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An Innovative 3D Interactive Platform Sourcing Geographic Information Combining Operating Photogrammetry Airborne LiDAR and Mobile Measurement System



June, 2014, FIG

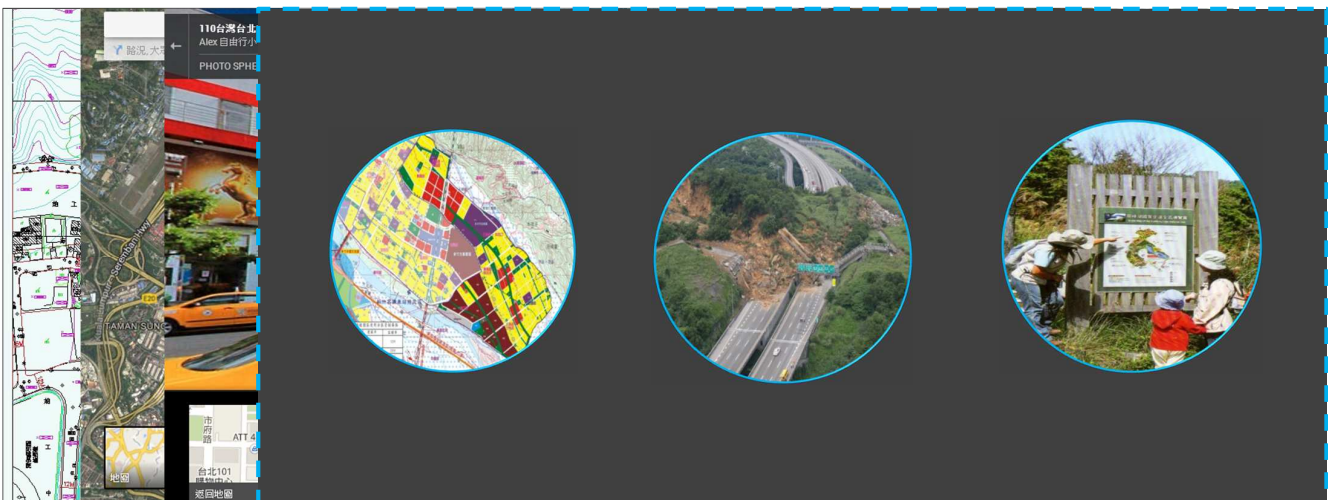
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The Future Trend



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- Present GIS displays spatial information by digitizing point, line and polygon. Recent time, However, the 2D plane result can no longer meet the demand advance with the 3D development.
- The 3D GIS has become the future trend to faithfully acquire, preserve, conduct, analysis macroscopic spatial information.

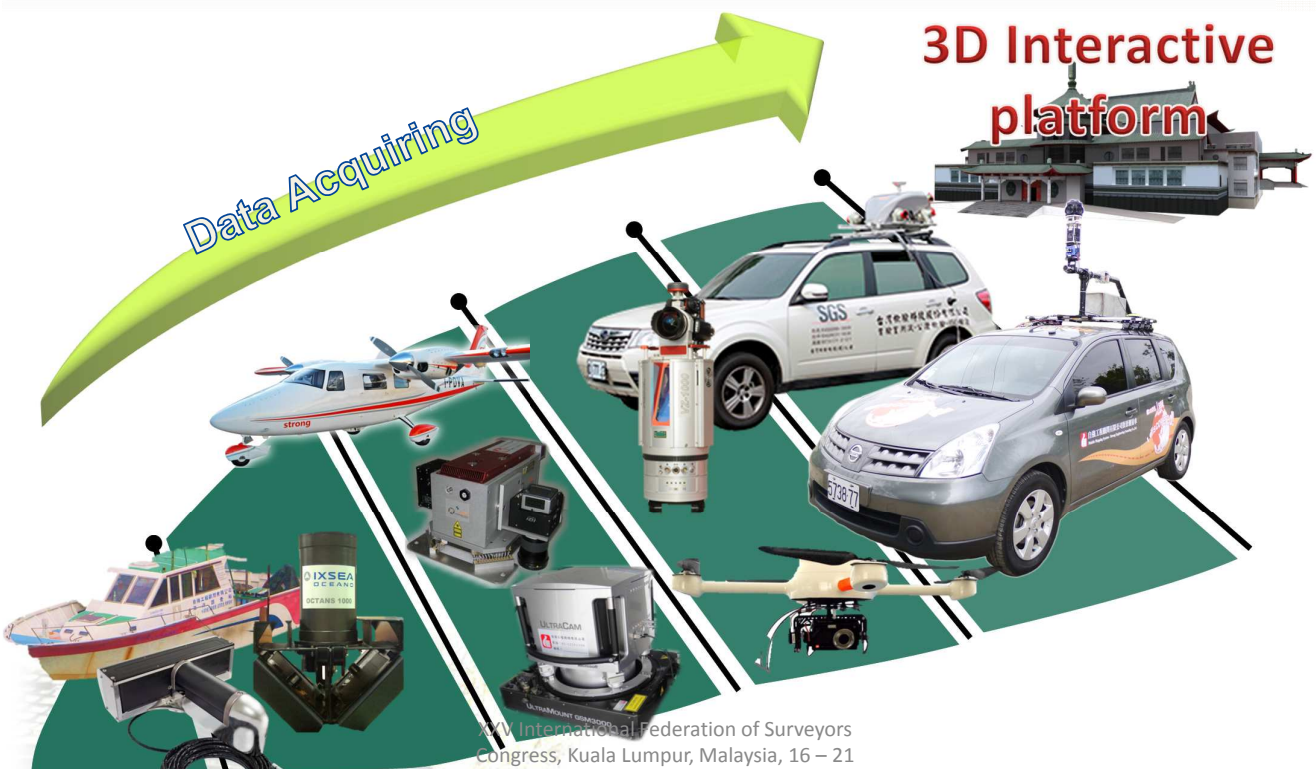


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Data Acquiring

3D Interactive
platform



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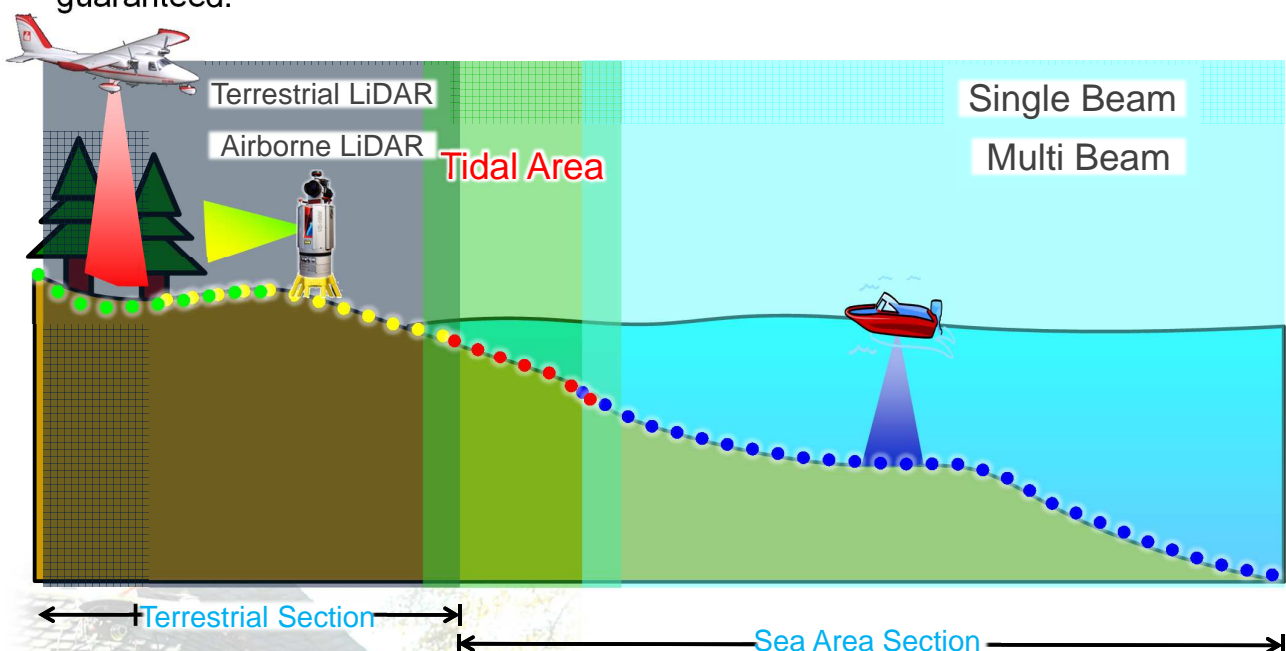


Real-world Example 1- Hualien Coastline Topographical Observation Project

- Long-term monitoring of the coastline erosion
- In this project, multi-beam echo sounder, airborne LiDAR and terrestrial LiDAR were used for acquiring spatial data.
- Aim to analyzed the information in 3D working environment and demonstrated the outcome.

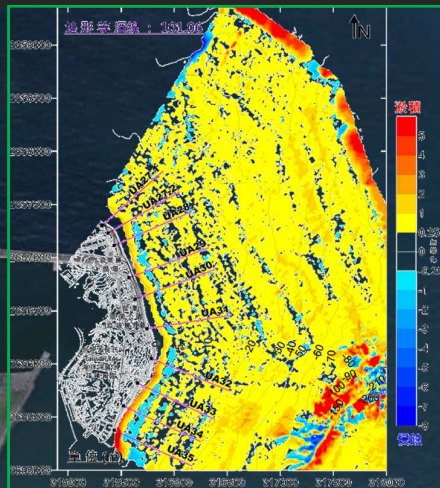


Consisting 2 different survey solutions in tidal Area, so the data quality can be guaranteed.

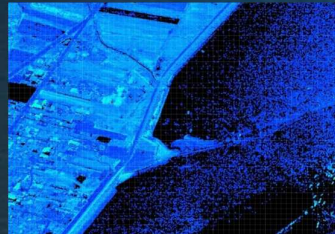
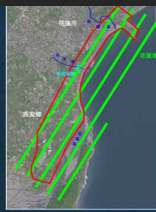




Different Kinds of Data Can be Integrated



Depth Contour



Airborne Point Cloud



Terrestrial Point Cloud

Coastline Cross Section 3D Management System

skyline 專業版

專案管理 觀看模式 量測工具 分析工具 加入物件 簡報工具

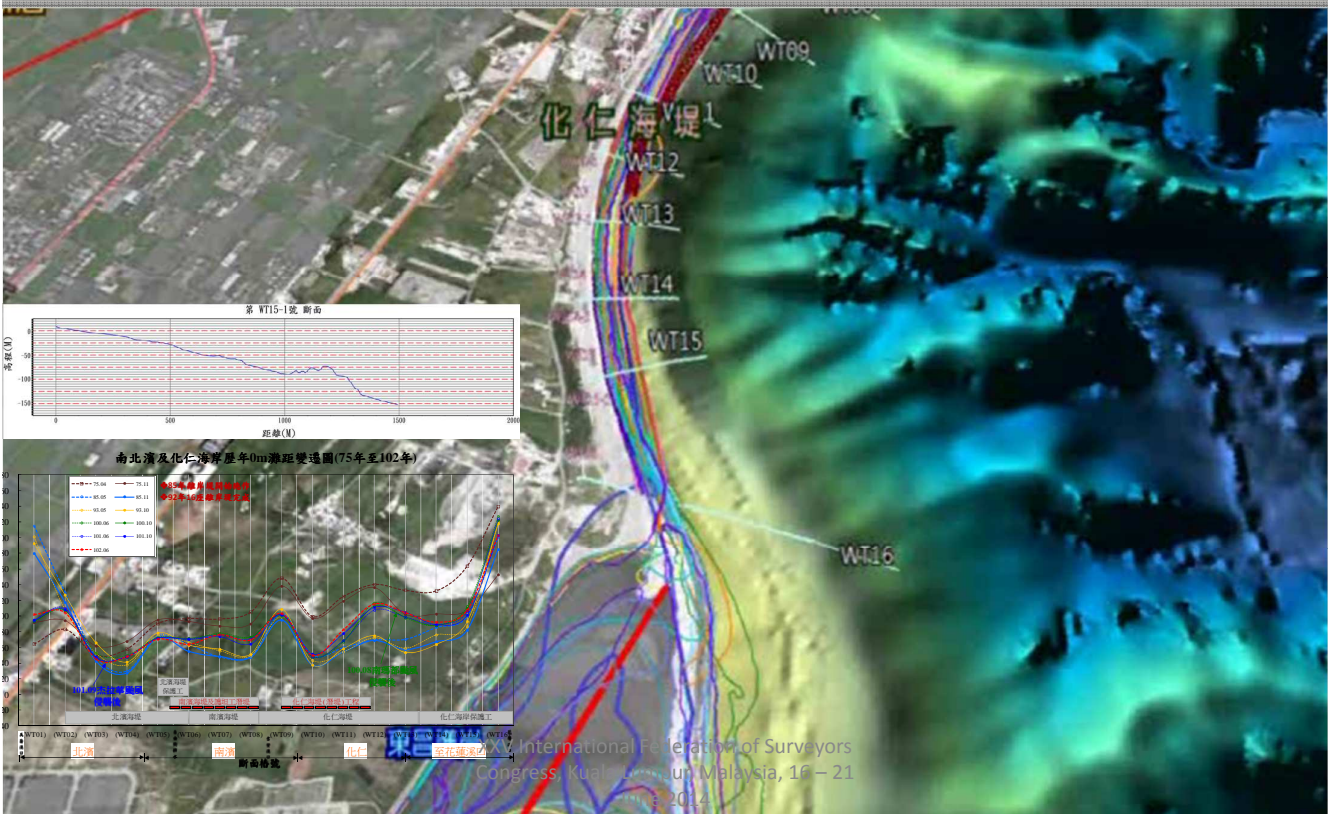
基礎圖資
 行政界
 道路
 水系
 海岸區域範圍
 河川水位測站
 堤防式護岸
 集水區
 洪氾斷層
 非都市使用分區
 地形圖成果
 路名
 建物
 地標
 橋樑
 海堤
 其他註記
 水系名稱
 等高線
 斷面效果
 七星洲
 環保公園
 花礁
 水碓牛山
 東興雙溪
 灘線
 七星洲
 環保公園
 花礁
 水碓牛山
 東興雙溪
 灘岸堤
 整登資料
 美崙溪口與花礁溪口
 等寬

➤ Enables End Users to Explore and to Retrieve Data at Various Layers

Slope Analysis Contours Cross Section Viewer
 Floating Window Cross-Section Output Elevation Output

吉安鄉

© Skyline



Real-world Example 2- Tourism Information Platform for YangMingShan National Park, Taiwan

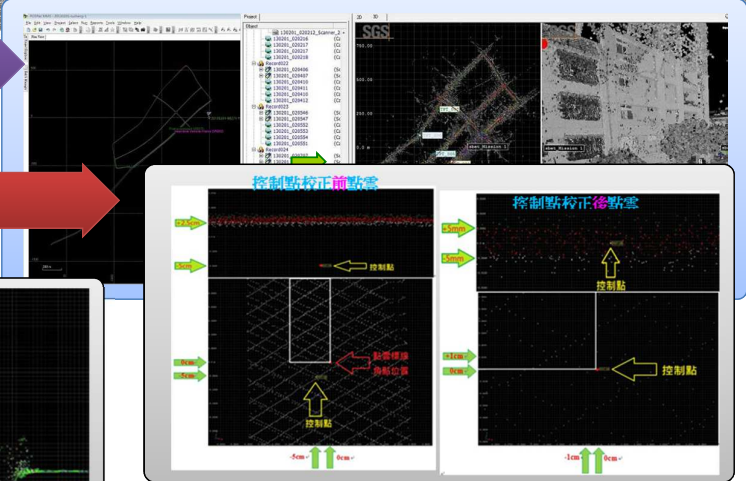
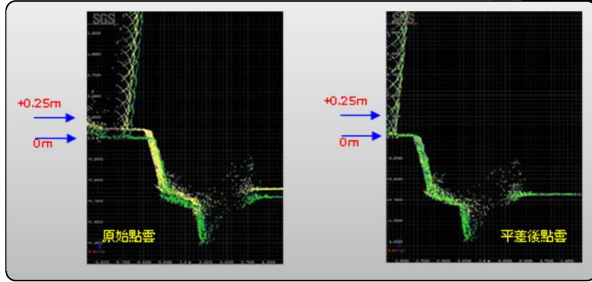
- Due To Increasingly Importance of Environmental Resource Management, It Has Become the Major Priority for Administrations to Establish These Fundamental Data Base.
- In this Renewal project, Mobile Scanner, Mobile Measurement System(Street View) Were Used for Acquiring Spatial Data.
- Aim to Establish a Interactive Information Platform in 3D Environment and Demonstrated the Outcome.





Computing of Trajectory and Point Clouds Coordinate

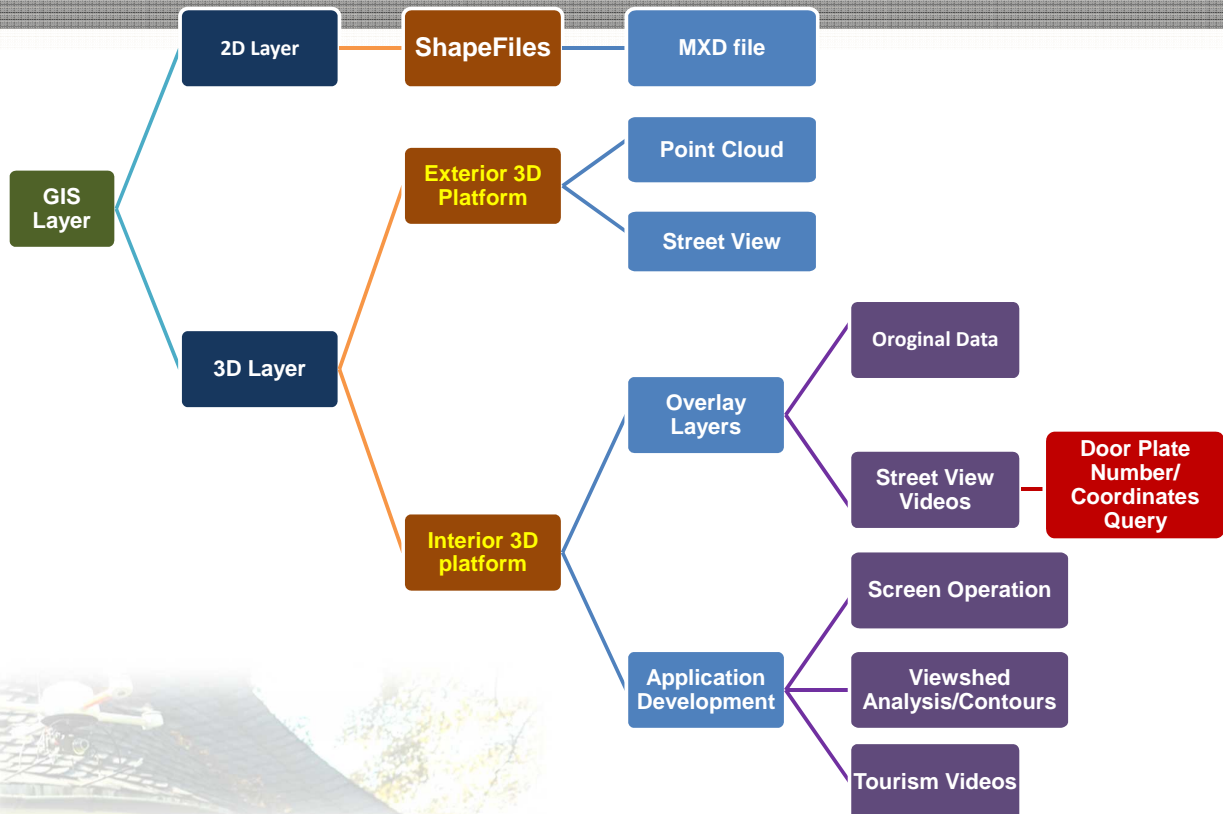
Adjustment



Color Point Cloud Animation Visualize Reality

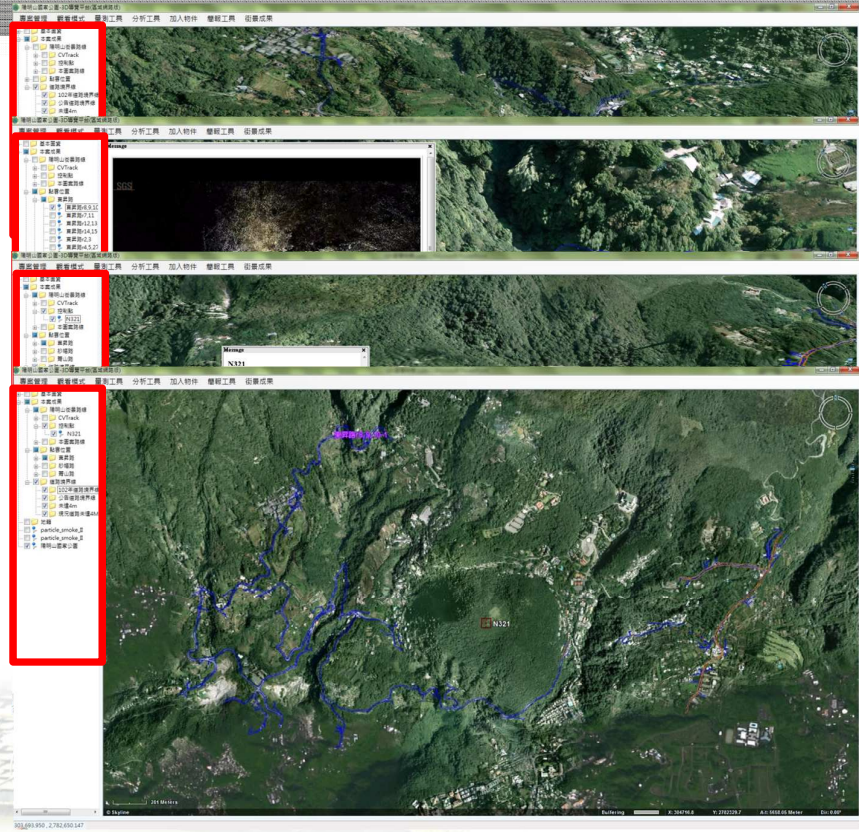
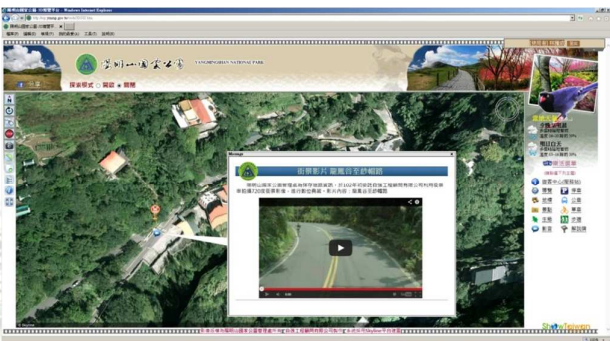
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GIS圖層架構





Import the point cloud and street view video to the 3D platform data base, and offering more comprehensive spatial information for end users.



- 基本圖資
- 本案成果
 - 陽明山街景路線
 - CVTrack
 - 控制點
 - N321
 - 本國案路線
 - 點雲位置
 - 東昇路
 - 紗帽路
 - 菁山路
 - 道路境界線
 - 102年道路境界線
 - 公告道路境界線
 - 未達4m
 - 現況道路未達4M
 - 地籍
 - particle_smoke_II
 - particle_smoke_II
 - 陽明山國家公園



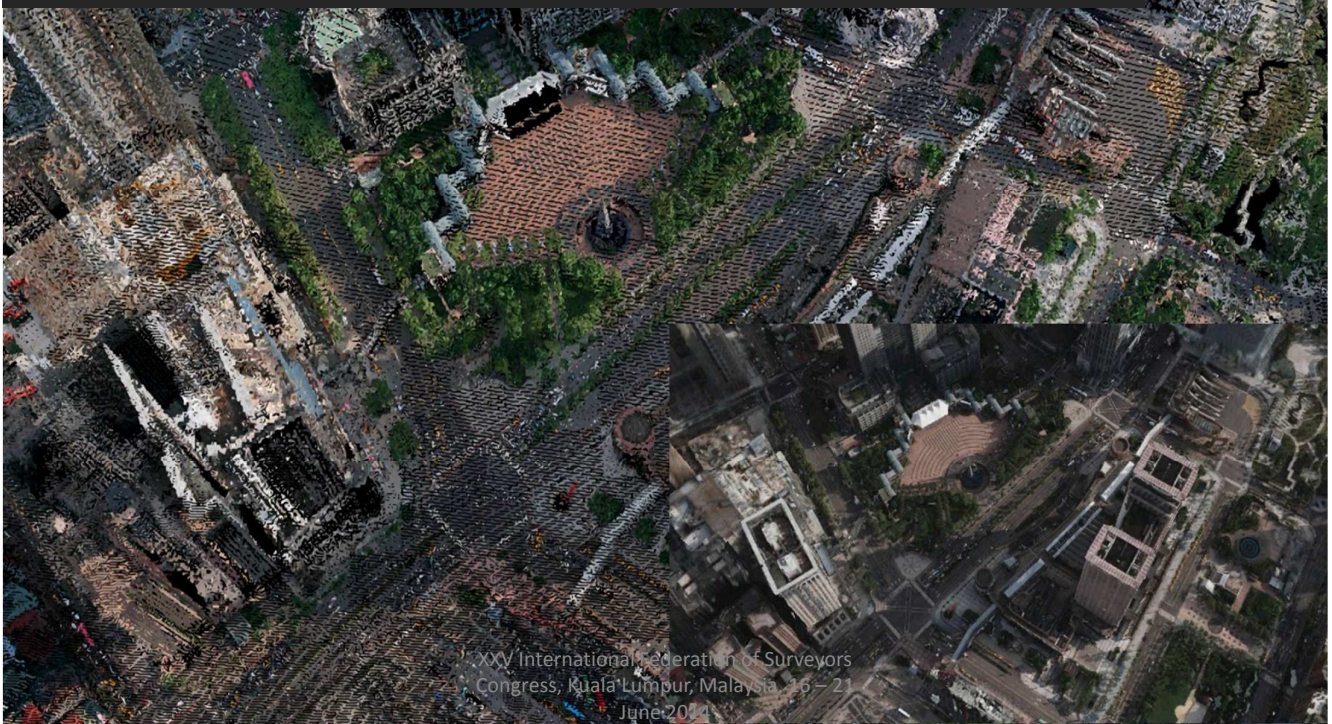
Other Customized Real-world Example- Attribute Data Overlap Analysis



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Other Customized Real-world Example- High Density Point Cloud and 3D City Modeling



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Other Customized Real-world Example- Kinmen Island 3D Photomesh Modeling



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LESSONS LEARNED

- 4 dominant aspects
 - planning
 - operation schedule,
 - cost
 - quality requirements

- This work flow is applicable to a wide array of applications



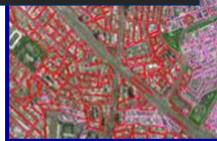
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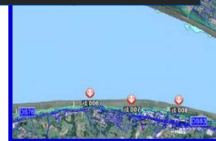
**3D urban
planning**



**Cadastre
management**



**River
Management**



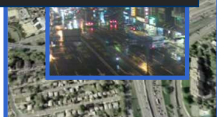
guided tours



**The digital
collectible**



**Instantaneous
Image link**



**safety monitoring
system**



Relief model



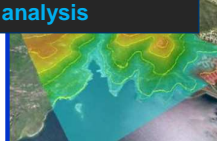
**Immediate
Command**



spatial statistics



**Topography
analysis**



**Communication
Systems analysis**



**Flood estimation
system**



**meteorological
information**



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THANK YOU



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Photomesh精度驗證：彰化和美都市計畫區為例

UCXP 左右重疊35% 前後重疊85%

檢核方式:3D模型顯示坐標與立體像對模型檢核共9點





航測對空標誌
平面坐標差異: **0.11m**
高程差異: **0.13m**

Photomesh實測模型成果

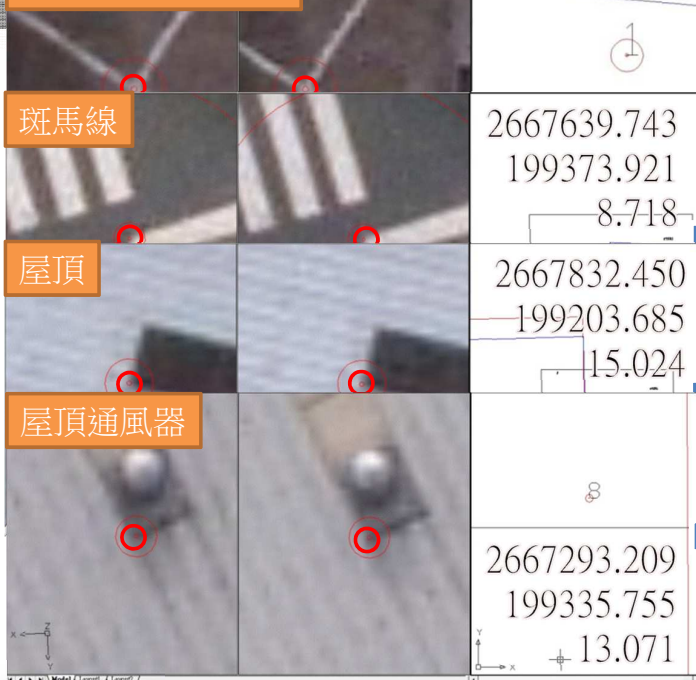


2667728.548
199793.417
8.821

控制測量坐標成果

一千分之二數值航測地形圖空標紀錄表			
點 號	ST1311	五十分之一圖幅號	94212060
點 名	ST1311	等級(已知點)	
點位控制	<input checked="" type="checkbox"/> 全控點 <input type="checkbox"/> 平控點 <input type="checkbox"/> 高控點		
空標形狀	<input type="checkbox"/> 十字標 <input type="checkbox"/> 平字標 <input checked="" type="checkbox"/> T字標 <input type="checkbox"/> 其他		
空標材料	路線漆	N坐標(TWD97)	2667728.628m
空標顏色	白	E坐標(TWD97)	199793.475m
建置單位	自強工程顧問有限公司	高程(正高)	8.689m
布標人員	黃揚俊	布標日期(年/月/日)	102/05/07
點位地點說明(含交通路線): 和美精美客路二段390號前PC暗溝上 位置圖:			
位置圖		<p>2667728.628 199793.475 8.685</p>	
遠景照片 拍攝點位附近顯著地物		近景照片 拍攝點位本身	
備註: 航測日期及人員請填寫外業實際作業時間及人員, 已知控制點檢測亦同。			

立體像對量測坐標



Skyline量測坐標



平均平面差量: **0.10m**
平均高程差量: **0.14m**

標準差: **0.12m**
標準差: **0.15m**

