YOUR COUNCIL?

78 per cent of respondents indicated that Gov 2.0 is important to their council.



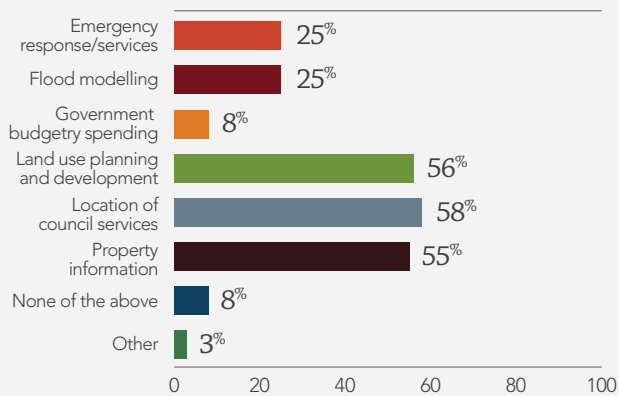
DO YOU BELIEVE GIS TECHNOLOGY CAN IMPROVE COMMUNICATION WITH THE PUBLIC?

99 per cent of respondents believe GIS technology can improve communication with the public.

99%

WHAT INFORMATION DOES YOUR COUNCIL COMMUNICATE TO THE PUBLIC USING GIS TECHNOLOGY?

More than half the respondents indicated their council currently uses GIS technology to publicly communicate: land use planning and development data; the location of council services; and property information.



“Transparency of information is key to successful community engagement.”

Tom Mesilane, GIS Coordinator, Latrobe City Council, VIC

“As more information is made publically available ratepayers will be able to see more of what is done.”

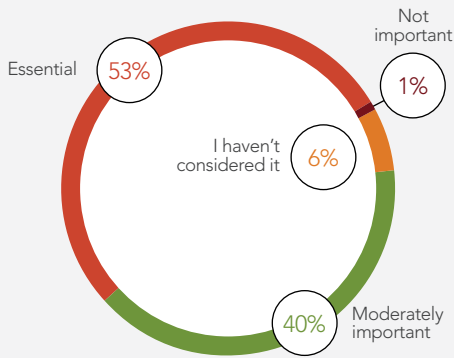
James Spath, Business Systems Analyst - GIS,
City of Busselton, WA



FOR THE PURPOSE OF THIS SURVEY, 'WEB 2.0' REFERS TO NEW GENERATION INTERNET CAPABILITIES SUCH AS INTELLIGENT MAPS, SOCIAL MEDIA AND CROWDSOURCED INFORMATION.

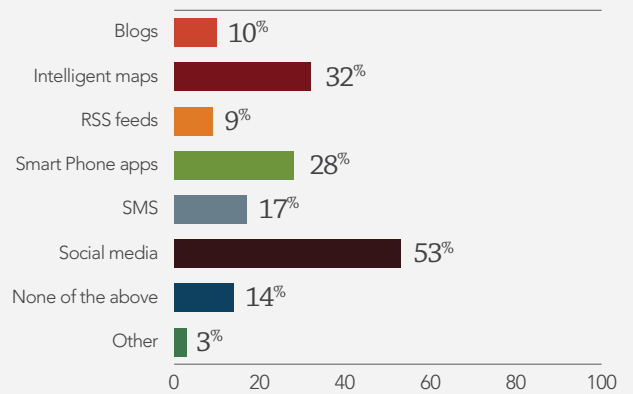
HOW IMPORTANT DO YOU BELIEVE WEB 2.0 TECHNOLOGIES ARE TO ENABLING COMMUNITY ENGAGEMENT?

93 per cent of respondents believe Web 2.0 technologies are important to enabling community engagement – with 53 per cent of those respondents deeming it 'essential'.



WHICH WEB 2.0 TECHNOLOGIES DOES YOUR COUNCIL CURRENTLY UTILISE?

The most popular Web 2.0 technologies that councils currently utilise include social media, intelligent maps and smartphone apps.



“Intelligent maps and smartphone apps are planned for the future to better serve our community.”

Tom Mesilane, GIS Coordinator, Latrobe City Council, VIC

78 PER CENT OF RESPONDENTS INDICATED THAT GOV 2.0 IS IMPORTANT TO THEIR COUNCIL.

WHEN ASKED HOW THEY BELIEVE GIS TECHNOLOGY COULD BE BETTER LEVERAGED TO IMPROVE TRANSPARENCY AND ACCOUNTABILITY, THE MAJORITY OF RESPONDENTS SPOKE TO SIX KEY AREAS, INCLUDING:

- » Facilitating greater communication with the public
- » Enabling integration and consistency across their technology platforms
- » Developing smartphone apps
- » Improving their internal decision-making abilities
- » Serving as a data management tool for reporting
- » Supporting regulatory and legislative changes

78%

“GIS provides data management tools that utilise geographic data to create meaningful information.”

Duc Nguyen, Property Mapping Officer, City of Canterbury, NSW

The vision for our future cities

.....

By Dave Byers

International Manager, Asia and Pacific, Esri

IN HIS BOOK *THE CITY IN HISTORY*, HISTORIAN LEWIS MUMFORD OBSERVED: "THE CHIEF FUNCTION OF THE CITY IS TO CONVERT POWER INTO FORM, ENERGY INTO CULTURE, DEAD MATTER INTO THE LIVING SYMBOLS OF ART, BIOLOGICAL REPRODUCTION INTO SOCIAL CREATIVITY."

Mumford points to an era where community decisions were made by councils of citizens, who brought with them various interests and experiences from a broad range of fields, to help shape their cities.

Mumford also believed technology was not an end to itself; rather it was useful and appropriate only to the extent it connected people to thoughtful goals.

As Mumford suggests, it is not unreasonable to expect – and indeed demand – that our cities not only function well, but also amplify the inputs brought by its population and flowing through its infrastructure.

This is the magic of every great city, and the charm of every liveable community – and it's being made possible today with GIS technology.

Effective deployment of GIS technology is becoming essential to the efficient functioning of local government – not only in Australia, but across the surrounding Asia Pacific region and broader global landscape.

Decades ago, the proving ground of GIS was in urban and regional planning efforts.

The findings of the Benchmark Study demonstrate this will remain a core area for the technology well into the future – but what has emerged as the new 'poster child' for GIS use in local government, is the role the technology holds in effective citizen engagement.

Across the Asia Pacific region, Australian councils - along with their New Zealand counterparts - are in many cases leading the way in terms of using GIS as a platform to build mapping applications that engage citizens, deliver transparency, and enhance policymaking.

Councils are leveraging geospatial services in the cloud, real-time data, user-generated content, mobile applications, and social networks to promote the open government practices that rate payers have now come to demand.

For example, ratepayers expect to not only "see my house" – they also expect to see, understand, and communicate information about their wider community, such as transportation options, water supply, public works, trash collection, schools, crime rates, natural disasters, local businesses and community services.

In this way, GIS technology has enabled government officials and staff to better serve and involve all stakeholders. GIS has become a platform for the well-informed conversation between citizens and their government.

This of course is in addition to the technology's ongoing role in underpinning the day-to-day operations of our cities – from asset management to emergency response.

GIS technology is indeed working to help local government fulfil Mumford's vision of the city as a place of heightened form, culture, art, and social creativity. And by improving the way governments communicate and engage with their citizens, it will continue to ensure our cities thrive.

Pictured:
Sydney's iconic
harbour at night.

“...what has emerged as the new ‘poster child’ for GIS use in local government, is the role the technology holds in effective citizen engagement.”

David Byers, International Manager – Asia and Pacific, Esri



Dave Byers

*International Manager,
Asia and Pacific, Esri*

With more than 30 years of GIS industry experience, Dave Byers is internationally renowned as an authority on GIS use in government. Since 1988, Dave has been Esri's International Manager for the Asia Pacific, and has worked closely with users across the region on the development of best-practice spatial deployments.

Perth maps the future of governance

.....

PERTH'S CITY OF BAYSWATER HAS ANSWERED THE CALL FOR MORE OPEN GOVERNMENT BY USING GIS TECHNOLOGY TO DELIVER GREATER ACCESS TO COUNCIL INFORMATION.

One of the first Australian government organisations – at any level – to provide their community with broad access to their council data, was the City of Bayswater, in Perth's north-eastern suburbs.

The City of Bayswater used GIS technology to develop *Interactive City Maps*: a user-friendly website that provides public access to the most up-to-date and authoritative spatial information available on the Bayswater area.

Behind the scenes, *Interactive City Maps* taps into Council's core GIS technology and data to deliver information to users via an interactive, map-based interface.

The user-friendly interface features a base map of the local government area and enables users to 'switch' on and off other council data layers – such as aerial photography, planning and zoning data, and land parcel and heritage information.



The site also features a highly accurate property search function, so users can: follow their own planning or building application progress; discover how Council's town planning scheme could affect developments and subdivisions; and even find out when their rubbish bins will be picked up.

Upon its launch, *Interactive City Maps* proved an instant, overnight success, clocking up more than 18,000 hits in its first three months: an average of more than 1,000 per week.

Since then, the site has also been recognised as 'best practice' – being named a 2012 finalist for a national e-government award.

City of Bayswater Geographic Services Manager Rod Woodford said the website demonstrated how

GIS technology could deliver on the Gov 2.0 concepts of community engagement and open government.

"Around the world, people are calling for all levels of government to provide increased transparency by embracing accessible and collaborative technologies," Mr Woodford said.

"*Interactive City Maps* is a perfect example of Gov 2.0: an intuitive and intelligent map-based website that provides Council information to anyone – regardless of who they are or where they've come from.

"We know this because we have received highly positive feedback from users who are excited to have immediate, online access to information previously only available over the phone or by visiting our offices.

"Information can also be passed both ways with relative ease, removing a lot of time-consuming face-to-face or telephone exchanges and opening Council up to greater input from the community."

Pictured: (Right) Perth's Interactive City Maps system.

Pictured: (Opposite) Perth's CBD at night.

“Around the world, people are calling for all levels of government to provide increased transparency by embracing accessible and collaborative technologies.”

Rod Woodford, Geographic Services Manager, City of Bayswater

Interactive City Maps enables residents to access:

- » Land parcel mapping, including parcel type and subdivision lodgements;
- » Aerial photography, including archives from as early as 1953;
- » Property searches returning: address, lot number, area, zoning, waste collection times, and property names;
- » ‘Find a facility’ searches, such as a school, playground, dog exercise area, or park;
- » Building application and development application status information;
- » Town planning schemes;
- » Heritage mapping; and,
- » Electoral boundary details.

Intelligent online maps unlock Gov 2.0

.....

GOSFORD HAS FOUND ITS LATEST WEB MAPPING WEBSITE IS A GEM – DELIVERING THE HIGHER LEVELS OF TRANSPARENCY, ACCESSIBILITY AND ENGAGEMENT IT'S CITIZENS EXPECT.

The onset of Gov 2.0 has compelled Australian governments at all levels to find new ways to share public data with communities.

Gov 2.0 involves leveraging technology to deliver more open and transparent services, where the public has improved access to government information.

GIS technology has emerged as a valuable tool for governments committed to providing rate payers with immediate and user-friendly access to information.

At the heart of using GIS for Gov 2.0 is the capacity to build interactive, intelligent mapping applications that engage communities and provide a common view of government data in the universal language of geography.

Gosford City Council is one government department that uses GIS technology to provide its residents with a new level of access to civic information.

The Council has layered its data over an interactive, online map of the local government area and provided the public with around the clock access to information that was previously only available during business hours;



such as planning, zoning, sea level rise and bushfire data.

Gosford City Council Spatial Information Coordinator Darren Santer said the visual nature of their award-winning *Gosford Electronic Mapping System* (GEMS) means it serves as a valuable resource to everyone in the community, regardless of background, education or ethnicity.

"By entering their address into GEMS, users can quickly identify where their nearest dog-friendly park is, find out what zone their property is located in, or identify if there are any land constraints or endangered vegetation in their area."

Information that was previously only accessible within Council is now at ratepayers' fingertips, driving higher levels of community satisfaction and taking pressure off Council staff.

"Previously, if a member of the public required information pertaining to zoning, they would have to ring one of our customer service operators," Mr Santer said.

"Now, GEMS gives the community 24 hour access to the same information used by Council staff on a daily basis at the click of a mouse.

"GIS technology has cut the number of calls our customer service team receives in half."

Mr Santer said Federal Government agencies including the Department of Environment and Climate Change also access the system to obtain the latest authoritative council data.

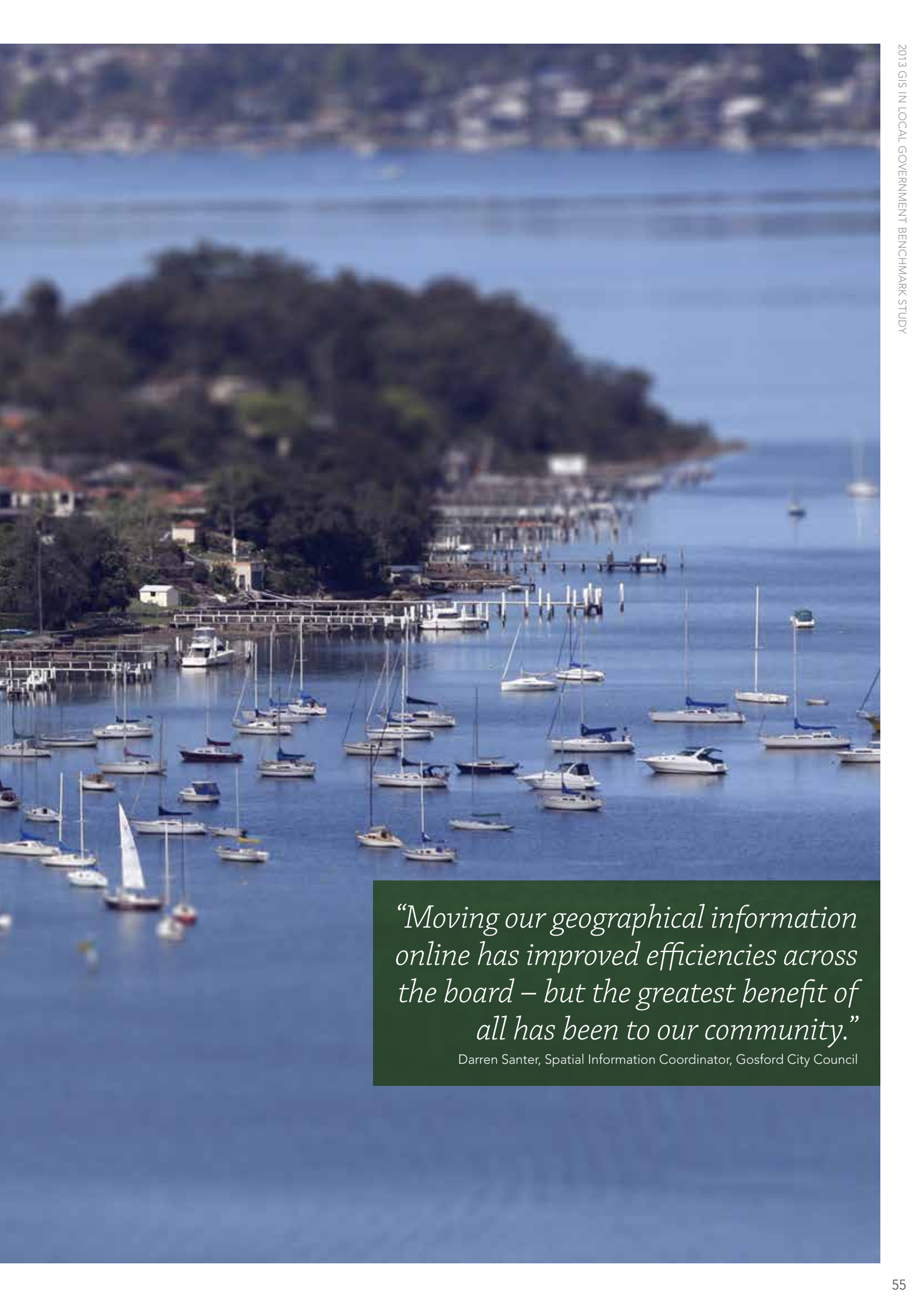
"Moving our geographical information online has improved efficiencies across the board – but the greatest benefit of all has been to our community," Mr Santer said.



Pictured: (Top) A screenshot from Gosford Electronic Mapping System (GEMS).

Pictured: (Right) An aerial image of Gosford, overlaid with information from GEMS.

Pictured: (Opposite) Picturesque Point Frederick, Gosford NSW.



“Moving our geographical information online has improved efficiencies across the board – but the greatest benefit of all has been to our community.”

Darren Santer, Spatial Information Coordinator, Gosford City Council

Adelaide reports Aussie first with community map app

.....

Pictured: (Right) Crowdsourcing, the new tool to help fight vandalism.

Pictured: (Bottom right) Protecting picturesque Adelaide streets from vandalism.

Pictured: (Opposite) Adelaide CBD.

IT'S KNOWN AS THE 'CITY OF CHURCHES', BUT NOW ADELAIDE CAN ADD ANOTHER FEATHER TO ITS CAP – AFTER BECOMING THE NATION'S FIRST CITY TO CREATE A TRULY INTERACTIVE COMMUNITY SMARTPHONE APP.

Adelaide has given its residents the power to instantly report community concerns – such as graffiti or busted street lights – with a click of their smartphones.

Drawing on GIS technology and a crowdsourcing software platform, Adelaide City Council's smartphone app – known as 'Report It' – enables users to send multimedia reports about city maintenance issues directly to the Council's customer service centre.

The result is an incredibly powerful tool that residents can use to send on-the-ground reports about what's happening in their communities – all in the blink of an eye.

Users simply capture photos, video or audio of the problem, and then press submit to send the information directly to Council.



Their reports are geo-tagged to automatically provide the issue's location, which makes reporting easier for users and increases reliability for service crews.

The technology also sends the user confirmation their report has been received and a status update when the job's been updated or completed – so it's increasing accountability and transparency for the Council as well.

The same technology has already been used successfully for similar apps in dozens of major US cities, including Los Angeles, San Francisco and Honolulu.

Adelaide City Council Business Solutions Team Leader Sonjoy Ghosh said residents were using the app to log a range of issues.

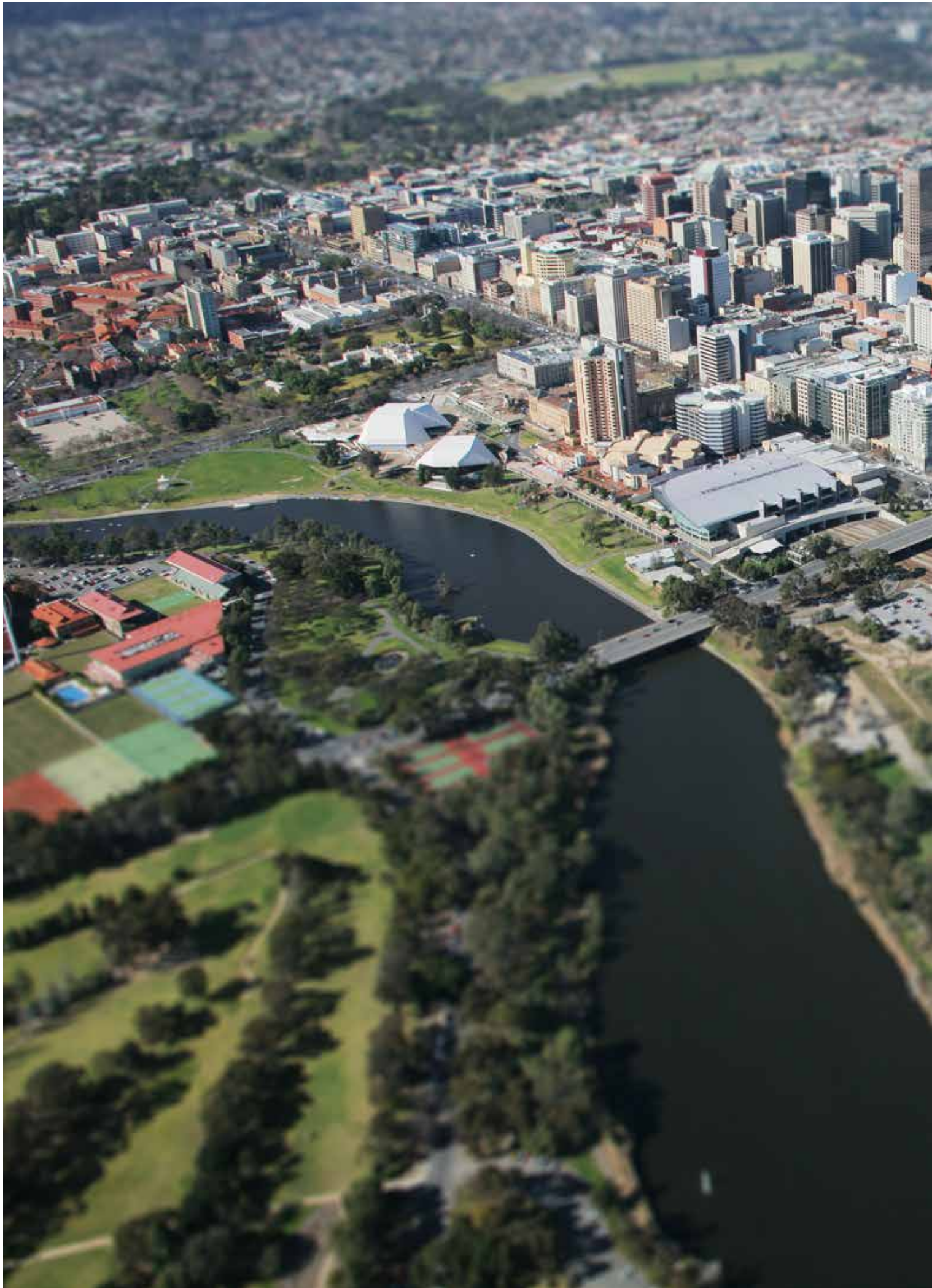
"Users have been including photographs of damaged lighting in the city parklands, right through to design deficiencies in public assets - for example, a tap that is too high for children to reach in a playground.

"It's been great to see the technology create a positive, collaborative experience that gives citizens a sense of ownership of their community."

The 'Report It' app is a free download available from the Council's website.









“It’s been great to see the technology create a positive, collaborative experience that gives citizens a sense of ownership of their community.”

Sonjoy Ghosh, Business Solutions Team Leader, Adelaide City Council

GIS helps Queensland rise from disaster

.....

AUSTRALIANS HAVE BEEN TRACKING QUEENSLAND'S LARGEST EVER RECONSTRUCTION EFFORT USING AN INTERACTIVE MAPPING WEBSITE DRIVEN BY ADVANCED GIS TECHNOLOGY.

When floods, Tropical Cyclone Yasi, and severe storms wreaked havoc across the Sunshine State during 2011, the disasters destroyed billions of dollars of property and infrastructure and took more than 30 lives.

In the crises' wake, the Queensland Reconstruction Authority (QRA) was formed to guide the biggest rebuilding effort in the state's history.

To provide Australians with a comprehensive, up-to-date insight into how the reconstruction process was unfolding, the QRA developed an interactive, online "mapping application".

Updated daily with data collated from various sources on the ground – such as the Department of Transport, councils and members of the community – the site displayed the status and condition of infrastructure and assets across Queensland.



With a click of a mouse, users could select affected communities and view disaster imagery of impacted infrastructure and assets – including schools, rail, homes, roads and bridges.

The map was also an invaluable tool aiding businesses and the community at large with situational awareness of infrastructure reconstruction progress.

QRA Director of Data and Performance Mark Cushing said GIS technology ensured Queensland's reconstruction program was open and transparent.

"The map has facilitated a two-way information exchange between the government and the community in a way that has never occurred before," Mr Cushing said.

"By providing access to the latest government rebuilding information in the visual and easy-to-understand format of an interactive map, the website also provided the community and local government with the opportunity to provide feedback on the flood extents impacting specific communities.


"The map's community feedback function encourages collaboration and information sharing between the government and members of the public, resulting in a sense of community engagement in the reconstruction efforts.

Pictured: (Right) Scale of devastation inflicted on property during Brisbane's floods.

Pictured: (Bottom right) Brisbane's flooded streets.

Pictured: (Opposite) Aerial view of Queensland's devastating 2011 floods.





“Using GIS technology to facilitate this flow of information was acknowledged by the World Bank as an innovative and cutting-edge approach.”

Mark Cushing, Director of Data and Performance, QRA

“Using GIS technology to facilitate this flow of information was acknowledged by the World Bank as an innovative and cutting-edge approach.”

When floods again ravaged Queensland in 2012, this time in the State’s Western Downs district, the map was quickly updated to include information about inundated towns such as Mitchell, Roma and St George.

The GIS technology behind the QRA map has also had an influence beyond the reconstruction

effort, providing the impetus for collaboration between State Government departments and councils.

“Each of these stakeholders has specialised data which is highly useful for other levels of government,” Mr Cushing said.

“For example, the Department of Environment and Resource Management developed accurate maps and spatial layers of actual flooding events and flood plains which are assisting local authorities and relevant recovery agencies in

better planning for future natural disaster events.

“The QRA map integrates information from these numerous organisations to provide a more detailed view and comprehensive understanding of what’s happening across our state than ever before.”

Web map opens up New Zealand council to community

.....

NEW ZEALAND'S WINE CAPITAL IS ALIGNING ITSELF CLOSELY WITH THE PRINCIPLES OF OPEN GOVERNMENT – BY PROVIDING A COMPREHENSIVE VISUAL DISPLAY OF CIVIC INFORMATION TO USERS ACROSS THE REGION.

While New Zealand is home to many geo-enabled local governments – including Auckland, Wellington and Hamilton – it's the council from the country's most famous wine district which has led the charge in using the technology to deliver improved levels of customer service.

Marlborough District Council has employed GIS technology to produce a user-friendly, public-facing web map that provides members of the community with instant access to useful information.

The interactive website layers council data over a map of the district, showcasing information such as property reports, planning and zoning data, aerial photographs – and even utility statements.

Marlborough District Council Solutions Architect Grant Carroll said the information contained in the map was previously only accessible to residents who contacted the Council during business hours.

"By using GIS technology to deliver this information online, we can now give our rate payers the information they're looking for around-the-clock – and in a level of detail never before available to the public," said Mr Carroll.

"Furthermore, by presenting this information in a visual, map-based format, we can ensure it's useful and understandable to anyone – regardless of their technological prowess, cultural background or the language they speak.



"Any business or member of the community can explore this information to make more informed decisions about property purchases; or to gain visibility over any potential community developments or council services available to them."

Pictured: (Right) Seymour Square, Blenheim.

Pictured: (Bottom right) A detail of Marlborough's public-facing web map.

Pictured: (Opposite) Marlborough – one of New Zealand's most famous wine districts.





“By using intelligent mapping platforms, we can more easily meet this growing hunger for knowledge – and ensure we are providing information to our residents in a meaningful way”

Grant Carroll, Solutions Architect, Marlborough District Council

This ‘self-service’ approach to information management has also seen Marlborough improve internal council efficiencies – as there has been a reduction in the number of phone calls and community enquiries its staff are normally required to field.

Mr Carroll said the website was also helping Council meet the community’s growing demand for greater visibility regarding government activities.

“There is certainly a drive internally within Marlborough District Council to align with the open government philosophy,” Mr Carroll said.

“The community has come to expect greater levels of transparency from us – and we are continually seeking new ways to leverage technology to connect with our citizens.

“By using intelligent mapping platforms, we can more easily meet this growing hunger for knowledge – and ensure we are providing information to our residents in a meaningful way.”

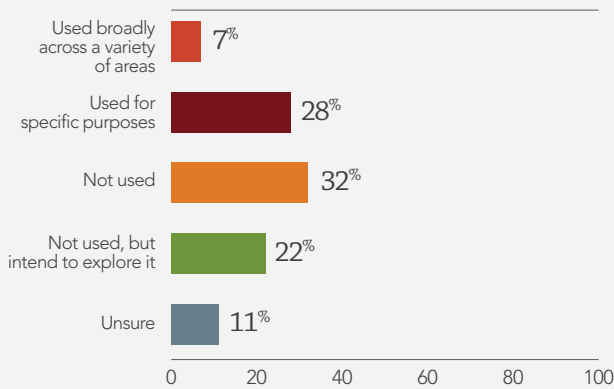
The new website is the latest chapter in a lengthy history of GIS technology use for Marlborough, which has leveraged the technology internally to manage its information for more than eight years.

GIS and Emergency Management

FOR THE PURPOSE OF THIS STUDY, CROWDSOURCED INFORMATION IS DEFINED AS DATA OBTAINED DIRECTLY FROM THE PUBLIC.

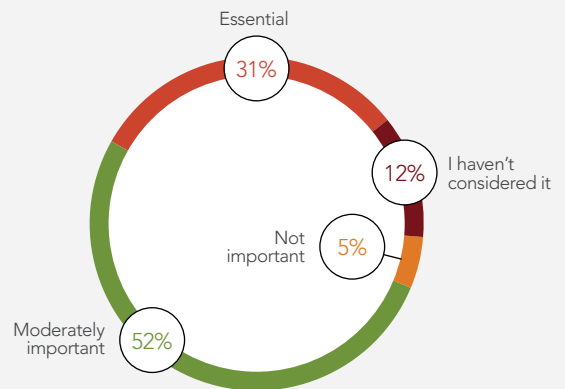
TO WHAT EXTENT DOES YOUR COUNCIL USE CROWDSOURCED INFORMATION?

More than one third of respondents already leverage crowdsourced data in some capacity – and a further 22 per cent intend to explore how it can be used.



HOW IMPORTANT DO YOU BELIEVE CROWDSOURCED INFORMATION COULD BE TO YOUR EMERGENCY RESPONSE ACTIVITIES?

83 per cent of respondents believe crowdsourced information is important to emergency response activities.



“This avenue has been discussed but some areas of council are reticent to pursue this.”

Tom Mesilane, GIS Coordinator, Latrobe City Council, VIC

“If a large amount of tweets are clustered within a narrow timeframe and in a certain area, we can be a lot more confident about their veracity. Once verified, information becomes official intelligence and emergency managers can use it to conduct rescue operations, assess damage to critical infrastructure, and prioritise medical assistance.”

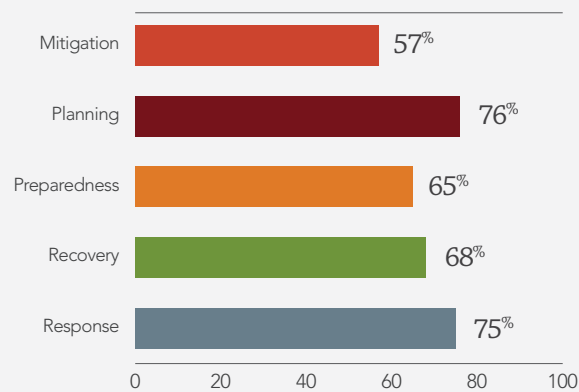
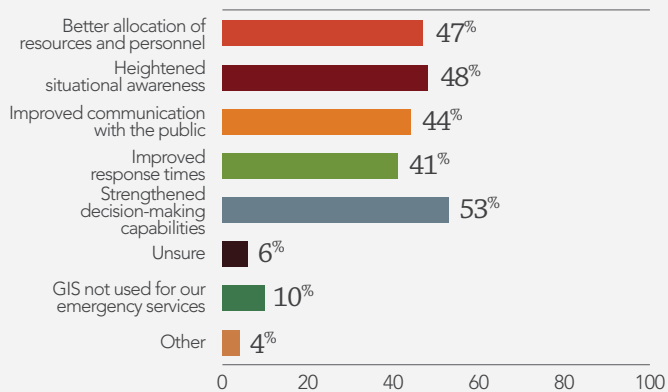
Kerrie Purcell, Managing Director, Lacuna Resolve, QLD

WHAT BENEFIT(S) DOES YOUR COUNCIL RECEIVE FROM UTILISING GIS TECHNOLOGY IN AN EMERGENCY?

During an emergency, most councils use GIS technology to strengthen their decision-making abilities.

IN TERMS OF EMERGENCY SERVICES MANAGEMENT, WHERE DO YOU BELIEVE GIS TECHNOLOGY CAN ADD VALUE?

Respondents indicated they believe GIS delivers most value during the planning and response phases.



“GIS should be used more (in emergency situations).”

Cornelia Moiler, GIS Coordinator, Shire of Kalamunda, WA

GIS in emergency services a growth area for councils

By Kerrie Purcell

Managing Director, Lacuna Resolve

LOCAL GOVERNMENTS HAVE LONG KNOWN THE BENEFITS OF USING GIS TECHNOLOGY IN ASSET MANAGEMENT, PLANNING AND ANALYSIS. HOWEVER, IT IS IN THE AREA OF EMERGENCY MANAGEMENT THAT COUNCILS ARE REALLY STARTING TO INNOVATE.

In particular, I see three key takeaways relating to emergency management that emerged from this Study, including:

- » The increasing importance of GIS technology for planning and decision making;
- » The crucial role of utilising crowdsourced information; and,
- » The advent of cloud-based solutions, which are transforming the way all levels of government share information.

Pictured: (Right) Mapping the Twitter reaction to Japan's tsunami.

Pictured: (Opposite) Emergency responders on duty.

It is clear that councils see GIS technology as integral to their internal emergency management activities, with around half of respondents declaring it strengthened decision-making (53 per cent), resource allocation (47 per cent), and heightened situational awareness (48 per cent).

As an example, local government can use the technology to compare pre and post disaster imagery of damaged assets such as hospitals and schools, and make an informed decision about where and when to deploy resources.

In this way, GIS plays a crucial role in helping local governments make more informed decisions in an emergency.

Crowdsourcing was also identified as a key area of growth.

Internationally, organisations are using crowdsourced information to develop a more detailed understanding of the situation on the ground during a crisis. The approach has helped guide rescue teams during the Japan Tsunami and in the US during Hurricanes Sandy and Katrina and the Oklahoma twisters.



First responders need rapid access to information to react appropriately during emergencies – and there is no way to get information faster than from eyewitness accounts.

Advancements to GIS means the technology can now map geo-located text, photos and videos that have been uploaded by disaster eyewitnesses to social-media platforms like Twitter and YouTube.

In Australia, members of the community already use social media to upload and exchange enormous amounts of information during disasters – such as a photo of a bridge that is damaged, or video footage of flood waters rising. This is vital, near real-time information that can be used by councils to bolster



in-house disaster intelligence such as rescue infrastructure maps.

There is still a place for more traditional information gathering, but the fact is – for many people, the web is becoming the first port of call during a disaster.

Of course, assessing the legitimacy of social media feeds has traditionally been a challenge – but GIS technology can now help verify this crowdsourced data by accessing the time and location of the post.

For example, if a large number of tweets are posted in a narrow timeframe and clustered in a certain area, emergency services can be more confident about their veracity.

Once verified, information becomes official intelligence and emergency managers can use it to conduct rescue operations, assess damage to critical infrastructure, and prioritise medical assistance.

Another significant development in the area of GIS and emergency management is in web-based cloud-managed data, supported by the Federal Government's recent announcement of the National Cloud Computing Strategy.

This approach allows different levels of government to easily share and display information via the web; ultimately facilitating all levels of government to share data and collaborate in an emergency. As an example, road closure information can be shared between local, state and federal governments, providing more accurate information to both emergency managers and the public.

Many local governments have taken the opportunity to drive innovation in the area of emergency management using geospatial technology. This trend will continue into the future as more and more councils explore this technology and utilise the benefits for both their organisation and their communities.



Kerrie Purcell

*Managing Director,
Lacuna Resolve*

Kerrie Purcell is one of Australia's most senior emergency services specialists, with more than thirty years' experience in the public safety sector – including as Director of Volunteer Services with the Queensland Fire and Rescue Service (QFRS) and Manager of the QFRS Geographic Information Systems (GIS) Unit. She is a founding member, Queensland representative and Deputy Chair of the Emergency Management Spatial Information Network of Australia (EMSINA).

A city in crisis

How GIS technology helped Bundaberg rise above the floodwaters

.....

By Steven Bowden

GIS Delivery and Support Team Leader, Bundaberg Regional Council

BUNDABERG REGIONAL COUNCIL HAS BEEN USING GIS TECHNOLOGY ACROSS DIFFERENT BUSINESS AREAS FOR THE PAST FIVE YEARS – BUT IT WAS WHEN THE DEVASTATING FLOODS HIT OUR CITY IN DECEMBER 2010 AND AGAIN IN JANUARY 2013 THAT THE TECHNOLOGY TRULY DELIVERED ITS GREATEST VALUE.

While GIS technology is useful in predicting when a flood or an extreme weather event is on its way, we found it delivered most value in providing our stakeholders such as the Australian Defence Force, Salvation Army and Red Cross – with an up-to-date view of the situation, as it was unfolding.

On 26 January 2013, six tornados struck the region – triggering the activation of Council's Local Disaster Coordination Centre.

Pictured: (Top) Emergency responders negotiating flood waters.

Pictured: (Right) Valuable support provided by Australia's defence forces.

Pictured: (Opposite) A scene of devastation in Bundaberg during the 2013 floods.



Due to significant rainfall across the region at the same time, we used GIS technology to define the boundaries of an incident area to allow a State Government Emergency Alert to be issued to the residents of Winfield (on Baffle Creek), warning them of impending flooding.

The Emergency Alert system produced an automatic voice message to all identified landline telephone services within the defined geographic area, notifying affected residents of approaching danger. It also sent a text message to all recognised mobile services.

As the torrential weather continued in the region, the Burnett River kept rising due to large rainfalls across the catchment area. The situation became so dire that on 28 January the mandatory evacuation of North Bundaberg was ordered; the largest in Queensland's history. More than 5,500 people in North Bundaberg and more than 7,000 in the greater Bundaberg region had to be relocated.

By 29 January, most of North Bundaberg and a significant area of East Bundaberg was completely underwater. During this period, we found GIS technology was



crucial in mapping and analysing the enormous amount of data that was being received by Council. For example, we were able to use the technology to develop a map showing the extent and duration of inundation via flood modelling.

GIS technology also came into play when Council moved into recovery mode on 31 January. GIS underpinned the Rapid Damage Assessment (RDA) processes undertaken by the GIS unit from the Queensland Fire and Rescue Service (QFRS).

In just a few days, Tropical Cyclone Oswald had flooded more than 600 kilometres along the east coast of Queensland. Both government and non-government agencies used RDA as a 'live stream', to assist tactical and operational planning for: the washout of houses; evacuations; recovery and outreach centres; and establishing reconstruction plans.

Our focus then turned to identifying where community members needed help – and GIS again played a significant role. By mapping the



location of requests for assistance from the Disaster Coordination Centre hotline in conjunction with the RDA data, we could locate where community members were and what assistance they required.

We could also quickly ascertain whether they were trapped; or if they were stuck without access to food. This meant response agencies such as State Emergency Services (SES), QFRS, Queensland Police Service (QPS), Queensland Ambulance Service (QAS), and helicopter assets could be accurately tasked and quickly dispatched.

The technology also meant we could provide these agencies with the information they needed to complete their jobs effectively. For example, we generated comprehensive maps for the Australian Defence Force to find suitable landing sites for food drops.

We also created maps of exclusion zones; traffic management plans;

critical infrastructure; mud army marshalling; and safe route maps.

After the event, we also used LiDAR to generate and confirm the locations of the sink holes that had formed during the floods. This information was then used to further refine the flood model.

In terms of statistics – 4,040 properties were directly affected by the disaster, 448 were deemed severely damaged, and over 600 businesses were impacted.

The 2013 Bundaberg floods provided a real opportunity for us to observe why GIS is an important element for local government use, particularly during emergency and disaster situations.

Ultimately, GIS technology improved our tactical and operational decision-making; situational awareness; strategic planning; community engagement; and rescue efforts.



Steven Bowden
.....

GIS Delivery and Support Team Leader, Bundaberg Regional Council

With a career in the spatial industry spanning more than 16 years, Steven Bowden has served as the GIS Delivery and Support Team Leader at Bundaberg Regional Council for 12 years. He possesses qualifications in Applied Science (Surveying) and Information Technology, and is a member of the Surveying and Spatial Sciences Institute (SSSI).

Other Bundaberg Regional Council GIS team members who assisted during the floods included: Laurie Stewart and Rona Swain, who provided GIS support throughout the event to both internal and external organisations.

Limiting flood risk with LiDAR

By Paul Lennox

GIS and Data Systems Coordinator, Bass Coast Shire Council

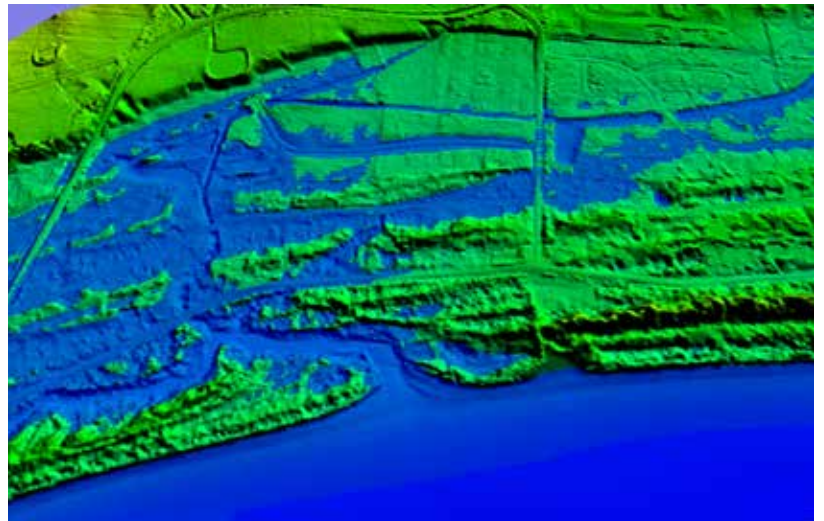
BASS COAST SHIRE COUNCIL HAS BEEN USING GIS TECHNOLOGY FOR MORE THAN A DECADE.

While asset management and planning are the areas where we primarily draw on GIS technology, we are also increasingly using LiDAR – a high resolution elevation and light detection tool – to gain a better understanding of the risks associated with flooding and other extreme events related to climate change.

In particular, using LiDAR and GIS technology enables us to map and analyse the enormous amount of data that must be taken into consideration when projecting the outcome of high intensity rainfall events.

Council has undertaken considerable research into the vertical accuracy assessment of LiDAR, using spatial autocorrelation concepts to better understand the limitations of our hydrological modelling.

GIS technology brings all of this information together and allows us to run models of the impacts



of various flood scenarios to understand the level of inundation that may take place.

Once we have a clear understanding of potential flooding, Council can make better decisions about how to put mitigation measures in place.



The 2011 floods in Melbourne and the 2011 flood in Brisbane were a clear warning to all in this regard.

Using GIS to perform ground surface modelling with LiDAR allows us to create three dimensional models so we can clearly identify issues such as overland flows associated with extreme rainfall events.

From here we can identify high-risk areas, where flows are going, and determine exactly how we can prevent flash flooding in people's backyards.



By using LiDAR and GIS technology in this way, we can also ensure underground drainage is properly constructed to lessen over ground flow.

A lot of drainage was put in place years ago prior to council having GIS knowledge – and we can now evaluate the performance of our existing drainage systems and better design green fields developments.

The three dimensional models we create using LiDAR help us mitigate risk of sea level rise, as we can

also model various sea level rise scenarios associated with climate change. This is particularly valuable during serious situations like the current king tide event happening across our coast.

Pictured: (Above) the main street of Cowes.

Pictured: (Opposite, bottom) Smiths Beach.

Pictured: (Opposite) Using 3D technologies, Bass Coast Shire Council can plan for flooding events.

Response and recovery without compromise

.....

Pictured: (Right) The Total Operational Mapping system (TOM) in action.

Pictured: (Bottom right) QFRS' command centre.

Pictured: (Opposite) A screenshot of QFRS' Total Operational Mapping system.

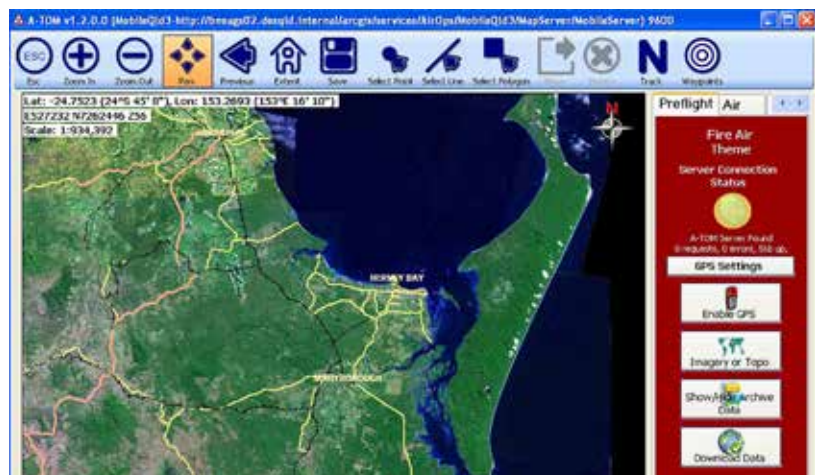
GIS TECHNOLOGY ANSWERS THE RESCUE CALL AND PROVES PIVOTAL IN GETTING COMMUNITIES BACK ON THEIR FEET AFTER DEVASTATING NATURAL DISASTERS AND EMERGENCIES THROUGHOUT QUEENSLAND.

By their very nature, natural disasters are unpredictable, unavoidable and unrelenting.

Thanks to GIS technology, state emergency services departments are better equipped than ever before to act swiftly in a crisis and effectively manage response and recovery efforts.

According to Mark Wallace, Manager of the Queensland Fire and Rescue Service (QFRS) GIS Unit, GIS is the enabler that puts vital data and information in context, to improve the coordination of emergency response activities across the state.

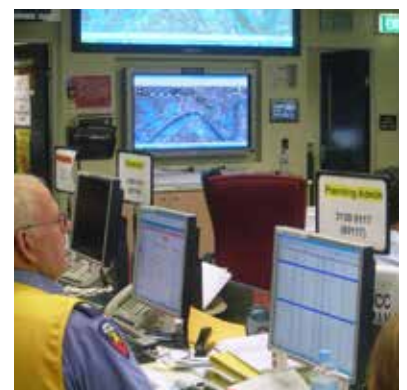
The QFRS, a division of the Department of Community Safety (DCS), is one of the agencies responsible for delivering emergency services to communities throughout Queensland.

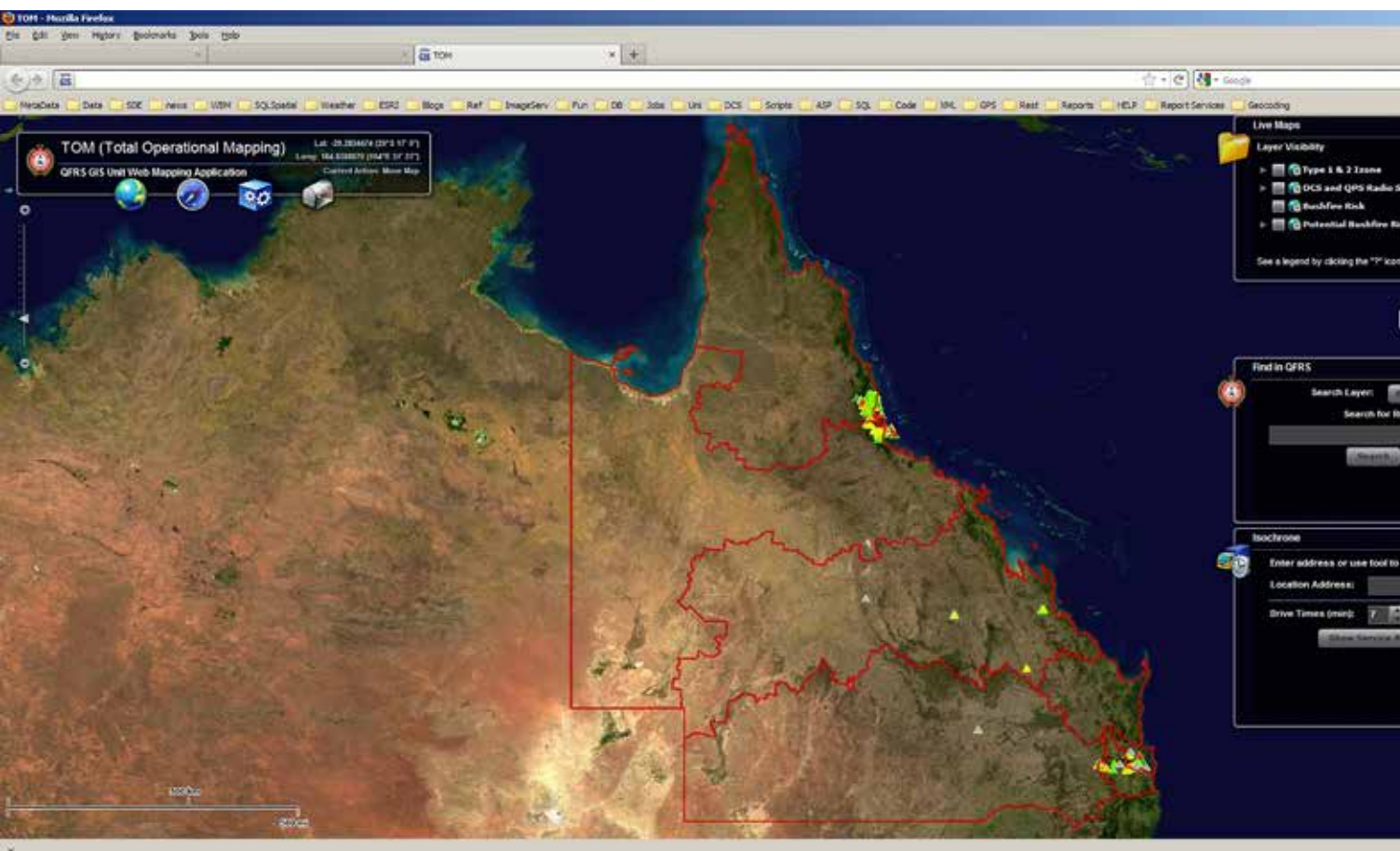


Their GIS solution, known as the *Total Operational Mapping* (TOM) system, operates with QFRS' other internal systems, bringing together information from various sources and organisations – such as the Bureau of Meteorology, Department of Transport and Main Roads, and Queensland Police – to create an interactive map of events as they occur across the state.

TOM visually represents near-real time emergency data on a map, translating complex scenarios into an easy-to-digest universal language, enabling staff to quickly and clearly interpret large volumes of information.

As a result, says Mr Wallace, decision making and response times are significantly improved and rescue staff and resources can be appropriately allocated – saving lives and protecting property.





When tropical cyclones, severe storms and floods ravaged Queensland in recent years, GIS technology provided QFRS with the capability to run scenario based models, allowing them to keep ahead of the disasters before they fully unfolded.

In one case, the system mapped storm tide inundation along the Queensland coast, enabling the QFRS to conduct predictive flood modelling to identify areas likely to be affected.

Armed with this foresight, QFRS could evacuate communities and strategically position their crews and resources, including evacuation centres and food drops, where they were clear of rising waters.

During the floods and Tropical Cyclone Yasi, the QFRS also leveraged cutting-edge aerial GIS technology, to convey information from out in the field back to the State Operations Coordination Centre.

"Aerial Total Operational Mapping (A-TOM) is a GIS-driven aerial intelligence gathering tool that was used in aircraft for mapping

damage, flood extent, road closures, and threatened assets such as buildings or pump stations," said Mr Wallace.

"A-TOM is a particularly vital resource for assessing and assisting disaster affected communities that have become inaccessible by road and helps identify and prioritise where resources need to be put most efficiently to get people back into their homes as soon as possible."

Mr Wallace said GIS has been the cornerstone for the recovery and reconstruction of Queensland – enabling the QFRS to build resilience and help the community to bounce back from this difficult time.

"Without GIS, the response and recovery effort would have been severely hampered," he said.

"It's about the social wellbeing of Queenslanders. And you can't compromise on that."

"Without GIS, the response and recovery effort would have been severely hampered."

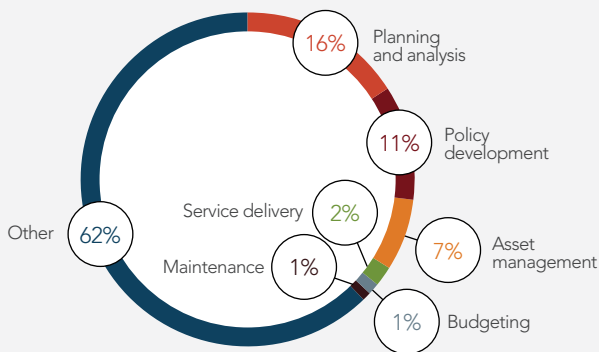
Mark Wallace, Queensland Fire and Rescue Service

GIS and Policy Making

WHAT ROLE DOES GIS TECHNOLOGY PLAY IN THE DEVELOPMENT OF YOUR COUNCIL'S POLICIES?

More than 80 per cent of respondents indicated GIS plays a role – with six main areas identified.

- » Planning and analysis
- » Policy development
- » Asset management
- » Budgeting
- » Service delivery
- » Maintenance



RESPONSES INCLUDE:

"It is the fundamental platform informing decisions, especially for planning policy."

Ben Pow, Services Manager – Business Information, Brisbane City Council, QLD

"In many cases, the GIS component of council policies is 66 per cent of the document. SCC uses mapping extensively in the development of policies across all areas of local government."

Martin Browne, Manager – Spatial Information Management, Sunshine Coast Council, QLD

WHILE MOST RESPONDENTS OUTLINED THAT GIS TECHNOLOGY CONTRIBUTES TO THEIR CURRENT POLICY DEVELOPMENT ACTIVITIES; SOME INDICATED IT WAS NOT A KEY AREA OF FOCUS.

"Minimal - Council still does not seem to see the importance of GIS at the strategic planning stage when developing policy."

Paul Lennox, GIS & Data Systems Coordinator, Bass Coast Shire Council, VIC

"Occasionally it is utilised but generally undervalued. There is a consistent trend to request maps, rather than involve GIS in the whole process."

Robert Shields, Senior Application Support Officer, Adelaide City Council, SA

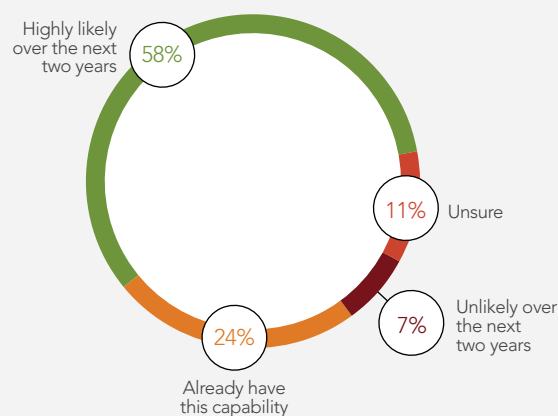
OVER THE NEXT FIVE YEARS, WHICH OF THE FOLLOWING GIS TECHNOLOGIES DO YOU BELIEVE WILL BECOME A PRIORITY FOR LOCAL GOVERNMENT?

Respondents indicated they consider the main GIS priorities over the next five years will be:

- » Cloud-based GIS services
- » Data management
- » Imagery
- » Mainstream usage of GIS technology
- » Mobile

OVER THE NEXT TWO YEARS, WHAT IS THE LIKELIHOOD THAT YOUR COUNCIL WILL DEPLOY GIS CAPABILITIES VIA SMARTPHONES?

Over half of the respondents indicated it's likely their council will deploy GIS capabilities via smartphones over the next two years; with 24 per cent indicating they already have this capability.



“Two-way public GIS (i.e. incorporating crowdsourcing).”

Greg Dunmill, GIS Co-ordinator, Moreland City Council, VIC

“Mobile, but specifically using mobile to insert the data into the other corporate systems such as Asset Management Systems.”

Simon Davis, Team Leader Asset Management,
City of Port Adelaide Enfield, SA

“For me, the main trend will be moving more online, enabling citizens and external partners more ‘self-help’. We also need to encourage innovative use and reuse of the spatial data we freely provide via open standards based web services.”

Miles Dunkin, Manager - Information Management,
Wellington City Council, New Zealand

Mapping environments to create a healthy future for SA children

.....

Pictured: SA Health's OPAL program will pinpoint communities supporting physical activity for children.

SOUTH AUSTRALIA IS TAKING ON CHILDHOOD OBESITY BY UTILISING GIS TECHNOLOGY TO PINPOINT COMMUNITIES ACROSS THE STATE WITH FACILITIES AND INFRASTRUCTURE THAT PROMOTE HEALTHY EATING AND PHYSICAL ACTIVITY – AND IN DOING SO, PIONEERING A NEW APPROACH TO HEALTH POLICY DEVELOPMENT.

With nearly a quarter of South Australian children overweight or obese*, SA Health, in partnership with the state's local governments, is tackling the issue through targeted funding and by developing community awareness and education policies, programs, partnerships and infrastructure.

Key to this strategy is the Obesity Prevention and Lifestyle (OPAL) program, which supports children's health through their families and communities.

Part of the OPAL program is an eight year evaluation of healthy living facilities that includes monitoring resources – such as playgrounds and recreation grounds – to better target state and local governments' policy and intervention efforts.

The evaluation uses GIS technology to analyse the state's existing infrastructure and environments to determine the best course of action in addressing the issue.

OPAL Evaluation Manager Dr Michelle Jones said in the first stage of the evaluation, OPAL field teams gather the information required using mobile devices connected to the organisation's central GIS technology.

"The teams input and upload data about the locations and conditions of facilities and resources that are associated with healthy eating and physical activity – such as playgrounds, ovals, bike tracks, food outlets and water fountains," Dr Jones said.

"Researchers can then analyse maps of this information with key demographic data – such as childhood obesity rates – to gain a greater understanding of the relationships between where resources are, what condition they are in and, importantly, who has access to them.

"By viewing our data in this way, we can gain a valuable insight into changes in existing facilities, and gather an understanding of how the

OPAL program has better supported the community to eat well and be active.

"Ultimately the technology enables our decision-makers to determine where targeted programs, policies and infrastructure are required to ensure children have facilities and environments that support healthy choices."

Dr Jones said GIS technology was crucial to ensuring the project could encourage children to live healthier lives and reduce future pressure on state health systems.

"There is a clear link between childhood obesity and obesity in adulthood, so it's vital for us to act as early as possible," Dr Jones said.

This project will support local governments in their public health planning processes.

"This is a long-term strategy and over the remaining five years of the OPAL program, we'll be regularly updating our GIS with new data to monitor health promoting environments."

*Taken from the SA Health's "The Eat Well Be Active Strategy for South Australia 2011–2016".



“This is a long-term strategy and over the remaining five years of the OPAL program, we’ll be regularly updating our GIS with new data to monitor health promoting environments.”

Dr Michelle Jones, OPAL Evaluation Manager

Looking to the Future

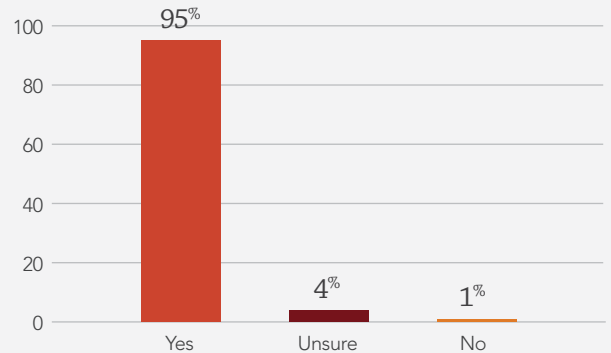
THE CITY OF MELBOURNE WAS AUSTRALIA'S FIRST COUNCIL TO MAKE ITS SPATIAL DATA FREELY AVAILABLE TO THE BROADER COMMUNITY. IS THIS AN INITIATIVE YOUR COUNCIL WOULD CONSIDER?

60 per cent of respondents indicated this is an initiative their council would consider.

60%

DO YOU BELIEVE THERE SHOULD BE A GREATER CAPACITY FOR COUNCILS TO SHARE INFORMATION WITH OTHER COUNCILS AND GOVERNMENT DEPARTMENTS?

95 per cent of respondents believe there should be a greater capacity for councils to share information with other councils and government departments.



“If councils collaborated and hosted combined services, we could provide the community with a homogeneous centre of information. Your council boundary shouldn’t be the determining factor in the information you receive.”

Stephen Yates, Senior GIS Officer, City of Charles Sturt, SA

James Spath

Business Systems
Analyst – GIS
City of Busselton, WA



How do you see councils using GIS technology in the future?

I see councils using a lot more crowdsourced apps. Also with the move to opening up access to data, I think a lot of councils will hopefully make their data more easily available and accessible. Projects such as GovHack and other 'mash up' initiatives

help us to see how we can combine data and link information together, so that people can better use it. It also helps you find the holes and errors in your data when other people are pouring over it as well.

How will the role of GIS technology within your council change over the next five years?

It's pretty hard to tell as technology and uses of GIS change so rapidly. I would see there would be an increase in the use of and reliance on spatial data. More and more the

'where' question will be first and foremost for contractors and ratepayers.

I also think there will be more integration of GIS technology with all our corporate systems. As local government authorities are place/property/land based, this is really a 'no brainer'. I also think there will be bureaus created where there are hubs for GIS, and GIS teams will service a few councils rather than just one.

Alan Keown

GIS Officer
Gloucester Shire
Council, NSW



What is the next GIS priority for your council?

There are three different but equally important priorities, including: implementing a new schema to take fullest advantage of the ArcGIS Server technology; implementing the trickle feed update of the cadastre; and sourcing low cost, high resolution, regularly updated imagery for the shire and its environs. The first two are critical to more fully spatially enabling and integrating Council's textual systems.

How will the role of GIS technology within your council change over the next five years?

Gloucester has a small rate base and a large area of land, with diverse environmental, economic and heritage characteristics.

Council is looking towards growing efficiencies from the integration of systems and the decentralisation of GIS capabilities, so we can increase productivity and increase the range and effectiveness of the services it offers.

The aim is to "activate spatial thinking" across all areas of Council's responsibilities. We expect that local government will play a greater role in environmental, urban settlement and heritage planning, and that there will be an increasing requirement for "evidence-based decision making". GIS will be critical for this.

How do you see councils using GIS technology in the future?

GIS technology will become as commonplace as in-car navigation or word-processing technology. Corporate reporting and performance monitoring will have a significant spatial component.

Certain areas of spatial data management and analysis will continue to be the

exclusive preserve of qualified GIS professionals, but more people will be making use of the results of their efforts. We see a strong, unaddressed demand for printed maps.

We would also expect to see Council's GIS more integrated into a local spatial data infrastructure, so local investment in GIS technology can be leveraged by state, federal and private agencies.

Melbourne first to join new world map

.....

THE COMMUNITY MAPS PROGRAM ALLOWS USERS TO SHARE THEIR LOCAL CONTENT IN THE CLOUD WITH THE GLOBAL GIS COMMUNITY. THE CITY OF MELBOURNE JOINS A GROWING NUMBER OF GROUPS MAKING THEIR SPATIAL DATA FREELY AVAILABLE THROUGH THE PROGRAM.

In 2012, the City of Melbourne made headlines when it became the first Australian council to make their spatial data freely available online as part of an international project to develop the world's most accurate online map.

Pictured:
(Right) Aerial view of Albert Park Lake and Melbourne CBD in the distance.

Pictured:
(Opposite) The centre of Melbourne CBD.

The council contributed their official local government area base map to the *Community Maps Program* – a global initiative which brings together the most up-to-date spatial data from official sources around the world.

As part of the Program, Melbourne joined major cities including New York and Los Angeles in becoming one of the first in the world to contribute to a new World Topographical Map – which is expected to become the most authoritative online global map ever developed.



The City of Melbourne's involvement with *Community Maps* has given every ratepayer in Melbourne – and the broader community – access to authoritative information about the nation's fastest growing city.

Residents can now freely access Melbourne's spatial data which includes building sites, parcel boundaries, tree locations and other layers which display the CBD and surrounding areas in a level of detail never before available to the public online.

The initiative offers individuals and organisations distinct advantages over other publically accessible mapping applications.

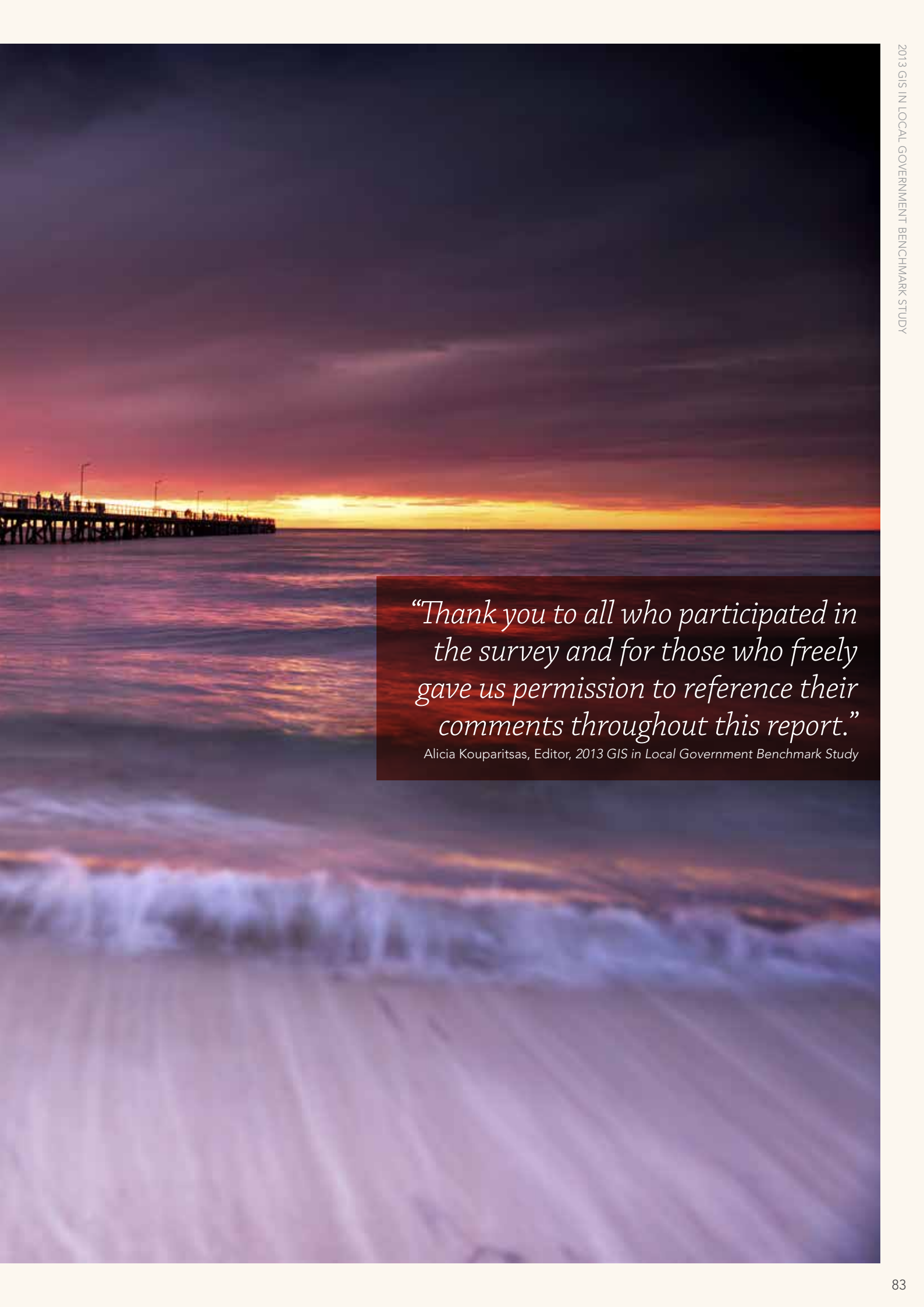
For example, other freely available online base maps for Melbourne contain data that can be out-of-date by up to three years.

With the new platform, City of Melbourne has the capability to provide regular updates from the most recent spatially enabled data available.

The program enables users to not only view maps of Melbourne's spatial data; but also create their own customised maps in an unprecedented level of detail.







“Thank you to all who participated in the survey and for those who freely gave us permission to reference their comments throughout this report.”

Alicia Kouparitsas, Editor, 2013 GIS in Local Government Benchmark Study

Study Sponsors

.....

About the Surveying and Spatial Sciences Institute (SSSI)

SSSI is the not-for-profit national peak body representing and supporting the largest membership of surveying and spatial science professionals in Australia and New Zealand.

SSSI represents professionals in land surveying, spatial information, cartography, remote sensing and photogrammetry, hydrographic surveying, engineering, mining surveying and special interest groups including Women in Spatial and Young Professionals.

sssi.org.au

About Esri Australia

Esri Australia is the nation's leading Geographic Information System (GIS) and location intelligence specialist. For more than three decades Esri Australia has partnered with thousands of government and commercial enterprises to deliver quality GIS solutions that have transformed the way organisations address opportunities and challenges.

GIS employs the science of geography to map and analyse information. Esri Australia uses the world's most advanced GIS technology to expose patterns and relationships within client data, providing an analytical vantage point that no other tool can.

esriaustralia.com.au

Contact

For more information about this report please contact:

Esri Australia Pty Ltd,
Level 3, 111 Elizabeth Street,
Brisbane, Qld 4000

P +61 (0)7 3218 4100

F +61 (0)7 3211 1310

Free phone 1800 447 111

E communications@esriaustralia.com.au

W esriaustralia.com.au/benchmark-study



Pictured:

(Previous)
Beautiful sunset
at Semaphore
Beach, South
Australia.

Pictured: (Right)
Vintage crane at
dusk, Constitution
Dock, Hobart,
Tasmania.

