BCE SURVEYING Pty Ltd

A.C.N. 088 348 136 / A.B.N. 93 088 348 136

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BCE Surveying Pty Submission to Smart ICT Inquiry – July 2015

BCE Surveying (BCE) is a leading Western Australian consultancy that provides a wide range of professional products and services including: - Surveying, Laser Scanning and Spatial Information Solutions. Innovations have included early adoption of Terrestrial and Mobile Laser scanning, Robotic and Reflector-less Total Stations, Global Navigation Satellite Systems (GNSS) and Inertial Measurement Units (IMU), Light Detection and Ranging (LiDAR), sophisticated GIS, 3D Modelling and BIM models. These innovations have been implemented through rigorous due diligence backed by a thorough research program.

Identifying innovative technology for the mapping, modelling, design and operation of infrastructure;

The convergence of several new technologies – big data, business analytics, cloud and Nano computing, high speed materials, and mobile technology - has provided the spatial industry a plethora of new opportunities for capturing, processing, value adding and managing data. These technologies have allowed improvements in Global Navigation Satellite Systems (GNSS) which has allowed for fundamental improvements in location accuracy for many industries. Laser technologies, which are now finding their use in driverless cars, have also provided significant benefits to the industry. Many such technologies couldn't have happened without the significant improvements in computing and battery power made possible by miniaturization over the past decades. Add ancillary systems, such as robotics, to the mix and the spatial industry has at our disposal, a suite of new automated procedures for rapid, highly mobile data collection. BCE services focus on utilisation of these rapid data capture techniques across the land, hydrographic, aerial and satellite surveying disciplines.

Identifying the new capabilities smart ICT will provide;

Improvements have moved equally forward in the spatial processing environment, allowing the new capability to be exploited. Increases in the computing capability around Geographic Information Systems (GIS) and cloud based solutions and apps can bring much of this geographic and location information to the palm of your hand. Information systems are at a threshold that is pushing well beyond traditional paradigms. GIS maps change as the different scenarios are tested. Such analytical assessment of these scenarios is far more powerful than traditional scientific approaches which don't address the holistic problem. Toggling on and off data such as aerial photographs, 3D models and land surfaces provide a realistic backdrop to additional value

Added information used in decision making. Examples include the coupling of high accuracy laser measurements with multi spectral imagery and high precision GPS to create super rich data sets. BCE further utilise their knowledge and understanding of these core data sets to further value add them to increase their usefulness for the end user. The inclusion of additional unique attributes such as size, time, quality, cost etc. allows BCE to turn your standard 3D data into detailed spatial information for intelligent decisions making purposes. By specifically matching data capture and processing needs with the end users requirements, BCE have been able to identify many new capabilities across both new markets and new pockets of growth in mature markets across a diverse range of industries.

Examining the productivity benefits of smart ICT

BCE has identified many productivity benefits from smart ICT. Our latest innovation is in the fields of Mobile Laser Scanning (MLS) and Building Information Modelling (BIM). The integration of these technologies have provided several productivity benefits both tangible and intangible

The development of MLS has resulted in a number of tangible productivity benefits to the surveying industry, clients and the community. Economically the resources required for completing survey using MLS are far less than traditionally required using conventional survey methods. Using traditional methods to survey a one square kilometre site would have taken up to 16 hours while the MLS can completed the equivalent area in just 2 hours. The savings in time, money and man power has substantial productivity benefits to all parties involve.

Intangible benefits include this related to environmental impact and safety aspect of undertaking work. The successful utilisation of a MLS to capture data means that surveyors no longer need to walk across potentially unstable ground or through fragile flora. This means that protected areas and unstable slopes are no longer exposed to degradation and erosion from being continually walked over. By not having surveyors accessing potentially dangerous or hazardous areas health & safety risks may also be reduced. The reduction of health & safety risks meets not only BCE, but many of our Clients strategic goals. In minimising risk, through eliminating the need for surveyors to walk across unstable and hazardous areas, BCE has proven to our clients that we have culture that is seeking to constantly improve or productivity.

Harmonising data formats and creating nationally consistent arrangements for data storage and access

BCE works across all states and in doing so have needed to develop a deep understanding of the nuances across the many different jurisdictions. This has taken considerable time and effort and is often seen as an

impediment for many companies looking to offer their service in in a national context. To achieve a harmonised, coordinated and consistent Geospatial environment that can effectively support Australia's national interest, priorities need to be focused in the following areas:

- Finalise development of a national standard for Geospatial data
- Identify fundamental systems and technology
- Establish appropriate management protocol
- Deliver outcomes through effective Governance and self-regulation

Identifying international best practice in the use of smart ICT in the design and planning of infrastructure;

Innovation is the unique application of technologies for improved outcomes. BCE has applied international best practice too many traditional survey techniques and has been able to translate those insights into innovative solutions that uniquely address the design and planning of infrastructure. BCE are working with world class universities (Curtin, RMIT, QUT) top international research centres (CRC-SI) and other partners from the public and private sectors to develop our research capacities in order to remain at the forefront of technology in our business.

Considering the use of smart ICT in related fields, such as disaster planning and remediation;

In addition to the BCE have identified the use of smart ICT across many new industries including

- Bio security
- Disaster planning and emergency scenarios
- Environmental management and remediation
- Climate change modelling and prediction
- Urban growth and renewal
- Socio economic issues such as homelessness, violent crime, theft and graffiti management
- Asset and Feature management

Considering means, including legislative and administrative action, by which government can promote this technology to increase economic productivity.

From a legislative perspective the Federal Government could provide further encouragement to early adopters of smart ICT through the simplification of the R&D tax incentive scheme.

Administrative action is required to develop the appropriate Governance mechanisms to allow industry to self-regulation and remove the duplication and double/triple handling of digital data. Source data need to be easily verified and attributed in accordance with prescribed protocols.

CITATION

"Main Roads WA now considers Mobile Laser Scanning as a proven data capture technology. Our detailed independent audits of delivered models have confirmed the data conforms to our highest required engineering accuracy standards at a high and consistent level. New automated extraction techniques, together with good processing methodologies, ensure the capture of all required detail that if not visible in the scan can be infilled by traditional survey approaches.

As such, this use of this data capture method, particularly in high traffic areas like Freeways and Main roads, is quickly emerging as the survey methodology of preference.

From Main Roads prospective Mobile Laser Scanning technology offers specific advantages to us in:

- Road User Impact: Data is now capture with virtually no impact or disruption what so ever to our road users.
- Safety: Surveyor is now no longer required to venture into traffic in order place a prism pole to capture detail.
- Cost: the lack of need for lane closures and other traffic control measures can provide considerable cost savings.
- Speed of data acquisition: Data capture is very rapid minimising effort and exposure in the field."

Wayne Cannel,
Survey and Mapping Manager
Road and Traffic Engineering,
Main Roads, WA.

Licensed and Engineering Surveying Management

BCE SURVEYING est 1994

BCE Surveying is one of Western Australia's most experienced licensed and engineering surveying companies with successful projects across the state and beyond.

Our highly experienced, qualified surveyors work with our clients to solve problems and limit risks though the implementation of the latest technology, coupled with quality, service, expertise and knowledge.

We provide survey and associated services to a wide variety of public and private client across the Land Development, Civil Engineering, Construction and Resource industries.

Our Licensed Surveying Services

As Licensed Surveyors we are qualified to carry out any legal survey work where property boundaries are concerned including

- Boundary re-establishment land surveys;
- Land titling advice
- Green title land subdivisions;
- Strata surveys, including built and vacant surveys;
- Amalgamations;
- Property council of Australia certified area surveys;
- As-constructed surveys;
- Built Form surveys.

Certified to ISO 9001, our surveying and data management capabilities cover all aspects of the industry.

Knowledge is power

bcesurveying.com.au

Licensed and Engineering Surveying Management

Our Engineering Surveying Services

BCE's clients in the resource, property, government and construction industries rely on BCE Surveying to provide the highest quality services in:

- Engineering an Construction setouts/control
- Earthworks modelling and volume calculations
- As-constructed surveys
- 3D DTM (Digital Terrain Modelling)
- Fixed and mobile 3D scanning using the fastest mobile surveying equipment in the state
- WCX Water Corp compliant as-constructed surveys
- Project management

Our Equipment

The surveying and associated equipment we use is the most sophisticated and up-to-date available. In licensed and engineering surveys the equipment we most commonly use includes:

- Trimble S6 and R8 robotic total stations
- Faro & Trimble 3D scanners
- Trimble SPS930 series machine control robotic total stations
- Trimble Dini digital levels
- Trimble R8 GPS units

Our Computing Power

BCE is a registered user of a range of highly regarded, state-of-the-art software and data management computer facilities. In licensed and engineering surveying applications, the software we use includes:

- Liscad
- Civilcad
- AutoDesk Infrastructure Design Suite
- Adobe Creative Suite
- Trimble Realworks

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Construction Services

Our surveyors are accurate and disciplined, and they use only the highest quality equipment, including fixed and mobile scanners unavailable elsewhere in Western Australia.

Contractors, builders, fabricators and facility owners and managers typically deploy the BCE Construction Services surveying teams at all phases of a project, from planning through construction and assembly, and beyond to provide as-constructed data.

The information we provide and manage can significantly reduce project risk, streamline production and construction times, and provide valuable insight into the form of the final product.

Working with software developers like Trimble, our field and office operators are trained and up to date with fast-moving advances.

Construction Services

Our Services

The more complex the planned construction is, the more important it is to involve BCE Surveying from the earliest stages of planning. We work on a scale from whole of building to individual componentry, and our accuracy is the highest available. Our service to the construction industry include:

- Construction setouts
- System and machinery alignment
- As-constructed surveys and 3D scans
- Fabrication scans and 3D model creation
- BIM Clash detection and construction control
- BIM construction setouts

Our Equipment

Our construction survey technology covers both fixed and mobile scanners, and we employ quality state-of-the-art equipment including:

- Survey grade Trimble MX-8 mobile 3D scanner
- Trimble MX8 Mobile Lidar
- Trimble S6 and R8 robotic total stations
- Faro & Trimble 3D scanners
- Trimble SPS930 series machine control robotic total stations
- Trimble Dini digital levels
- Trimble R8 GPS units

Our Computing Power

The BCE Surveying Construction Services team has access to a wide range of hardware and software designed to provide high-level detail for planning and construction purposes, and the programs we use may include:

- Liscad
- Civilcad
- AutoDesk Revit
- Adobe Creative Suite
- Trimble Realworks
- Trimble Business Centre

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Laser Scanning Services

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Fixed and mobile 3D scanning for infrastructure, is probably the fastest advancing sector of the surveying industry.

Primarily of use to public and private sector organisations involved in the planning, construction, maintenance and management of buildings and other infrastructure, the Infrastructure Imaging services offered by BCE Surveying are fast, accurate and safe, and in the hands of our widely experienced operators, very cost-effective.

Our client-focused business approach, and the ability of our teams to adapt to any conditions and project parameters, gives BCE Surveying a competitive edge in meeting your goals in Infrastructure Imaging.

Intelligent 3D content quickly and efficiently from laser scans for designers, fabricators, contractors and owners.

Knowledge is power

bcesurveying.com.au

Laser Scanning Services

Our Services

Using class-leading 3D scanning hardware and software, our skilled personnel can provide QA controlled services in Infrastructure Imaging in areas such as:

- Heritage infrastructure scanning
- GIS (Graphic Information Systems)
- Facilities Management (FM) requirements
- Visual Impact projects
- Topographic, Road, Utility and Network data extraction
- 3D and BIM model creation
- As-constructed scans and BIM modelling
- BIM construction setouts
- BIM management services
- 3D BIM model site surveys

Our Equipment

Our Infrastructure Imaging equipment is the fastest and most accurate available, and the hardware we use includes:

- Survey grade Trimble MX-8 mobile 3D scanner
- Trimble MX8 Mobile Lidar & Photography
- Trimble S6 and R8 robotic total stations
- Faro & Trimble 3D scanners
- Trimble SPS930 series machine control robotic total stations
- Trimble Dini digital levels
- Trimble R8 GPS units

Our Computing Power

Knowing how to properly extract and utilise the data obtained from Infrastructure Imaging is probably the most important part of the process, and the BCE Surveying team has access to the most practical and beneficial computing hardware and software, to expedite the process.
Our computing power encompasses:

- Liscad
- Civilcad
- AutoDesk Infrastructure Design Suite
- Adobe Creative Suite
- Trimble Business Centre

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Building Information Modelling Services

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Building Information Modelling gives architects, engineers, government and heritage workers, and investors and owners, access to a pleasing array of insights into the buildings they own, manage or are planning.

Flexible and scalable for projects of any size or complexity, the BCE Surveying BIM services combine superior data collection technology and techniques with state-of-the-art data management, manipulation and storage capabilities.

BCE Surveying has positioned itself to be a key player in BIM, Machine Guidence systems, Laser Scanning and 3D modelling.

Building Information Modelling Services

Our Services

Any situation that demands the creation of accurate, flexible and informative models can be undertaken by the BCE Surveying BIM team. Some of our services that have been called upon in the past include:

- BIM 3D scanning project integration
- BIM Site modelling
- BIM Architectural, MEP and plant modelling
- BIM content management and clash detection
- BIM Site control setout and verification
- As constructed BIM models.
- BIM Project Management

Our Equipment

From scanning individual components to detailing entire suburban areas, the BCE Surveying site teams can deploy a wide range of leading edge surveying hardware, including:

- Trimble\Autodesk BIM & GIS systems
- Trimble MX8 Mobile Lidar
- Faro & Trimble 3D scanners
- Trimble S6 and S8 robotic total stations
- Trimble SPS930 series machine control robotic total stations
- Trimble Dini digital levels
- Trimble R8 GPS units

Our Computing Power

BCE has the capacity to obtain, manage and manipulate enormous volumes of data, and use it to generate incredibly useful, insightful models. The equipment we use to ensure that our BIM modeling is of the highest possible resolution and accuracy includes:

- Liscad
- Civilcad
- AutoDesk Infrastructure Design Suite
- Adobe Creative Suite
- Trimble Business Centre

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Asset and Service Management

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BCE Surveying offers probably the quickest, most accurate and cost-effective means of identifying, imaging and cataloguing assets and services, and using the information to efficiently manage them.

Applying a customised solution for each project, our skilled and experienced staff can build a complete inventory of assets, survey the condition of built and manufactured items, and create high impact flythroughs and VR models for a range of purposes.

These services are most often required by local government, mining and resource companies, and organisations as diverse as tree farms and water management departments.

BCE Survey has invested in leading edge technology that cuts time and cost, while providing vast quantities of useable data.

Knowledge is power

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Asset and Service Management

Our Services

Using fixed and/or mobile scanners, the Asset and Service Management team at BCE Surveying can collect, extract and manipulate an enormous amount of data for use in the following:

- Asset identification for GIS\Management systems
- Information extraction and data manipulation
- Road furniture surveys
- Road and bridge condition assessments
- BIM
- Plant and HVAC modelling.
- Visual impact flythroughs and VR models
- Statutory compliance checking
- Vegetation volumes and plantation yields

Our Equipment

The pace of advancement in this area of surveying is phenomenal, and BCE has invested heavily to ensure that our surveying teams are equipped with the most reliable, accurate and competitive equipment available.
Our current equipment store includes:

- Trimble\Autodesk BIM & GIS systems
- Trimble MX8 Mobile Lidar
- Faro & Trimble 3D scanners
- Trimble S6 and R8 robotic total stations
- Trimble SPS930 series machine control robotic total stations
- Trimble Dini digital levels
- Trimble R8 GPS units

Our Computing Power

The key to extracting and utilising the vast amount of data collected by our site teams is to provide our office teams with the computing "grunt" to allow accessible data storage, and quality data manipulation software and hardware. The BCE Surveying computer facilities include:

- Liscad
- Civilcad
- Autocad
- Trimble Business Centre

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Facilities and Network Management

The Facilities and Network Management team at BCE Surveying provides a diverse array of services to clients in both the public and private sectors.

We cover everything from risk assessment and compliance checking, to damage examination and documentation, to planning for retrofit facility and plant upgrades, to infrastructure condition surveys.

Our ability to integrate disparate datasets allows clients to exploit the data more fully, and this is enhanced by our capacity to produce informative visual presentations. We are able to provide fully customised survey and data manipulation programs for any application, from pipeline and power management, to aerial photogrammetry, and BIM hazard monitoring.

BCE Surveying has contributes to some of the largest mining, construction and civil projects undertaken in Australia.

Facilities and Network Management

Our Services

Using fixed and/or mobile scanners, the Asset and Service Management team at BCE Surveying can collect, extract and manipulate an enormous amount of data for use in the following:

- 3D scanning for 'retrofit' FM and plant upgrades
- Pipeline and Powerline surveys
- BIM hazard, risk assessment and compliance checks
- Insurance damage assessment and monitoring
- Signage impact assessment
- Aerial photogrammetry
- DTM, GIS, BIM, and Plant data integration

Our Equipment

Depending on the project, the Facilities and Network Management team may call upon a number of BCE Surveying's high quality, state-of-the-art scanning and survey equipment, which may include:

- Trimble\Autodesk BIM & GIS systems
- Trimble MX8 Mobile Lidar
- Trimble S6 and R8 robotic total stations
- Faro & Trimble 3D scanners
- Trimble SPS930 series machine control robotic total stations
- Trimble Dini digital levels
- Trimble R8 GPS units

Our Computing Power

Our data management and manipulation capabilities are second to none, and BCE can use the powerful computing assets at its disposal to create finely detailed visuals and presentations, integrate disparate data from a range of sources, and store and manage vast amounts of data. Our network utilises hardware and software of the highest quality, including:

- Liscad
- Civilcad
- AutoDesk Infrastructure Design Suite
- Adobe Creative Suite
- Trimble Realworks
- Trimble Business Centre

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