From Maps to Models

Applying Surveying Expertise to become

The Spatial Information Manager

Mark Nichols
Trimble Vice President
Our History and Our Future – from Maps to Models

Technology changes have improved our ability to deliver richer information
Surveyors offer professional services across various industries
Although the tools have changed...
We still need to be experts on measurement and analysis

Delivering accurate spatial data across multiple industries and events
For example

Disaster response - One immediate need is an accurate framework

• Options
  1) Satellite delivered RTX, available globally
  2) The establishment or re-survey of a VRS network

• VRS successfully used as the framework post event for
  Malaysian Tsunami - 2004
  Hurricane Katrina - 2005
  Sichuan Earthquake – 2008
  Christchurch Earthquake - 2011
Industry requirements are driving technology innovation and paving the way for increased benefits

| Safety                                           | • Fewer workers on roadside; does not hinder traffic  
                                                   | • Data processing back in the office on the desktop |
|-------------------------------------------------|---------------------------------------------------------|
| Efficiency                                      | • Faster than conventional data capture methods        |
                                                   | • Rapid access to data                                  |
                                                   | • Reduced operational costs                            |
| Simplicity                                      | • User friendly interface                              |
                                                   | • ‘Click of the button’ in many cases                  |
| Completeness                                    | • Real time QA/QC in field and office settings         |
                                                   | • Field re-visits can be done back in office on desktop |
                                                   | • Data is available at all times                       |
| Accuracy                                        | • Location referencing (linear & spatial) provides the best possible accuracy due to GNSS |
| Scalability                                     | • Open, modular, and portable solution                 |
                                                   | • Coupled closely to GIS and Asset Management Systems  |
| Transparency                                    | • Real time costs                                      |
                                                   | • Real time schedules                                  |
                                                   | • Audits                                               |
Integration of technologies allow us to collect billions and billions of data points per hour.
...and gather features rapidly as well
Delivering detailed and accurate spatial data faster and richer than ever before ...
For example

**Disaster response - Rapid damage assessment**

Mobile mapping can be used to accurately record the current status

Post quake in Christchurch the city centre was mapped in just 2 days using Trimble mobile mapping
And... Rapid data collection is not just outside anymore

The technology now exists to map our world in 3D to cm level accuracy, from space, air, land and inside buildings.
We can now generate accurate deliverables from pictures
Merging airborne and ground data capture, both inside and out into a single rich model.
Demand for rich data is on the increase
Technology today = spatial information everywhere for everyone

Using mobile devices or rugged professional tools
Enabled by cloud solutions for rapid definition and deployment
For rapid damage assessment of any type of event
Feeding a structured, authoritative data set
Crowd sourced or professionally sourced
The Spatial data enables the discussion

Post event the environment looks very different

3D city models enable discussions and communication

Built using SketchUp models from 3D Warehouse
And new virtual capabilities where spatial information is applied are being adopted by industries.
The data services are being automated
$50B-$60B is spent each year to collect, analyze & maintain Geospatial data (IDC)

From maps to models

2.5M GIS software users; tens of millions of potential GIS data users – many are mobile

>25 Years Serving the GIS Industry

- **1989**: First GPS system designed for GIS Field Data Collection
- **1995**: First plug-and-play GPS sensor for laptops and PDAs
- **1995**: First pen-based GIS data collector
- **1996**: First real-time GPS/GIS system
- **2002**: First Windows® CE device with integrated GPS
- **2005**: First Windows Mobile® device with subfoot GPS
- **2008**: First GIS data collection system with decimeter GNSS
- **2013**: Trimble TerraFlex released

 `$50B-$60B` is spent each year to collect, analyze & maintain Geospatial data (IDC)
$50 Billion spent annually but...

in many parts of the World it is still paper based
$50 Billion spent annually but...  
inaccurate base data still exists
Our ability to acquire and generate geospatial data has and will continue to increase exponentially.
Connectivity in the field to the office is becoming commonplace...

enabling more people of all skill sets to be able to collect data
Connecting spatial data to stakeholders improves productivity

CITIZENS & CONSUMERS
- GIS Data Users
  - Smart Meters
  - A source of data

MANAGEMENT
Dashboards & Reports

MOBILE FIELD CREWS & FLEETS
- Data Collection / Validation
- Work & Incident Management
- Asset Management
- Fleet tracking & Routing

CONTRACTORS – Intelligent Machines

The right information delivered to the right people at the right time
Connectivity enables the intersection of professional, government, and consumer

Extracting the value across the stakeholders – enabled by being Connected
We need to move from being data and measurement centric to process and industry centric as industries vertically integrate, built on a solid spatial framework.

A disruptive process that offers the customer’s compelling value AND cannot be operated without technology and connectivity.
We have the opportunity to be the geospatial manager across industries.

Managing the data across the project lifecycle

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<th>Required Life Cycle Data</th>
<th>Trimble Apps Today</th>
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<td>objectives</td>
<td>Trimble SCT Pro</td>
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<tr>
<td>budget timeline</td>
<td>Survey Control</td>
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<td>TRIMBLE 3D MAX</td>
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<td>Construction model</td>
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<tr>
<td>maintenance schedule</td>
<td>Total Station</td>
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<td>interior asset locations</td>
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<td>Planning</td>
<td>Survey</td>
<td>Design</td>
<td>Estimate</td>
<td>Earthworks</td>
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<td>5%</td>
<td>10%</td>
<td>10%</td>
<td>55%</td>
<td>20%</td>
<td>Build</td>
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</tbody>
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**FIG Working Week 2016**

**CHRISTCHURCH, NEW ZEALAND 2–6 MAY 2016**

Recovery from disaster
What can we do to drive change and ensure we are not a piece of history but be a very key participant in the future....
Understand that common technologies and shared platforms will expand the reach of spatial data across people, applications and industries.
Understand the use of machine control is an opportunity to us as surveyors, not a threat

- The surveyor’s new function has transformed to geo-data manager
- Creating or verifying the digital terrain and design models that are placed in the machine.
- **Ensuring the accuracy and quality of construction**
- Monitoring progress, field checking the work as it occurs, updating changes to the model
- The creation of complete and accurate “as-built” documents to serve the project life-cycle

Machine control can provide >30% increased job site productivity, and >50% reduction of reworks
Adopt collaboration tools that will allow you to share and apply spatial data across a common platform to better serve multiple people, applications and industries.
Embrace the vertical construction/building industry which provides us as surveyors additional opportunities and huge potential. “The world has nowhere to go but up”.
Where we can help

Providing collaboration tools that deliver integrated visibility through one ecosystem

Complete access to data
Accuracy of data
Hardware/Software and Software/Software integration

Open and agnostic
We can help deliver enhanced productivity

- Efficient collaboration and communication across and throughout the project lifecycle
- Solutions available from office to field
- Optimized hardware/software performance
What we can enable

**Increased Accuracy and Data Integrity managed through collaboration platforms**

- Information that leads to proactive business decisions
- Visualization, constructability
- Solutions from project concept, to build and operate; realized business vision
- Unparalleled Industry Expertise

Preserving accuracy from the virtual to the real world
Construction Productivity Example

Leveraging the constructible model, created through collaboration in the field
$2B LAX Tom Bradley International Terminal

Technology delivered: 10% Faster, 50% lower cost of layout, 80% increase in accuracy,
Result: Less rework and wastage
Enabling resilience - Monitoring for the future

Continuously monitored buildings
Enables data driven decisions on re-occupation post event

“Big data” can potentially aid emergency response
The Surveyor of the future will…

- Become industry focused: Road, Mining, Building and Construction, Railway, Cadastral, etc.
- Embrace spatial data from all sources to improve the solutions in all industries.
- Analyse, interpret, and audit spatial data collected by both Surveyors and non-Surveyors
  - Providing quality control on the data sources to ensure it is fit for purpose
- Become the **data authority** across all industry continuums
The Surveyor of the future will be
The expert in
the art of managing and delivering value from Geospatial Information

Connected and collaborating using models, not maps
Thank You

Mark Nichols
Trimble Vice President