

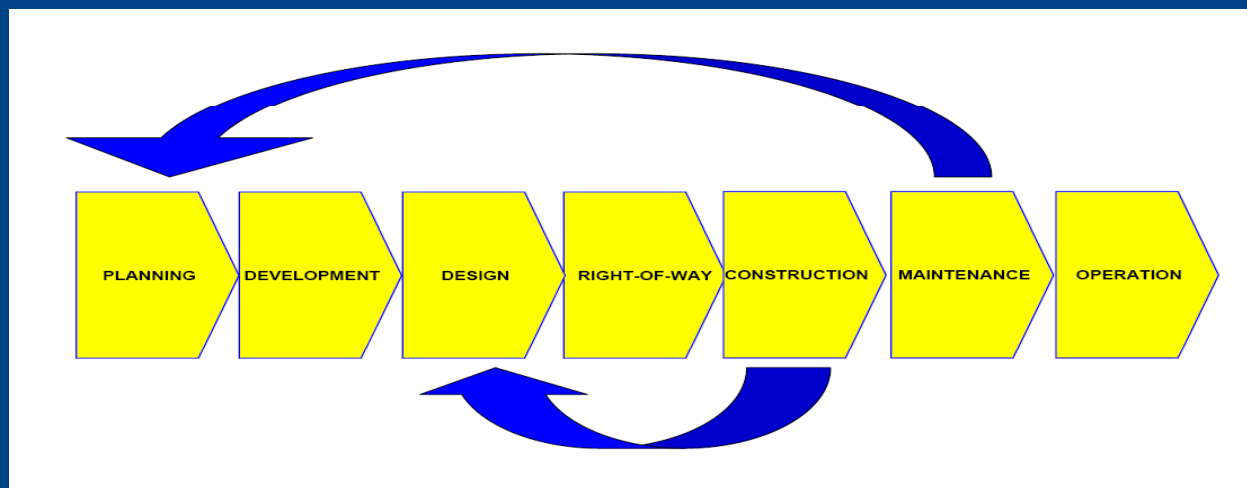
Integrating Various Terrestrial & Aerial Sensor Data for Transportation Projects

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Roadway life cycle



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Problem statement

- Long life of Infrastructure creates complexity in its own right for stakeholders
- Many stakeholders in many domains (Planning, Survey, Engineering, Maintenance, etc)
- Domains often isolated in function and life cycle phase
- Each domain has its own toolset
- Not all stakeholders use georeferenced data

→ Creating barriers to data collection, maintenance, and sharing

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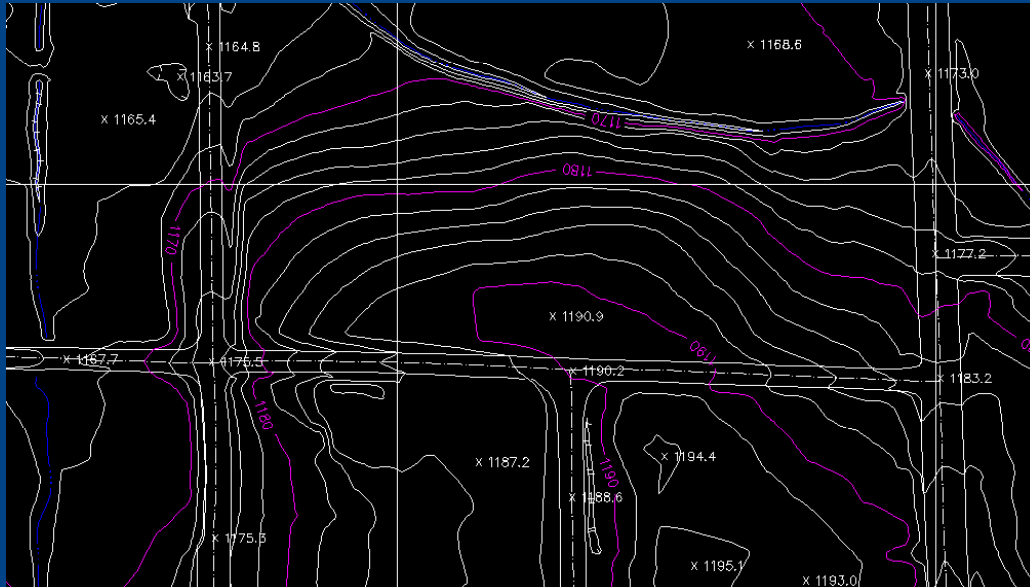
Terrestrial & aerial sensors



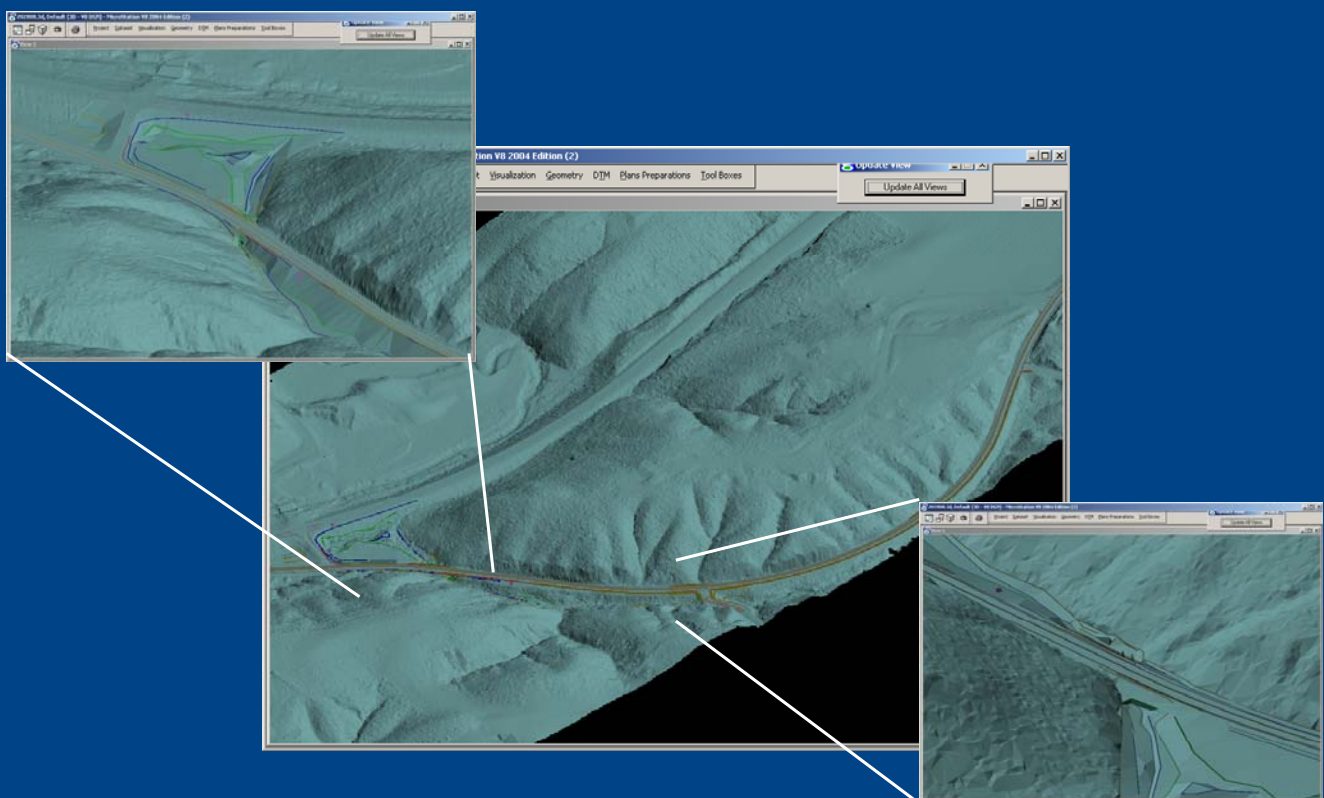
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Common mapping deliverable

- Contour map & Digital Terrain Model (DTM)



Combined aerial and terrestrial LIDAR



The future of integration – 3D models

- Most design is 2D or pseudo 3D (2.5D)
- No single sensor can generate 3D model alone due to limitations in ...
 - Range
 - Accuracy
 - Operation cost versus revisit rate
 - Etc.
- The 3D model can be the foundation
 - Multiple terrestrial and aerial sensors contribute
 - Open standards needed due to multiple stakeholders

Integration needs & barriers

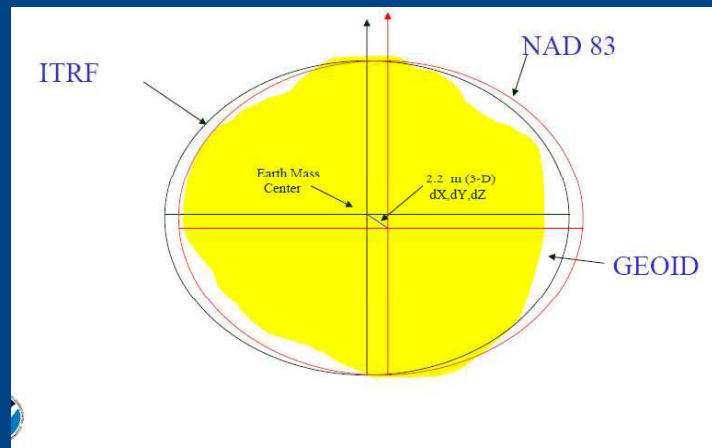
- Common Control needed, but practical
- Optimum data fusion is a major challenge
- Software applications failing to keep up

Common Control

- Permanent & semi-permanent control
 - Established control throughout lifecycle



- Common datum
 - Earth centered
 - ITRF



Optimum data fusion

- Strengths & weaknesses
 - Exploit strengths of each sensor
 - Compensate for weaknesses
- Terrestrial
 - GIS asset mapping
 - Traditional survey
 - Tripod mounted laser scanning
 - Mobile GIS, mapping, scanning, survey
 - Mobile pavement inspection
- Aerial
 - Imagery
 - LIDAR
- Complimentary application

Software is the Achilles heel

- Hardware progressing faster than software
- Diverse software & workflows
- Need for a common data model throughout lifecycle based on open standards

Conclusion

- Intent
 - Generate thought about convergence
- Intelligent transportation
 - Needs 3D,4D,5D open source models
 - Needs data availability throughout the life cycle
- Significant barriers to generation and use of engineering quality, fully attributed models