



FIG Working Week 2016

CHRISTCHURCH, NEW ZEALAND 2-6 MAY 2016

Recovery

from disaster

From Maps to Models

Applying Surveying Expertise to become

The Spatial Information Manager

Mark Nichols
Trimble Vice President



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FIG Working Week 2016

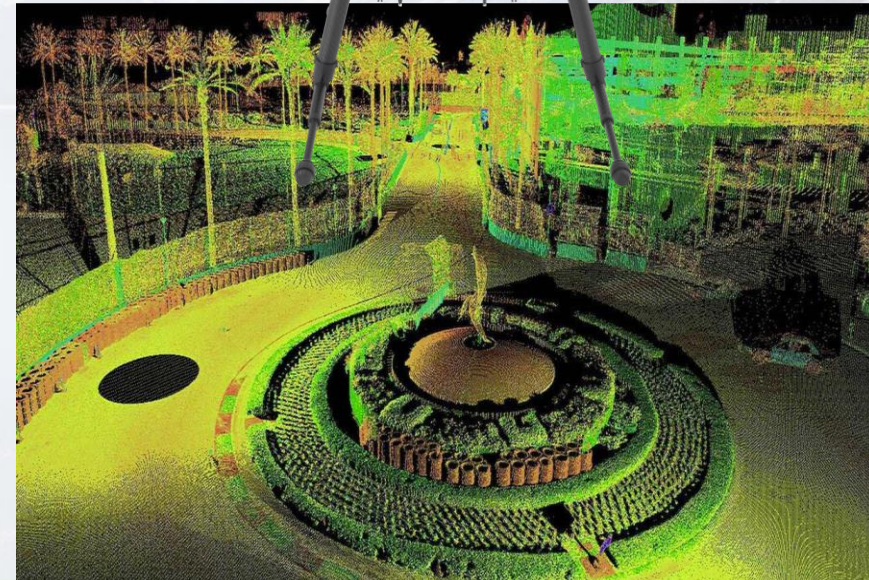
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Recovery

from disaster

Our History and Our Future – from Maps to Models

Technology changes have improved our ability to deliver richer information



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Recovery

from disaster

Surveyors offer professional services across various industries





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Although the tools have changed...
We still need to be experts on measurement and analysis



Delivering accurate spatial data across multiple industries and events



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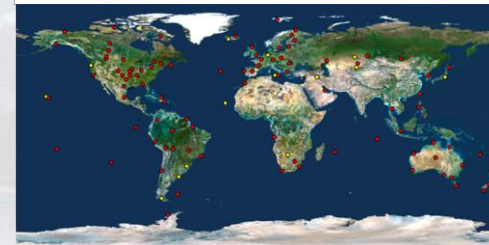
Recovery

from disaster

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	<ul style="list-style-type: none">• Fewer workers on roadside; does not hinder traffic• Data processing back in the office on the desktop
Efficiency	<ul style="list-style-type: none">• Faster than conventional data capture methods• Rapid access to data• Reduced operational costs
Simplicity	<ul style="list-style-type: none">• User friendly interface• 'Click of the button' in many cases
Completeness	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Location referencing (linear & spatial) provides the best possible accuracy due to GNSS
Scalability	<ul style="list-style-type: none">• Open, modular, and portable solution• Coupled closely to GIS and Asset Management Systems
Transparency	<ul style="list-style-type: none">• Real time costs• Real time schedules• Audits



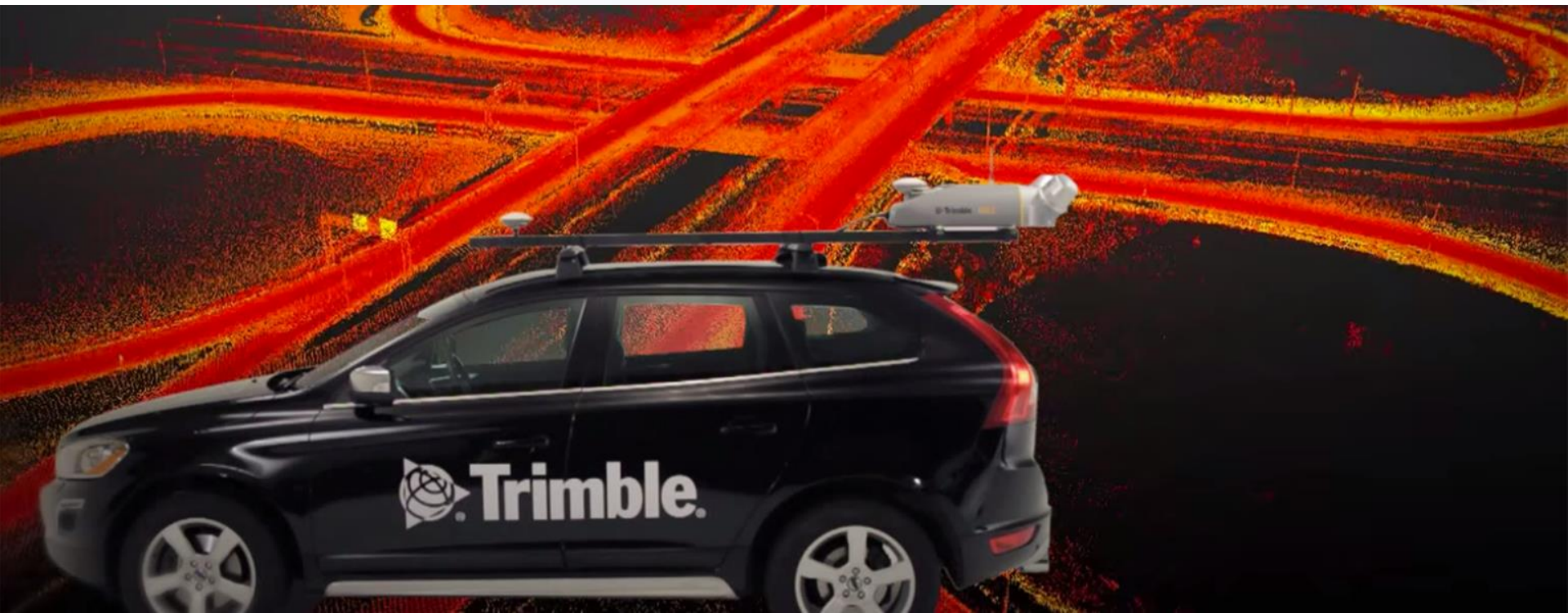
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Integration of technologies allow us to collect billions and billions of data points per hour



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Recovery

from disaster

...and gather features rapidly as well

Legend

- 3DPOINTS
- LEVELCURVES
- CONTROLPOINT
- VQ-250-MTQ_Run
- viaduc(5)_Right.gps
- viaduc(5)_Right.avi
- viaduc(6)_Right.gps
- viaduc(6)_Right.avi**
- viaduc(6)_VQ250.las
- points
- edge
- pavement
- pole

Object Attributes - viadu... x

Id	2640132
x	621450.382652
y	5031138.5952E
z	-15.876589
Norm. Angle V	-1.366886
Norm. Angle H	1.572453
Angle V	1.366886
Angle H	1.572453
Beam Distance	17.597502 m
Lateral Distanc	13.661022 m
Retro	0.415250
R	0
G	0
B	0
Confidence	255
Scan Size	0



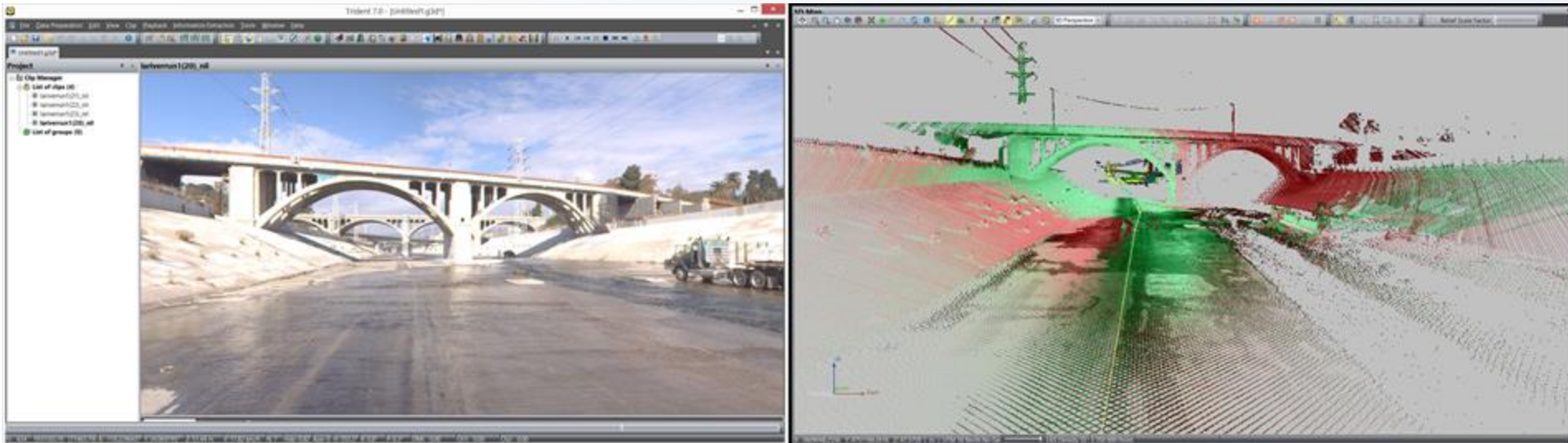
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Recovery

from disaster

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





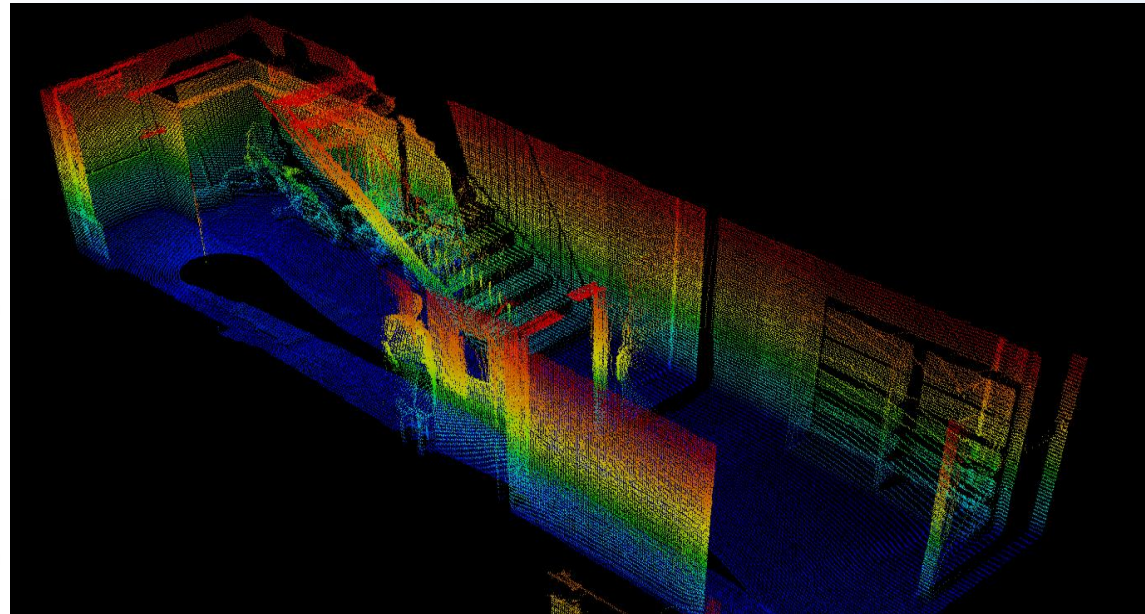
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And... Rapid data collection is not just outside anymore



The technology now exists to map our world in 3D to cm level accuracy, from space, air, land and inside buildings.



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from disaster

We can now generate accurate deliverables from pictures

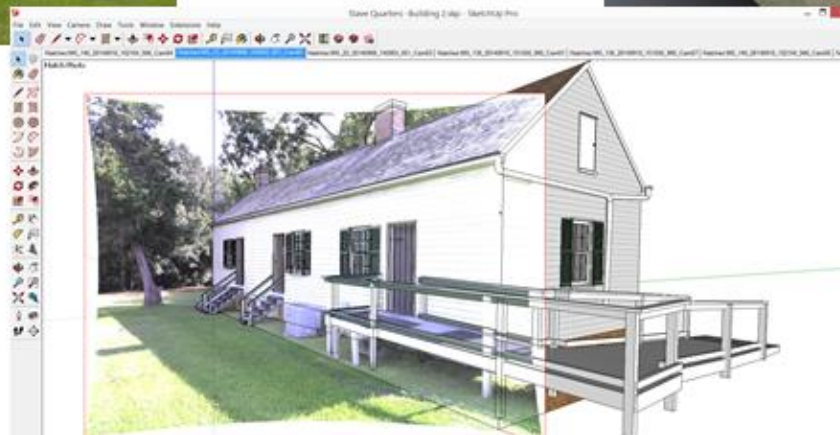




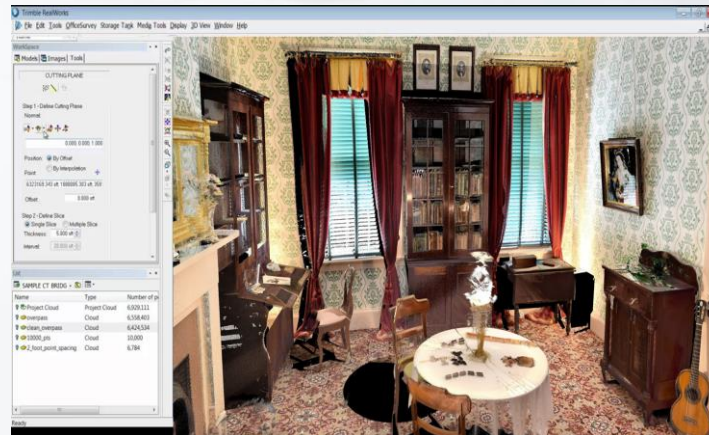
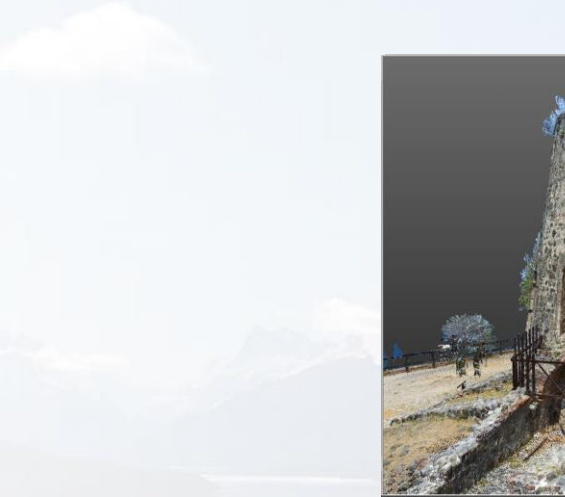
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Merging airborne and ground data capture, both inside and out into a single rich model



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Demand for rich data is on the increase

Technology today = spatial information everywhere for everyone

Using mobile devices or rugged professional tools



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Recovery

from disaster

Enabled by cloud solutions for rapid definition and deployment

The screenshot displays the Trimble software interface. On the left is a navigation sidebar with a yellow header containing the Trimble logo and a list of menu items: DATA, FORMS, TASKS, LOCATIONS, and PEOPLE. The main area shows a 'Templates' section titled 'in Post quake building survey' with a list of four templates: Bridge status, Building status, Restricted area, and Road status. Two configuration windows are overlaid on the interface:

- Building status (Published):** This window shows 'Geometry Settings' with 'Type' set to 'Point'. The 'Preview' section lists fields: 'Street address', 'Building owner', 'Building occupier', and 'Number of occupants'. Below this, there is a 'Building status' dropdown menu with three options: 'Red - Unsafe to enter or occupy' (checked as Default), 'Yellow - Limited access until rep...', and 'Green - OK to occupy'. There are also options for 'Show Other option' and 'Multiple choice question'.
- Restricted area (Published):** This window shows 'Geometry Settings' with 'Type' set to 'Line'. The 'Preview' section lists fields: 'Restricted area', 'Reason for restriction', and 'Hazards in restricted areas'. Below this, there is a 'Show Other option' checked and 'Multiple choice question' checked. A 'Maximum length' field is set to 30. A list of hazard options is shown: 'Potential rockfalls', 'Loose building parapets', 'Sink holes', 'Deep liquifaction (>20cm)', 'Building likely to collapse', and 'Other', each with a 'Default' checkbox and up/down arrows.



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Recovery

from disaster

For rapid damage assessment of any type of event





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Feeding a structured, authoritative data set Crowd sourced or professionally sourced

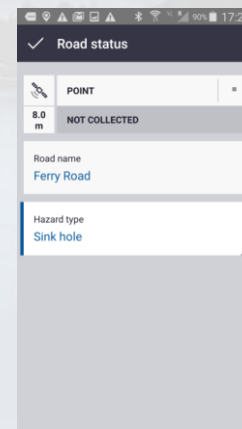
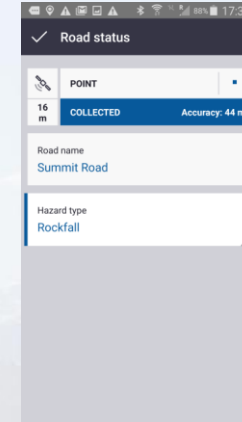
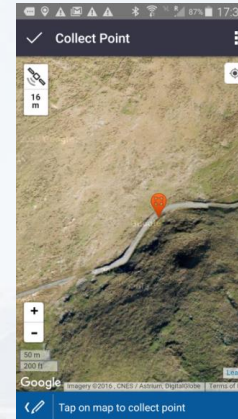




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from disaster

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

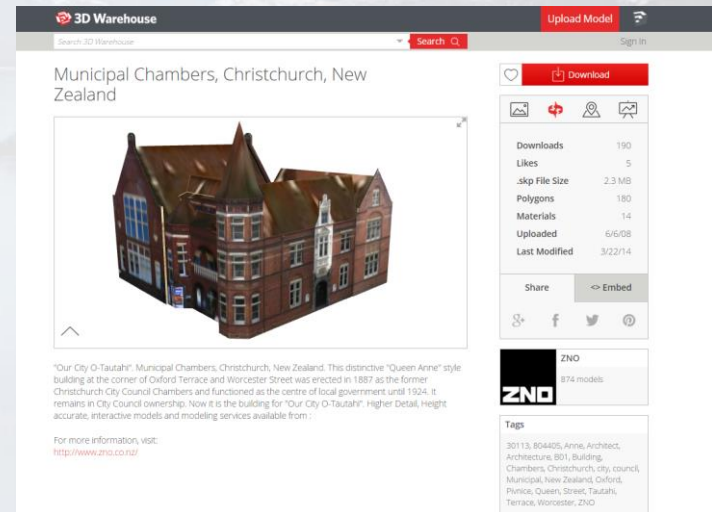




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Recovery

from disaster

And new virtual capabilities where spatial information is applied are being adopted by industries



Microsoft HoloLens



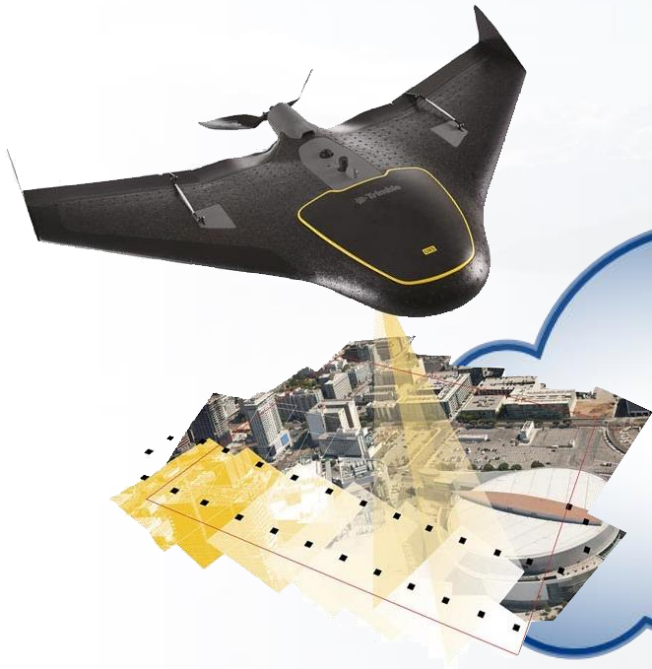
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Recovery

from disaster

The data services are being automated



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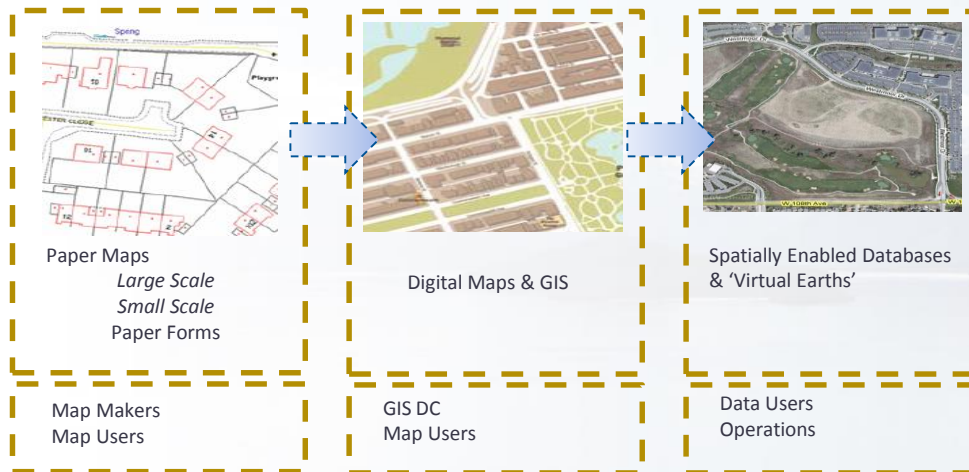
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Recovery

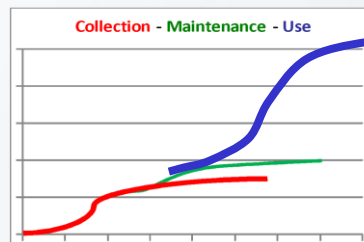
from disaster

\$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
- 2113 • Trimble TerraFlex released



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Recovery

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\$50 Billion spent annually but...



in many parts of the World it is still paper based



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Recovery

from disaster

\$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.

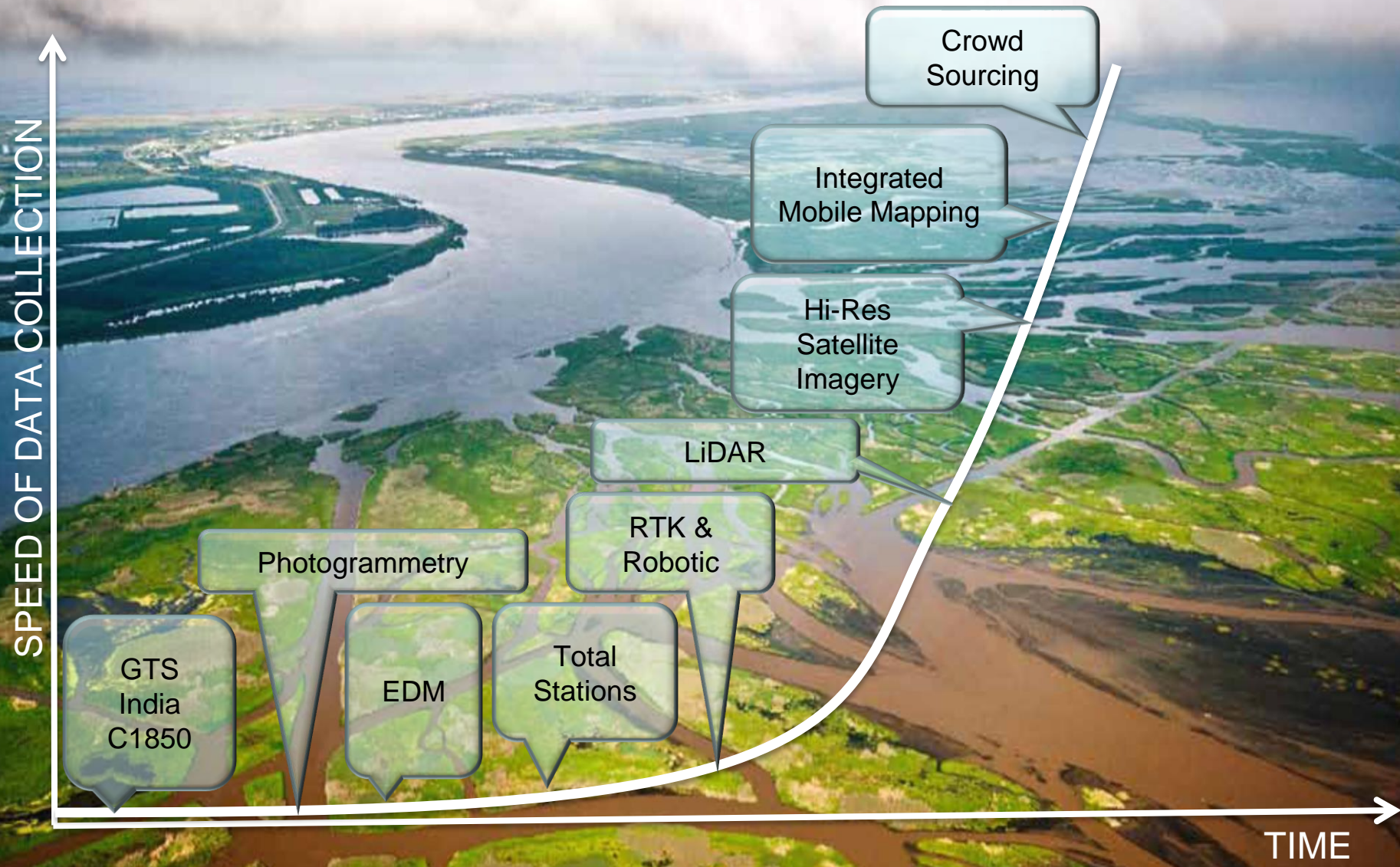




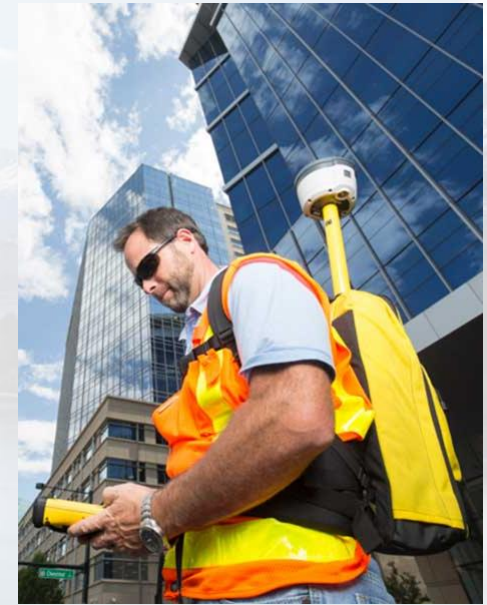
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Recovery

from disaster

Connectivity in the field to the office is becoming commonplace...



enabling more people of all skill sets to be able to collect data



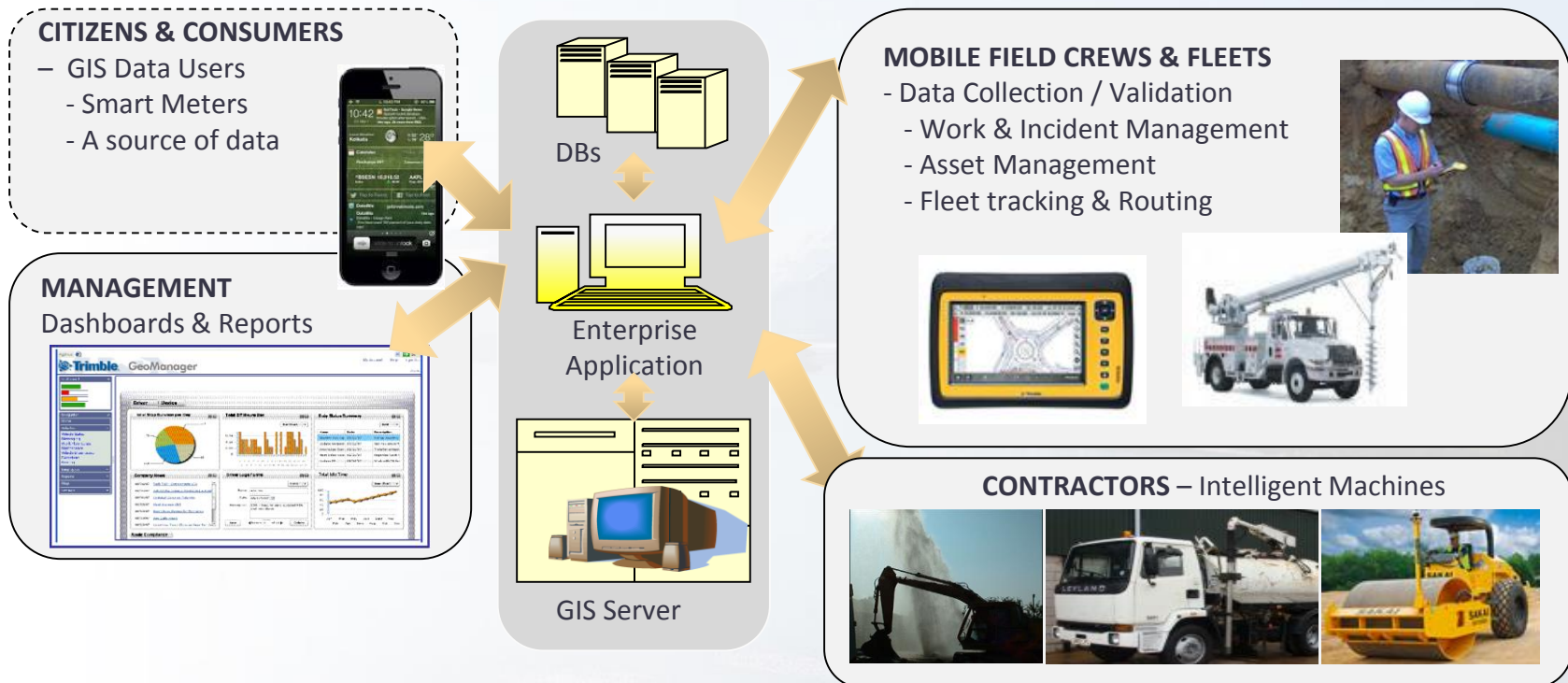
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Recovery

from disaster

Connecting spatial data to stakeholders improves productivity



The right information delivered to the right people at the right time



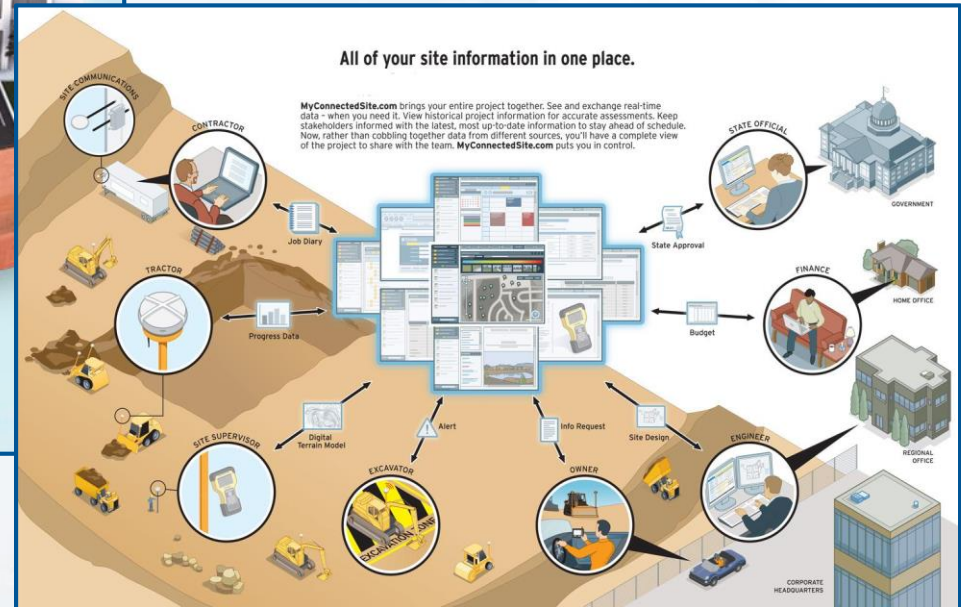
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Recovery

from disaster

Connectivity enables the intersection of professional, government, and consumer



Extracting the value across the stakeholders – enabled by being Connected



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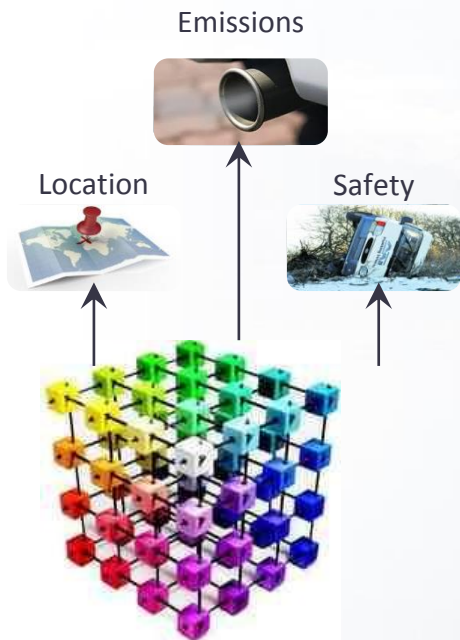
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We need to move from being data and measurement centric to process and industry centric as industries vertically integrate, built on a solid spatial framework



A disruptive process that offers the customer's compelling value AND cannot be operated without technology and connectivity





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from disaster

We have the opportunity to be the geospatial manager across industries

Managing the data across the project lifecycle

		5%		10%		65%			20%	
		Feasibility	Planning	Survey	Design	Estimate	Earthworks	Build	Maintain & Operate	
Govt/Regulatory	2016	[Grey bar spanning Feasibility to Maintain & Operate]								
AEC	2016	[Orange bar spanning Planning to Design]								
Survey	2016	[Yellow bar spanning Survey to Design]								
Contractor	2016	[Blue bar spanning Planning to Build]								
General Contractor	2016	[Cyan bar spanning Estimate to Build]								
Owner	2016	[Light green bar spanning Feasibility to Maintain & Operate]								
Required Life Cycle Data		objectives budget timeline visualization GIS data aerial satellite	topographic data boundaries "no-go" areas GIS data aerial satellite	planning data legal description boundaries VRS network location GPRS availability	survey data planning data legal description boundaries GPRS availability	design data survey data soil data geological data weather data	design data control points machine control machine health productivity reports survey data boundaries existing structure alignments VRS network location GPRS availability	design data productivity reports control points interior fixed assets interior asset loc utilities setbacks structure boundaries	as built asset data maintenance schedule condition reports	
Trimble Apps Today		high accuracy digital camera	Quantm	Survey Controller GPS Receivers Total Stations 3-D Scanning VRS Infrastructure	Trimble Link Terramodel	Pavdrit	GCS 3-D MC SPS Product Family VRS Infrastructure Construction Mngr	Lasers Pointers 3-D Scanning Construction Supply Total Stations LM80	Terrasync Pathfinder Office GeoExplorer	



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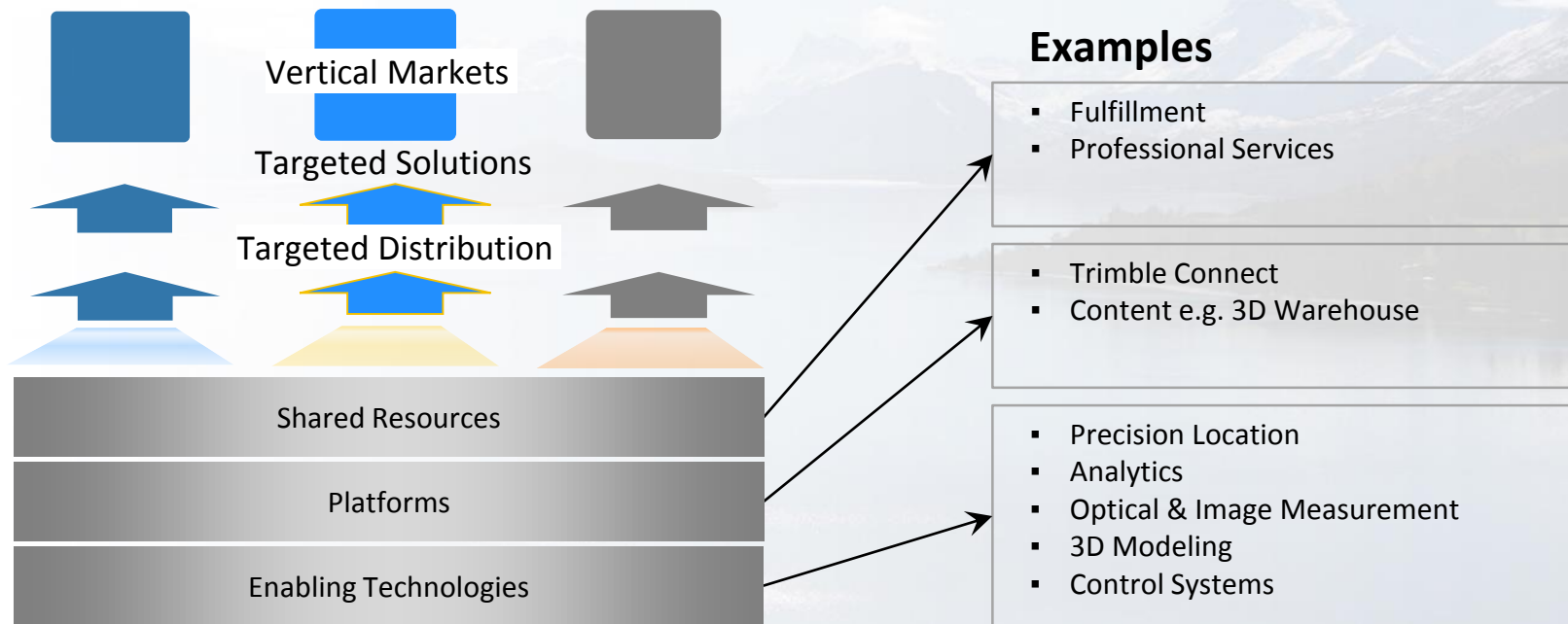
Recovery

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



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Recovery

from disaster

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





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Recovery

from disaster

Embrace the vertical construction/building industry which provides us as surveyors additional opportunities and huge potential.

“The world has nowhere to go but up”.



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Recovery

from disaster

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



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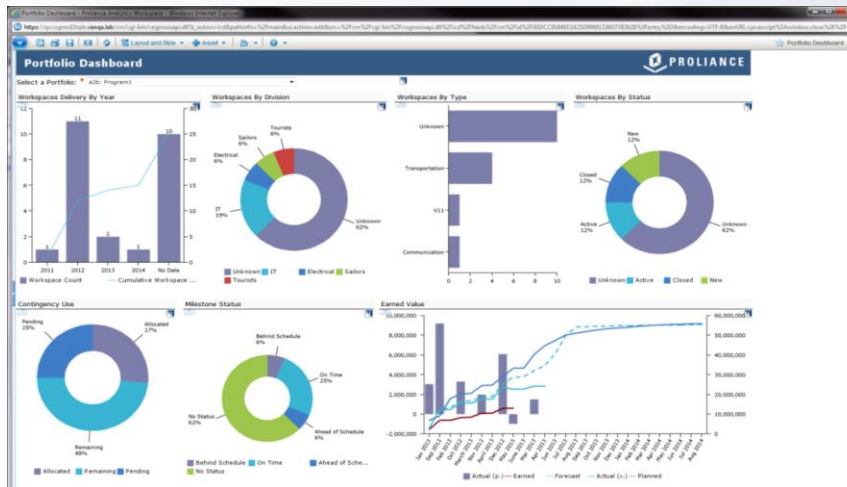
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Recovery

from disaster

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



Supporting open industry standards



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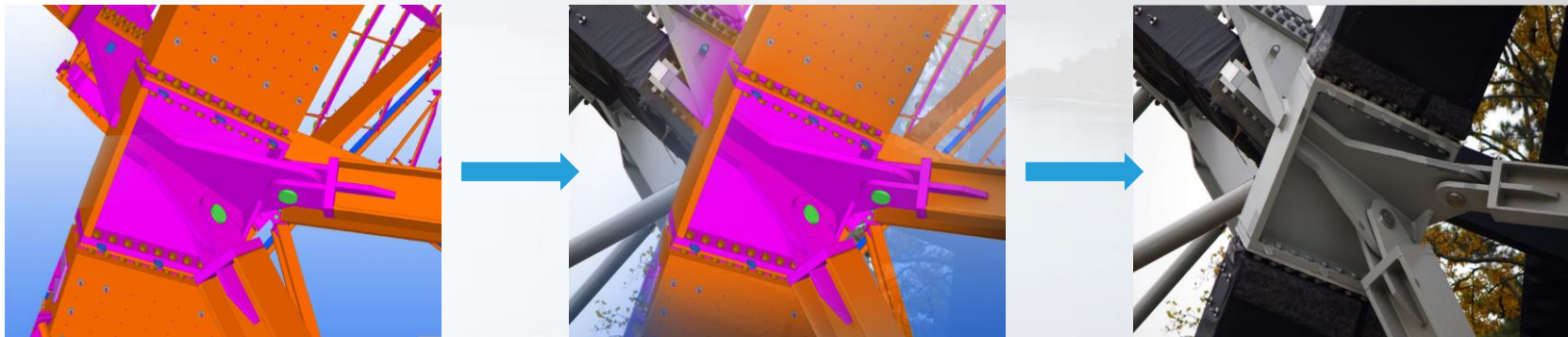




What we can enable

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



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Recovery

from disaster

Construction Productivity Example

Leveraging the constructible model, created through collaboration in the field

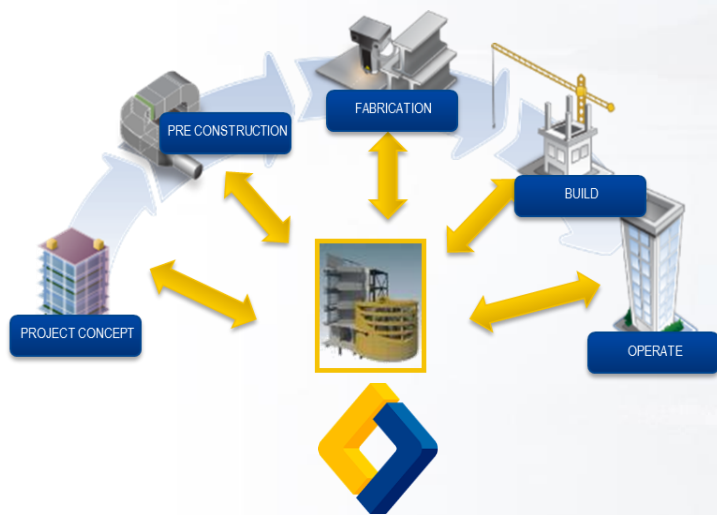




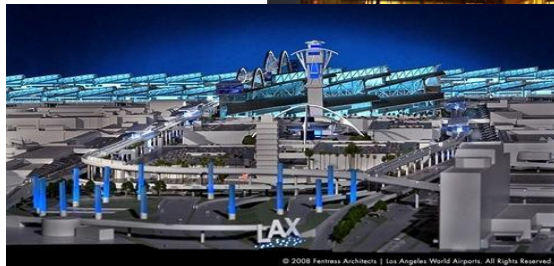
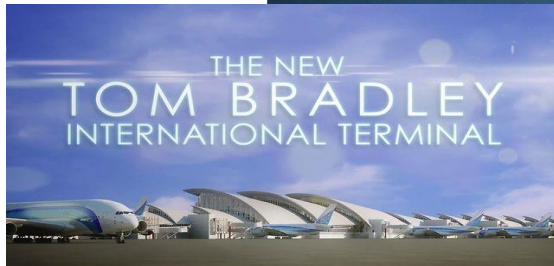
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Recovery

from disaster

\$2B LAX Tom Bradley International Terminal



Technology delivered: 10% Faster, 50% lower cost of layout, 80% increase in accuracy,
Result: Less rework and wastage



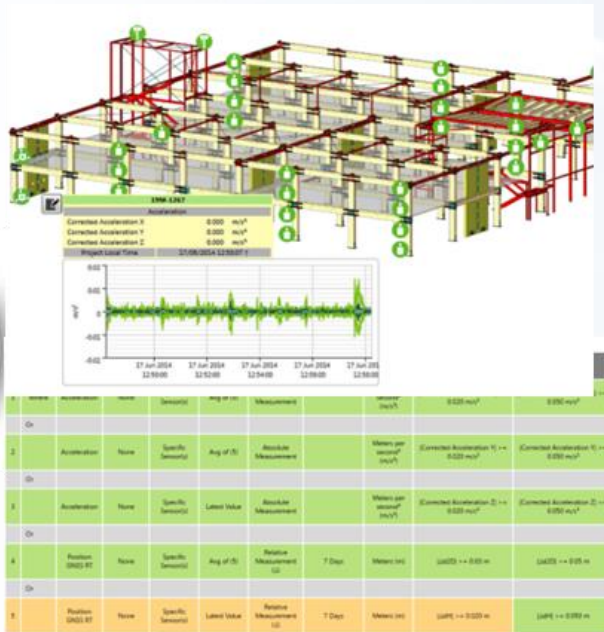
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Recovery

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Enabling resilience - Monitoring for the future



Trimble New Zealand office

Continuously monitored buildings

Enables data driven decisions on re-occupation post event

“Big data” can potentially aid emergency response



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Recovery

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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

Industry focused services



Platform - The Cadastre

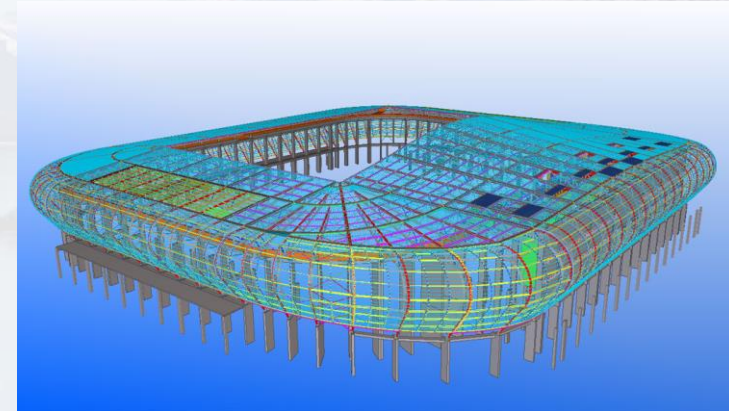
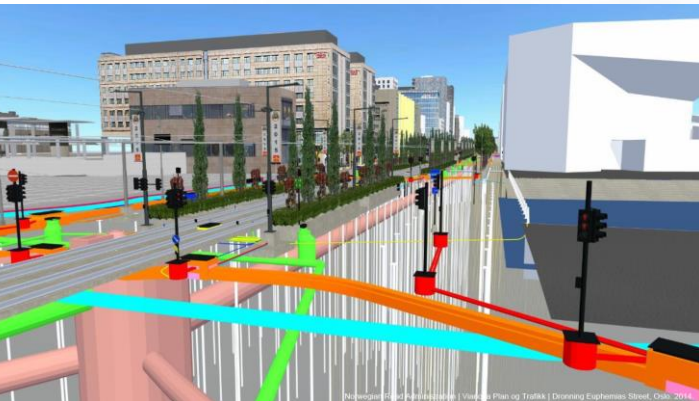




The Surveyor of the future will be

The expert in

the art of managing and delivering value from Geospatial Information



Connected and collaborating using models, not maps



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Thank You

Mark Nichols
Trimble Vice President



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