# The Future of Photogrammetric Production

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*Solution Definition Manager – Earth Imaging Solution Center*

Security, Government & Infrastructure



INTERGRAPH

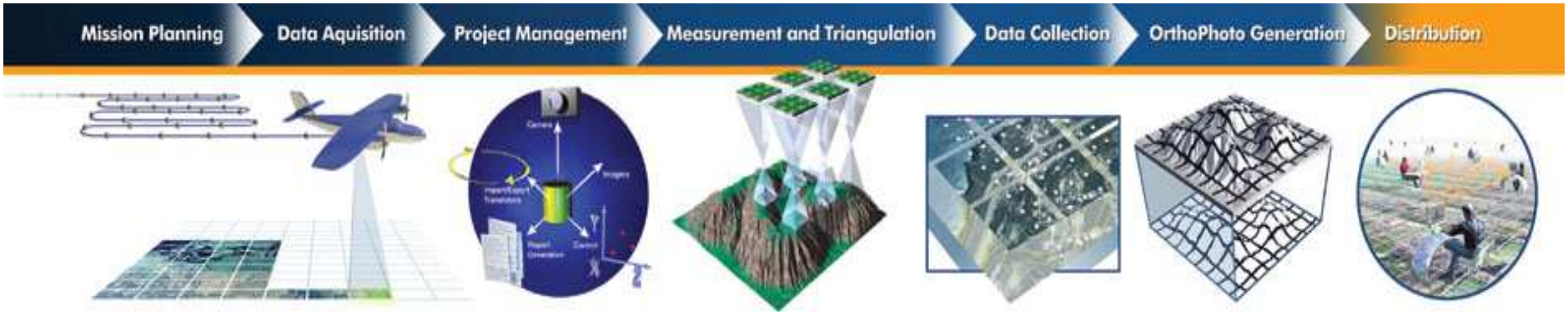
# The evolution of Photogrammetry

INTERGRAPH

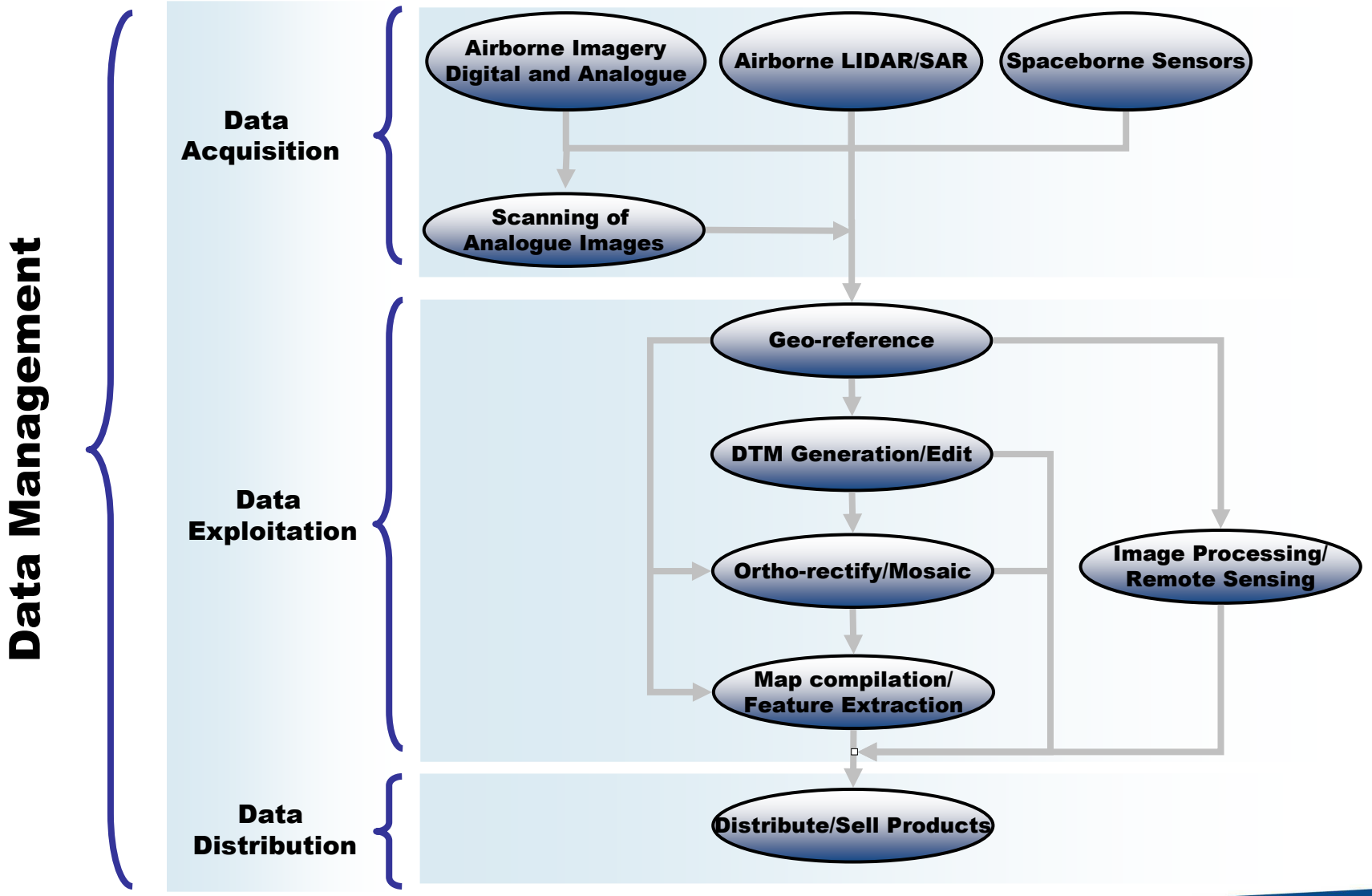
- **Analogue**
- **Analytical**
- **Digital**
  - **now**
  - **tomorrow**
  - **What´s coming next ?**

# Intergraph Visions and goals

Provide solutions across the whole range of Earth Imaging requirements, to help our customers see their world clearly



# Customer workflows



# Market forces

- The Earth Imaging market is currently in change
  - Transition to fully digital workflows
  - Use of aerial digital sensors is becoming commonplace
  - Increasing dependency on the Global GIS Market
  - Demand for open systems and data interoperability

- Being all-digital introduces new challenges
  - How to manage, store, view, archive and distribute the data?
  - Demand for instant access to enterprise data through intranet as well as internet
  - Automated tools and efficient production
  - Stereo-based GIS editing and updating

# Customer demands today

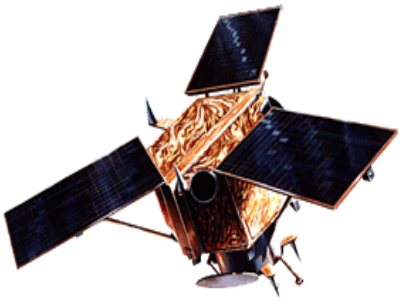
- Productivity
  - Automation of workflows
  - Efficiency, reduction in production cost

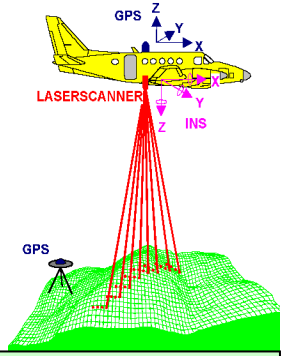
- Ease of use
  - Consistent interface
  - Easy to learn

# Digital Photogrammetry Today...

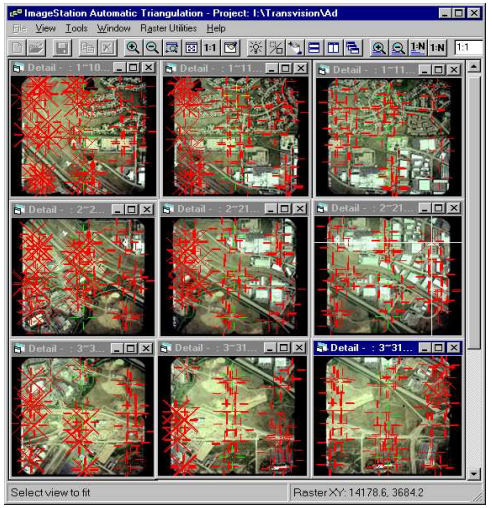
End-to-end Digital Workflow

Single Sensor

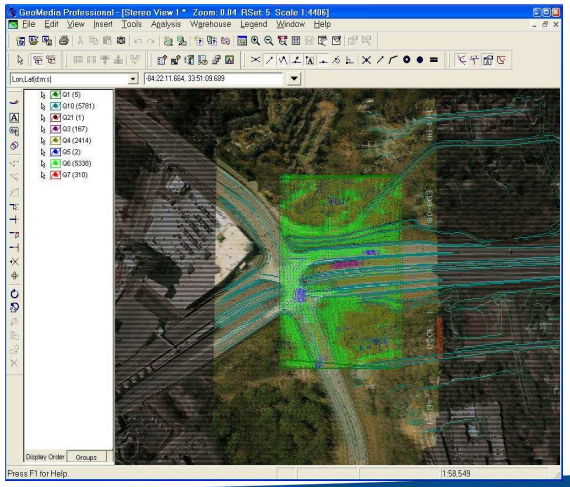




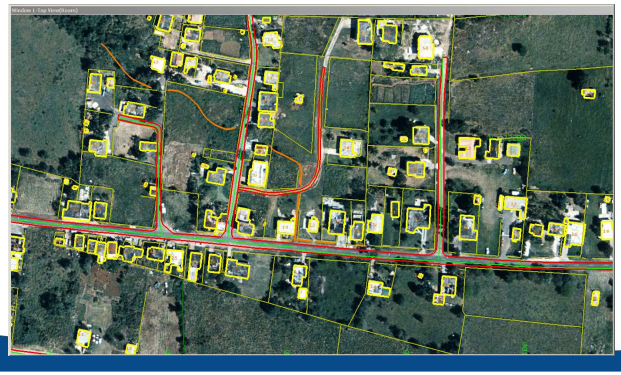

Automatic Operations

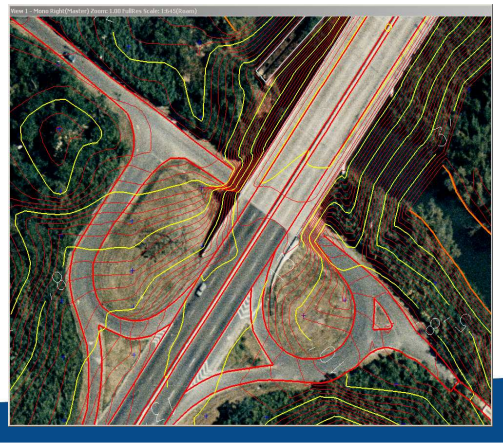



Photogrammetry & GIS are Merging



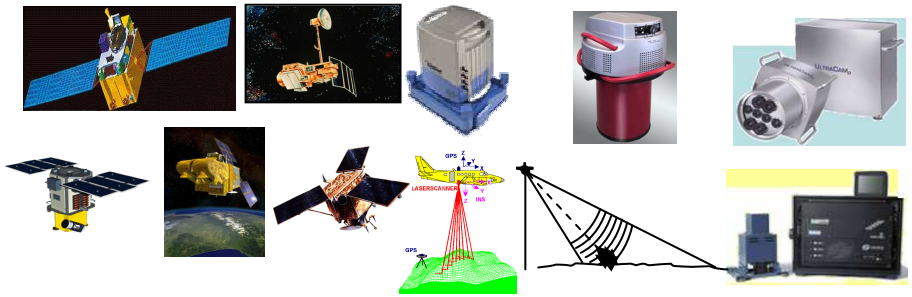

Manual 2D/3D Feature Collection





# Digital Photogrammetry Trend…

New Sensors



Integrated Real-time Sensors

Photogrammetry and Geospatial are Integrated

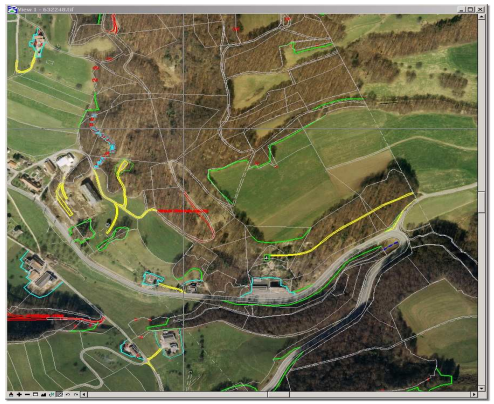
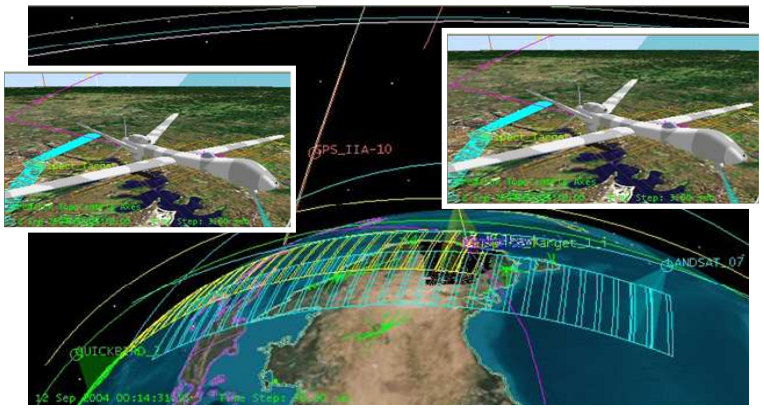


Image Analysis Change Detection

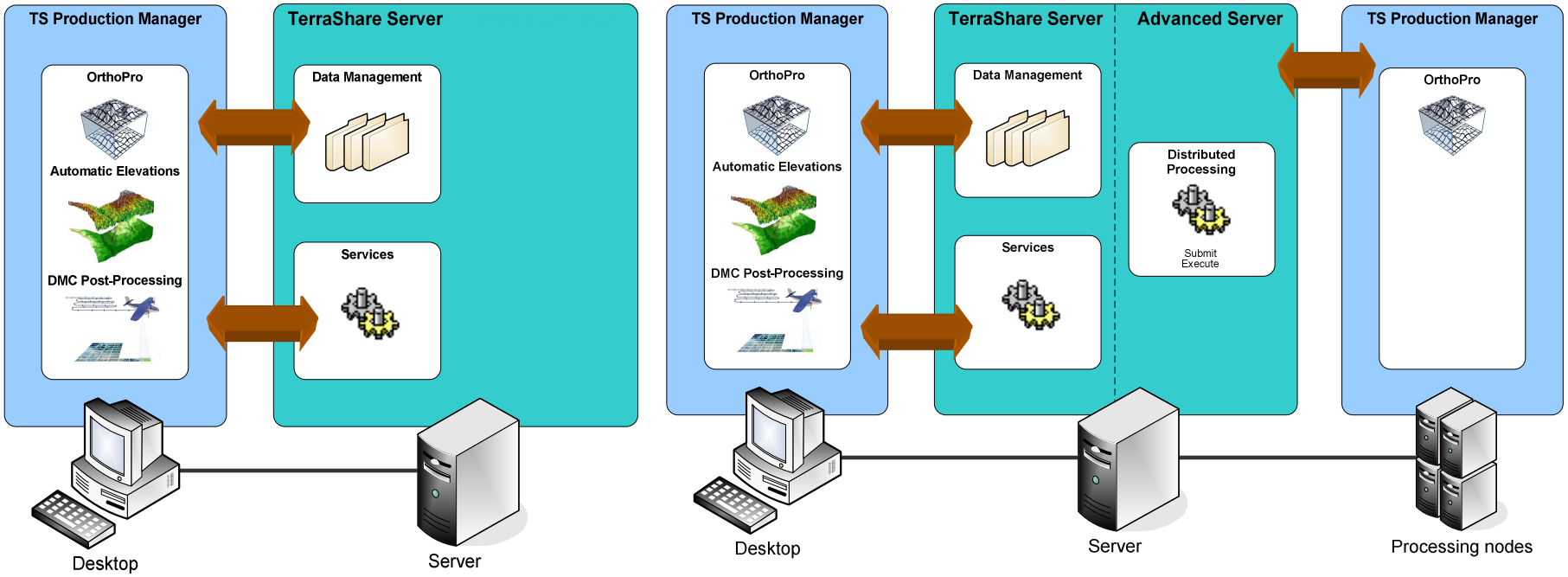


Speech recognition Voice Synchronisation

# Digital Photogrammetry Trend…

**From: Desktop Production**

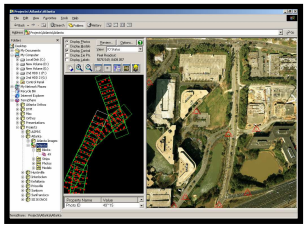
**To: Distributed Production**



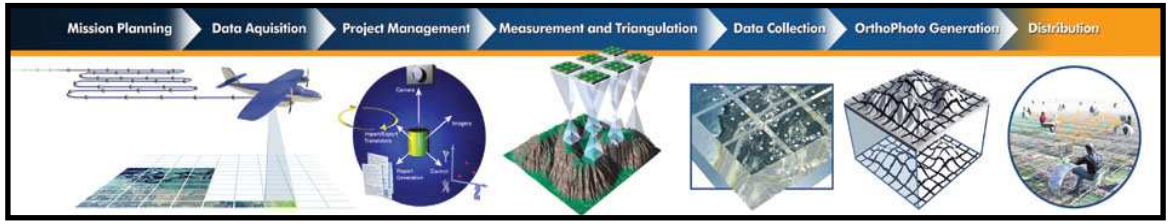
# Open Interoperability Trend…

- Any Sensor

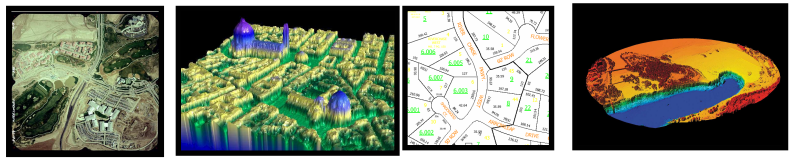
- Any Process



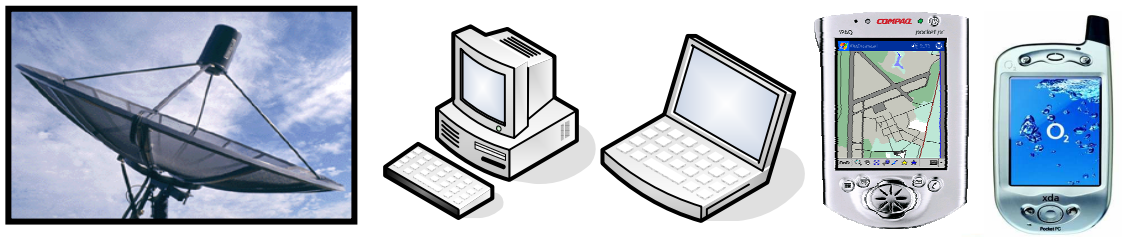
- Any Workflow




- Any Data



- Anywhere



# Trends Affecting Earth Imaging… (1/2)

INTERGRAPH

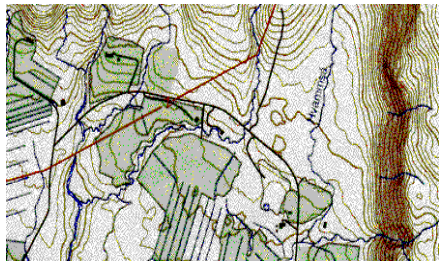
- Rapid production mandates …
- More earth imaging sensors…
- In-flight calibrations…
- Global geospatial data sets…
- Photogrammetry integrated within GIS…
- Image & elevation data repositories…
- 3D Visualization…

# Trends Affecting Earth Imaging… (2/2)

- Image analysis/change detection…
- Automated feature extraction (again)…
- Spatially enabled enterprises…
  - Distributed processing
  - Seamless spatial computing
- Standards and interoperability…
- Web services…

# Project Duration for Statewide Mapping

- **Ground surveys (and the first set of nationwide 1:50,000 USGS quadrangle maps**



**100 years**

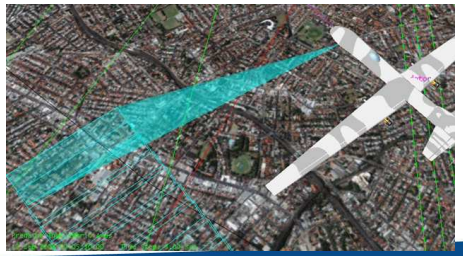
- **Aerial Surveys (and the completed set of USGS DOQQs)**

**10 years**

- **Satellite imagery**

**1 year**

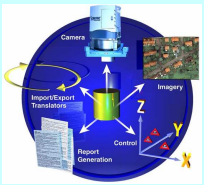
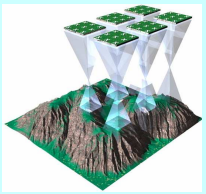
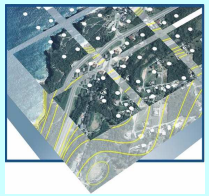
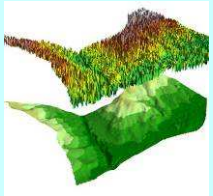
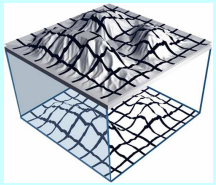
- **Unmanned Aerial Vehicles (UAVs)**



**1 day**

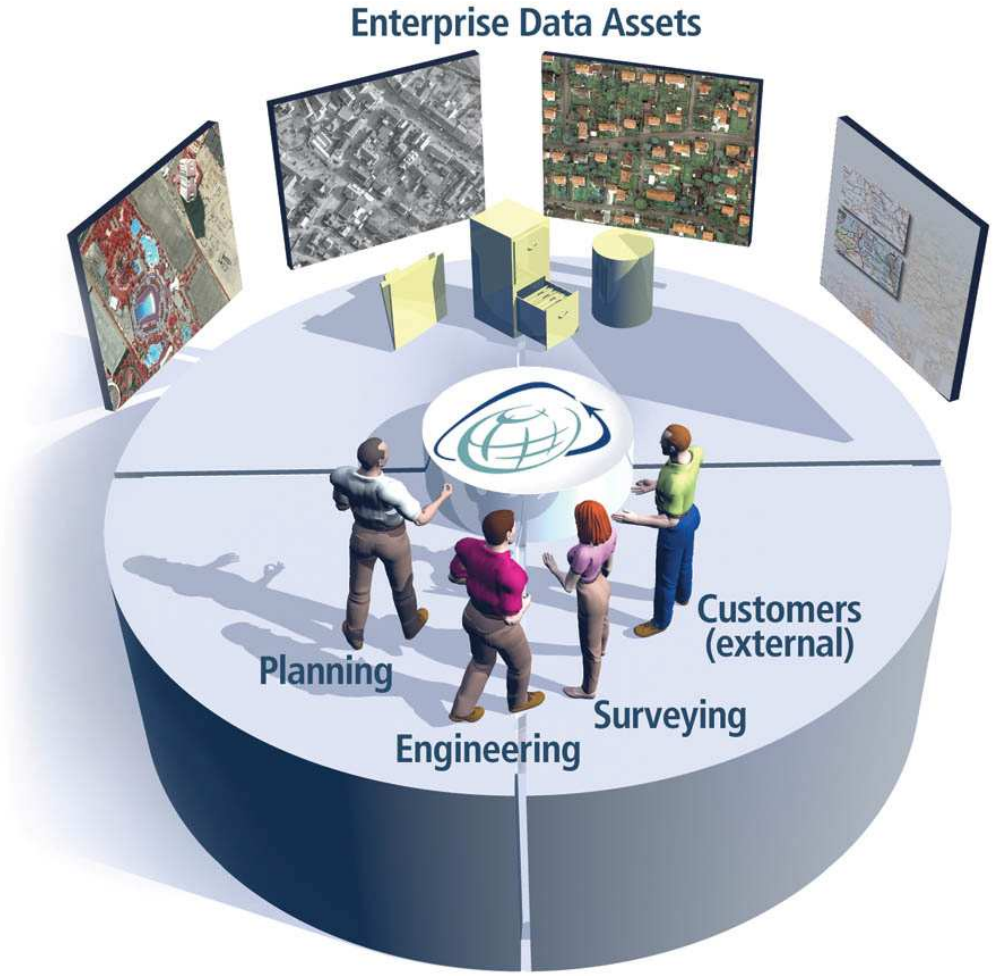
# ImageStation Solutions today

INTERGRAPH

| | | | |
|---|---|---|---|
| **Project Management** |  | ISPM | ImageStation Photogrammetric Manager |
| **Orientation/Triangulation** |  | ISMS | ImageStation Model Setup |
| | | ISDM | ImageStation Digital Mensuration + Satellite sensors |
| | | ISAT | ImageStation Automatic Triangulation |
| **Stereo 3D Feature Capture** |  | ISFC-M | ImageStation Feature Capture - MicroStation |
| | | ISFC-G | ImageStation Feature Capture – GeoMedia |
| | | ISSD | ImageStation StereoDisplay |
| **DTM Collection & Edit** |  | ISAE | ImageStation Automatic Elevations |
| | | ISDC | ImageStation DTM Collection |
| | | ISSD | ImageStation StereoDisplay |
| **Orthophoto Production** |  | ISOP | ImageStation OrthoPro |
| | | ISBR | ImageStation Base Rectifier |

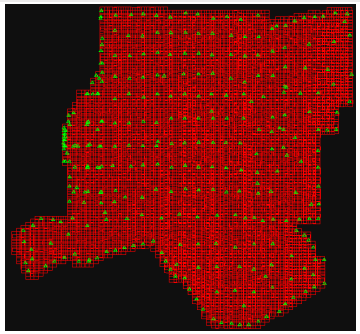
# TerraShare

INTERGRAPH



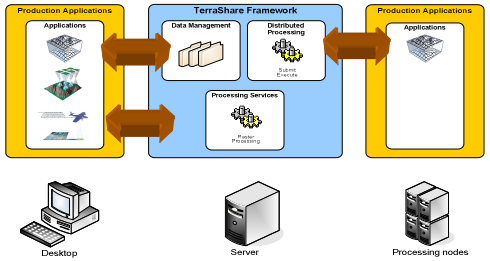
# Our Response today (1/2)...

- Aerotriangulation enhancements

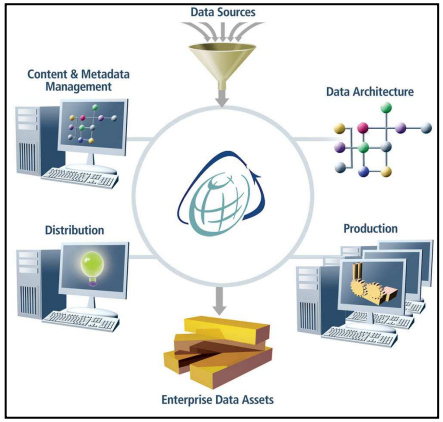


**PRODUCTIVITY**
**265 Times Faster!**

- Distributed processing

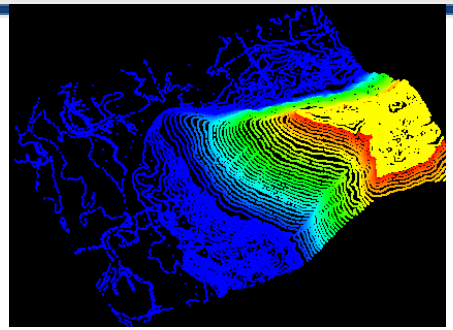



- Unique TerraShare image & elevation management

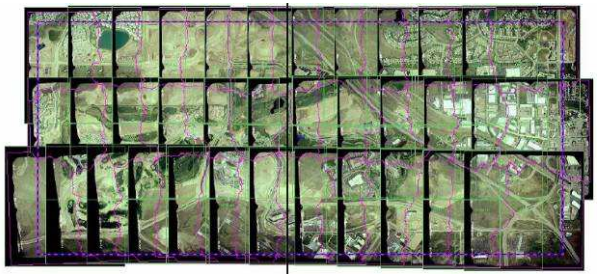


# Our Response today (2/2)

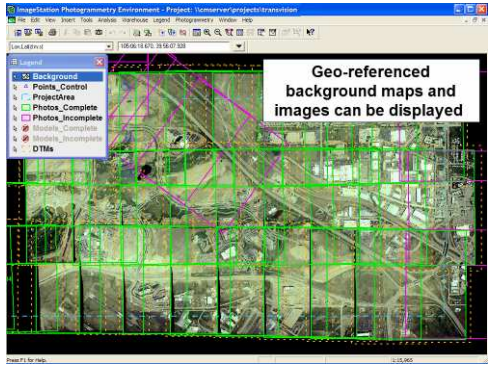
- Automated DEM Generation & Editing



- Smart seamlines



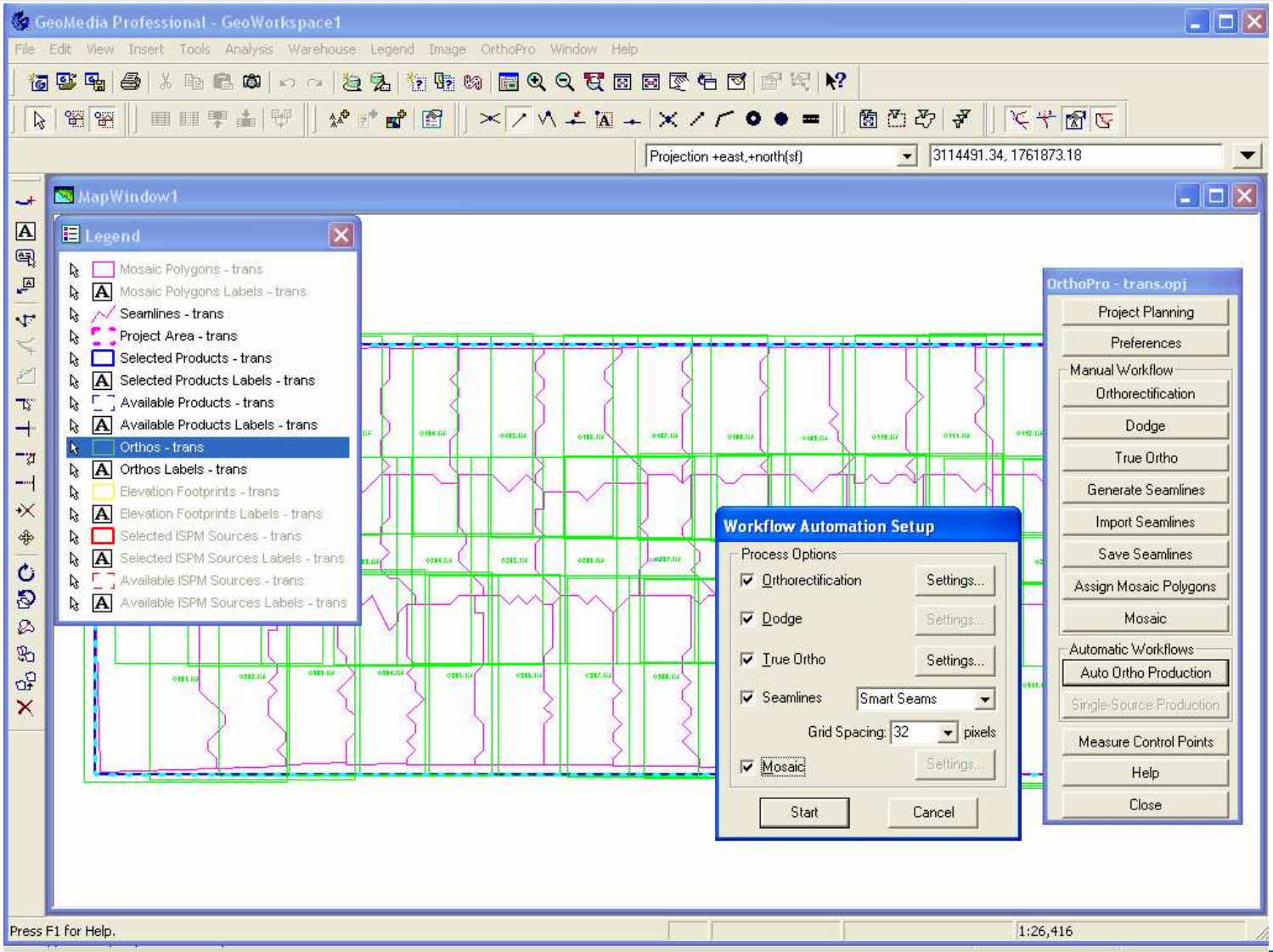
- New production management tools



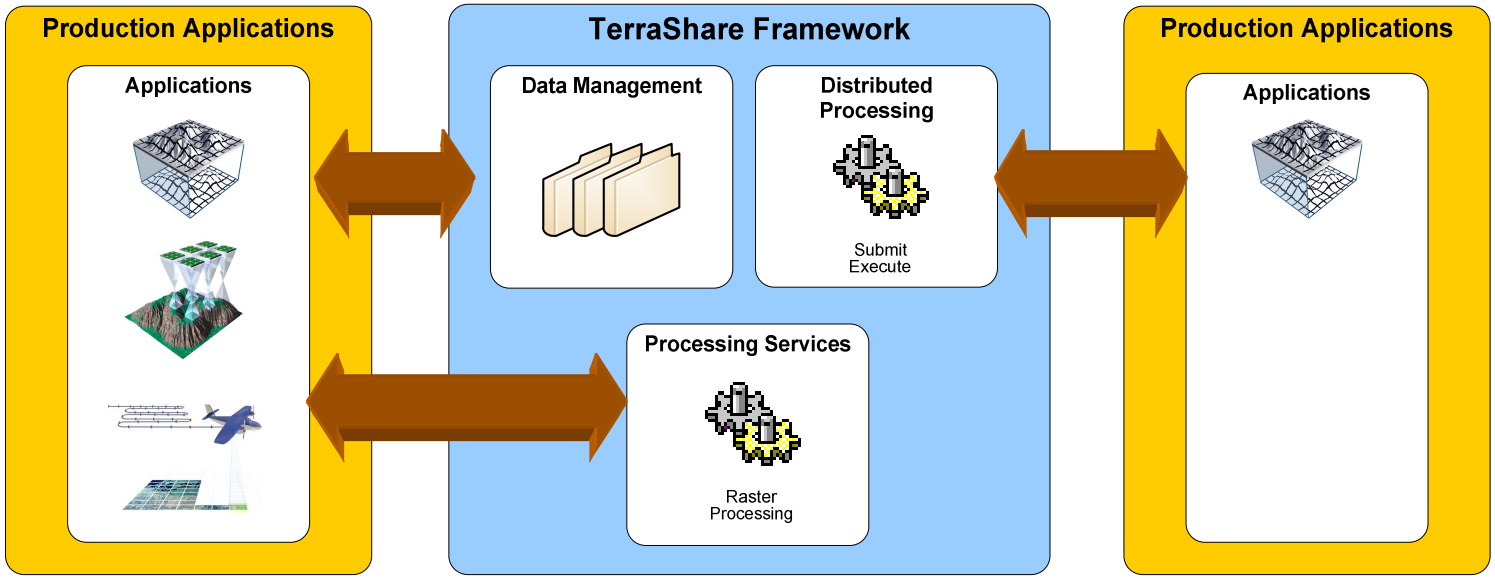
# Enterprise Exploitation

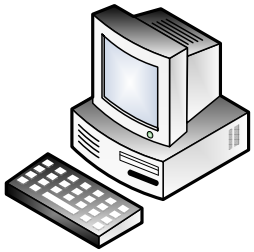
- One-button Orthorectification and Mosaicking
- Distributed Processing for Orthorectification/Mosaicking
- Distributed Processing for DMC Post-processing
- Consistent/Easy-to-Use User Interface
- Customizable Workflow
- Production Tracking

# One-button Rectification & Mosaicking



# OrthoPro Distributed Processing (DP)



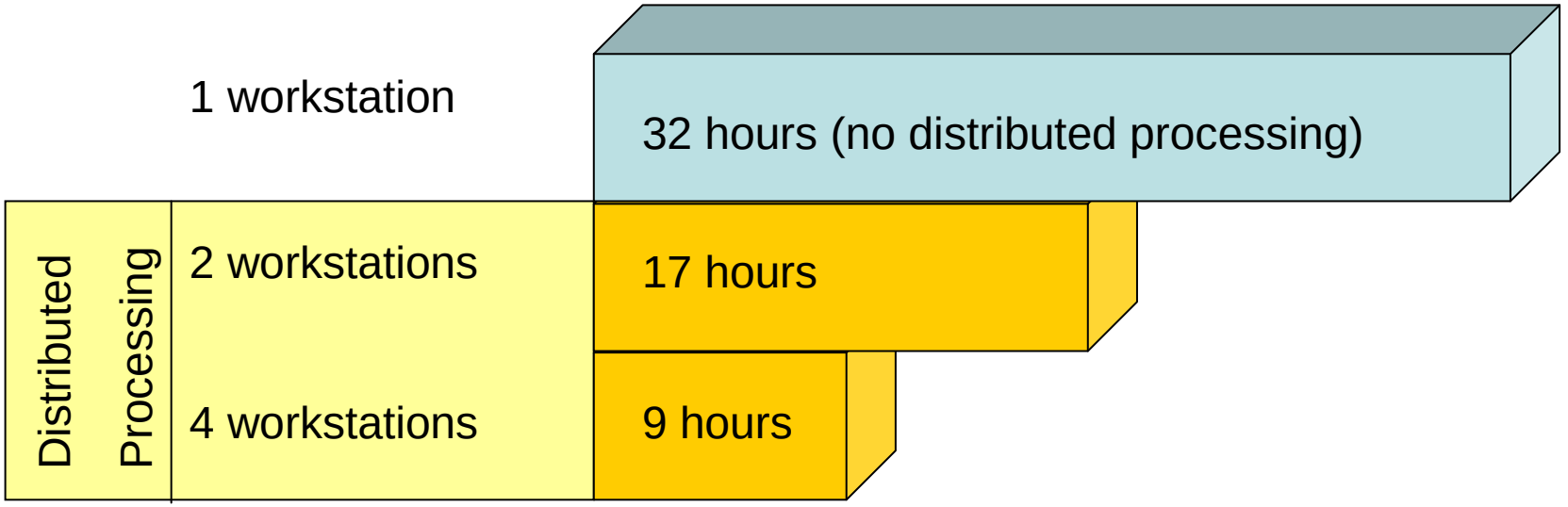
Desktop

Server

Processing nodes

# Performance of DP

- Comparison of the rectify process in a test project of 819 images, 294 DTMs




Note, Poor server and network performance may affect DP performance

# DMC, Digital Mapping Camera

INTERGRAPH

**Image size 13.5k x 7.5k pixels**

**Panchromatic and Multispectral**

**12 Bit radiometric resolution**

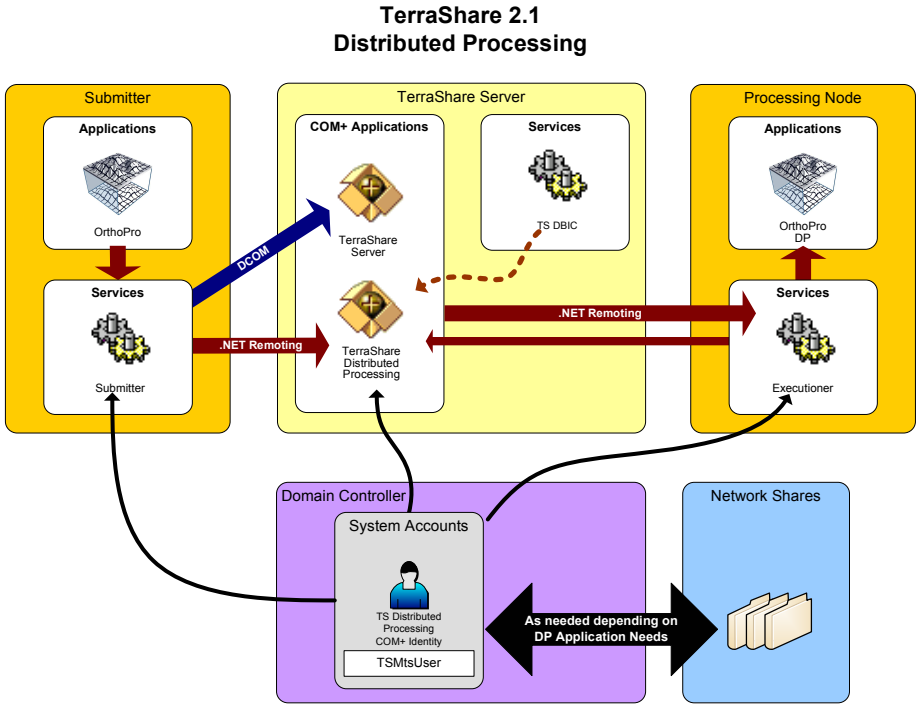
**864 Gigabytes of data storage**

**See presentation by Hartmut Rosengarten**

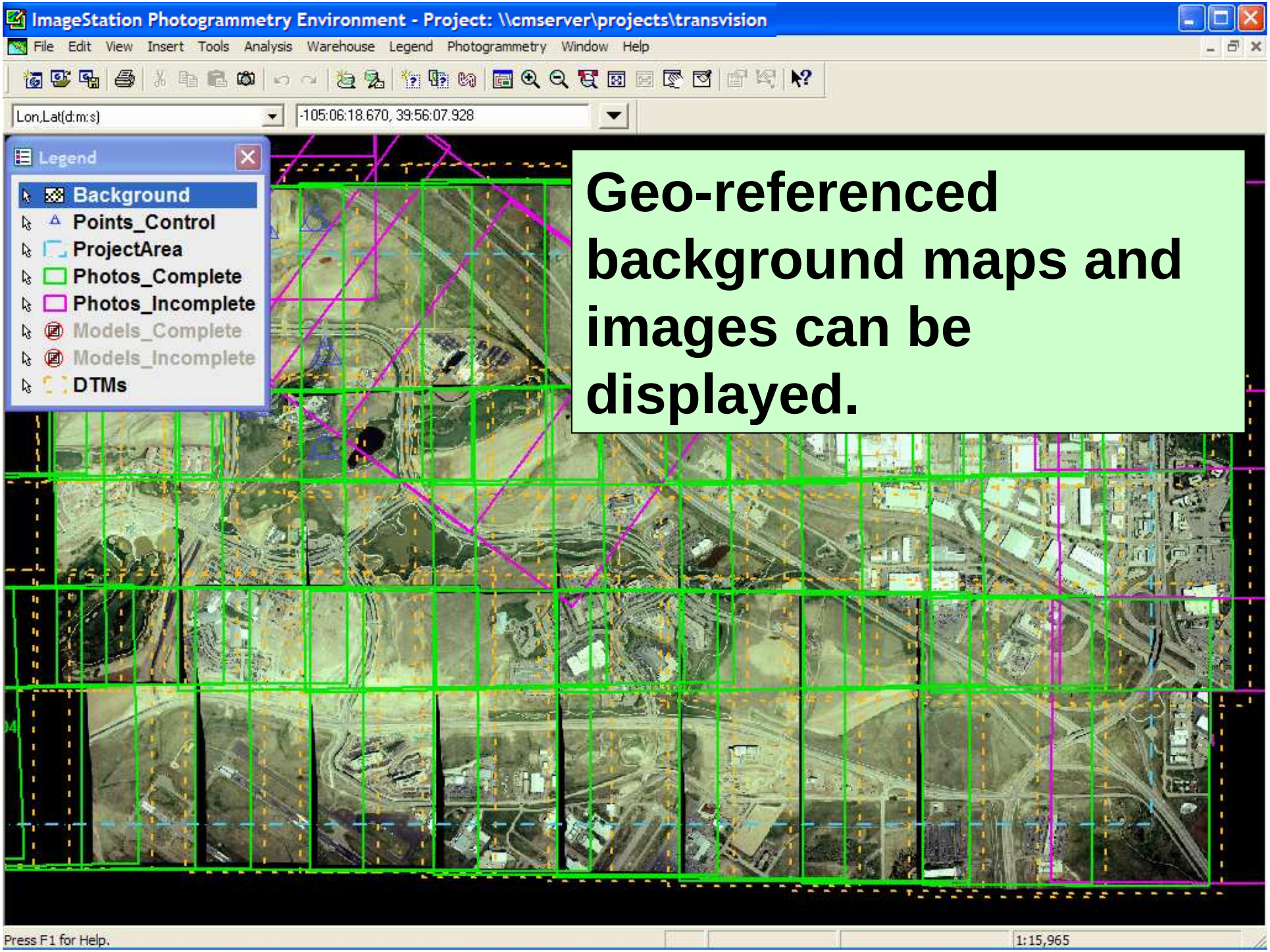
# Distributed Processing for DMC PPS

- Using TerraShare Advanced Server – Distributed Processing
- Reduce time taken for data to be available for exploitation
- Scaleable, the more processing nodes you have the fast it goes

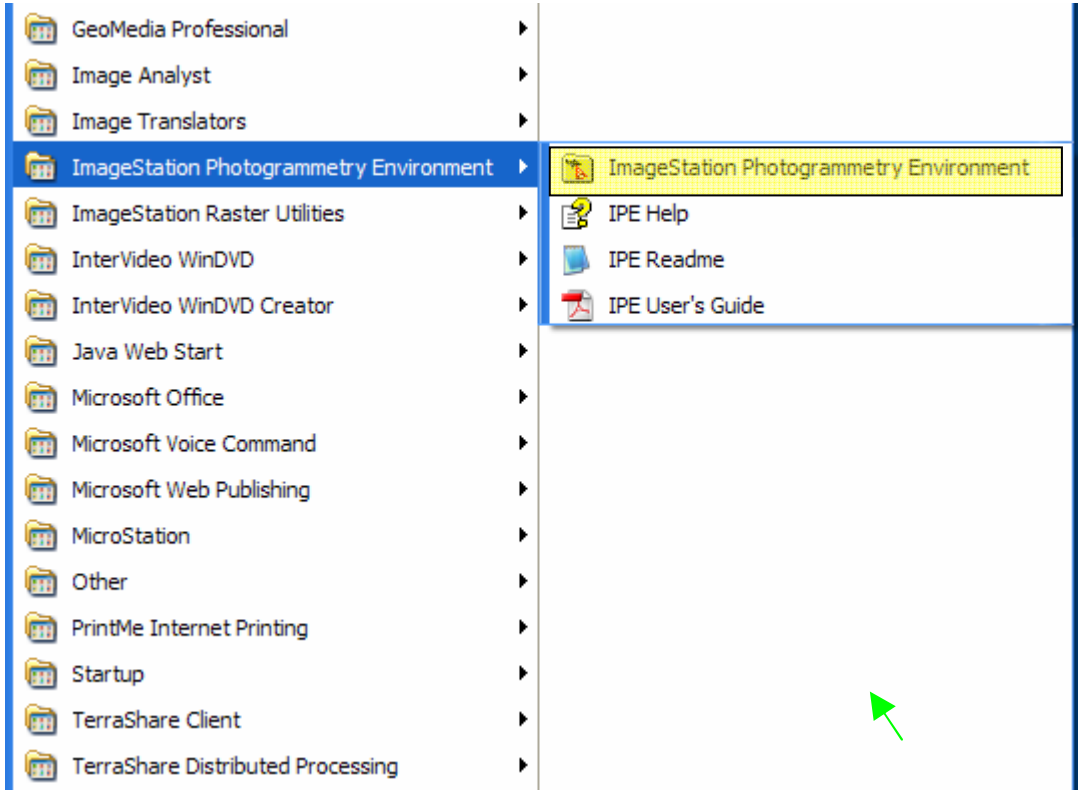
+



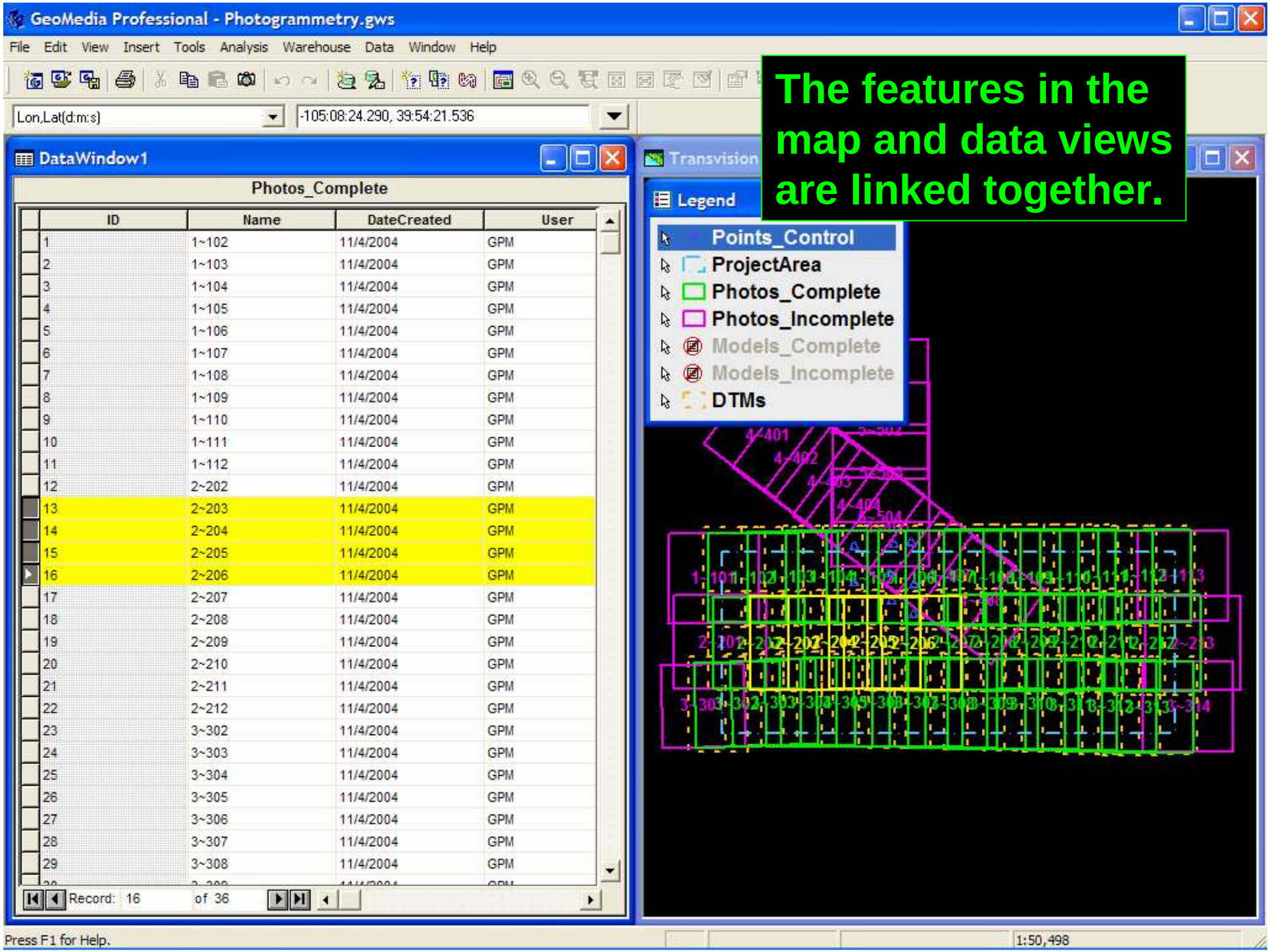

**See presentation by Christoph Dörstel**


ImageStation Photogrammetry Environment - Project: \\cmserver\projects\transvision
File Edit View Insert Tools Analysis Warehouse Legend Photogrammetry Window Help
Lon,Lat(d:m:s)
-105:06:18.670, 39:56:07.928
Legend
Background
Points_Control
ProjectArea
Photos_Complete
Photos_Incomplete
Models_Complete
Models_Incomplete
DTMs
Geo-referenced background maps and images can be displayed.
Press F1 for Help.
1:15,965

# ImageStation Photogrammetry Environment




Simplified, single entry point to create, view, and run a full Photogrammetric Workflow.


GeoMedia Professional - Photogrammetry.gws
File Edit View Insert Tools Analysis Warehouse Data Window Help
Lon,Lat(d:m:s)
-105:08:24.290, 39:54:21.536
The features in the map and data views are linked together.
DataWindow1
Photos_Complete
ID Name DateCreated User
1 1~102 11/4/2004 GPM
2 1~103 11/4/2004 GPM
3 1~104 11/4/2004 GPM
4 1~105 11/4/2004 GPM
5 1~106 11/4/2004 GPM
6 1~107 11/4/2004 GPM
7 1~108 11/4/2004 GPM
8 1~109 11/4/2004 GPM
9 1~110 11/4/2004 GPM
10 1~111 11/4/2004 GPM
11 1~112 11/4/2004 GPM
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15 2~205 11/4/2004 GPM
16 2~206 11/4/2004 GPM
17 2~207 11/4/2004 GPM
18 2~208 11/4/2004 GPM
19 2~209 11/4/2004 GPM
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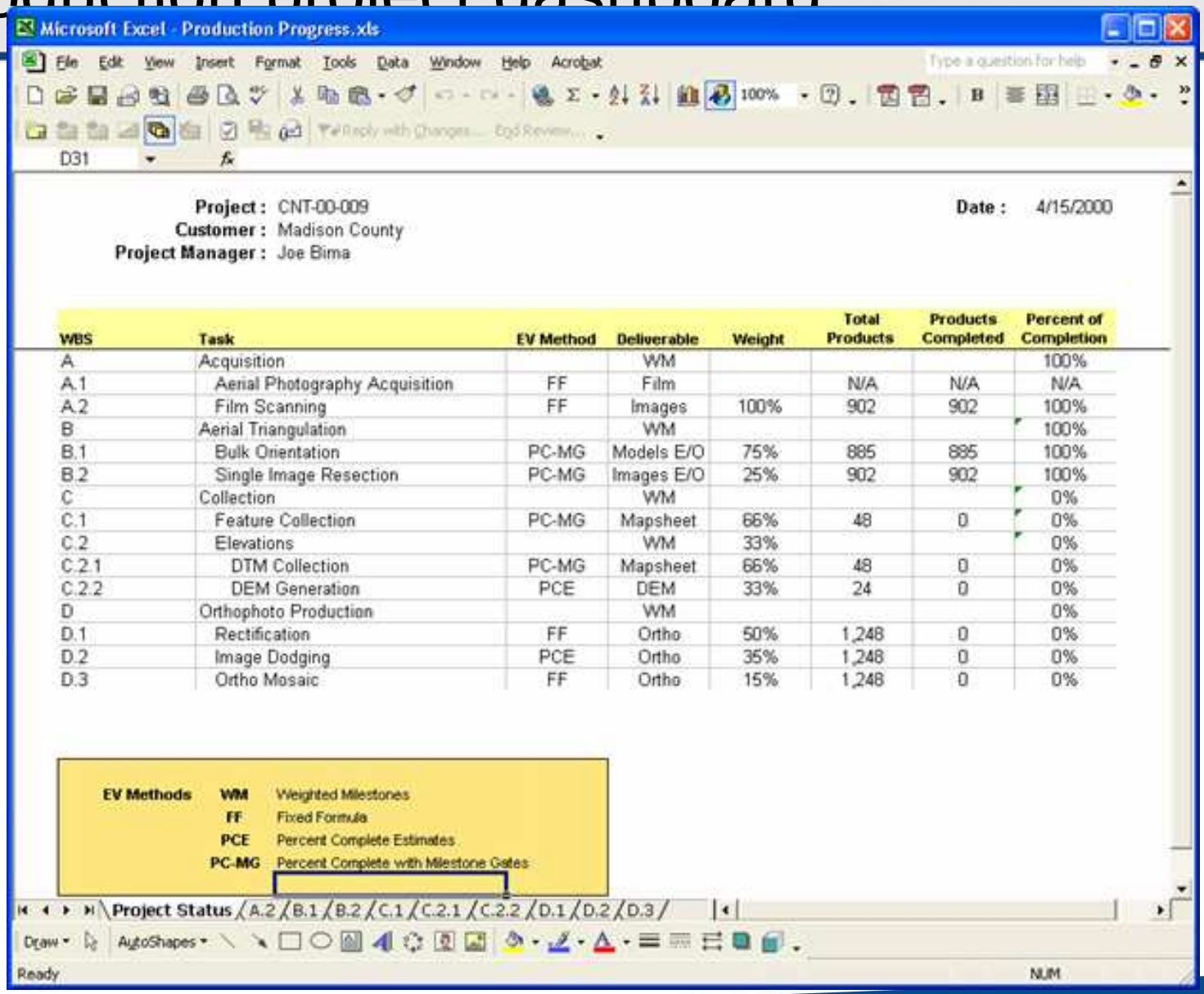
22 2~212 11/4/2004 GPM
23 3~302 11/4/2004 GPM
24 3~303 11/4/2004 GPM
25 3~304 11/4/2004 GPM
26 3~305 11/4/2004 GPM
27 3~306 11/4/2004 GPM
28 3~307 11/4/2004 GPM
29 3~308 11/4/2004 GPM
Record: 16 of 36
Transvision
Legend
Points_Control
ProjectArea
Photos_Complete
Photos_Incomplete
Models_Complete
Models_Incomplete
DTMs
Press F1 for Help.
1:50,498

# TerraShare Production Manager
# Production project dashboard




**Project :** CNT-00-009
**Customer :** Madison County
**Project Manager :** Joe Bima

**Date :** 4/15/2000

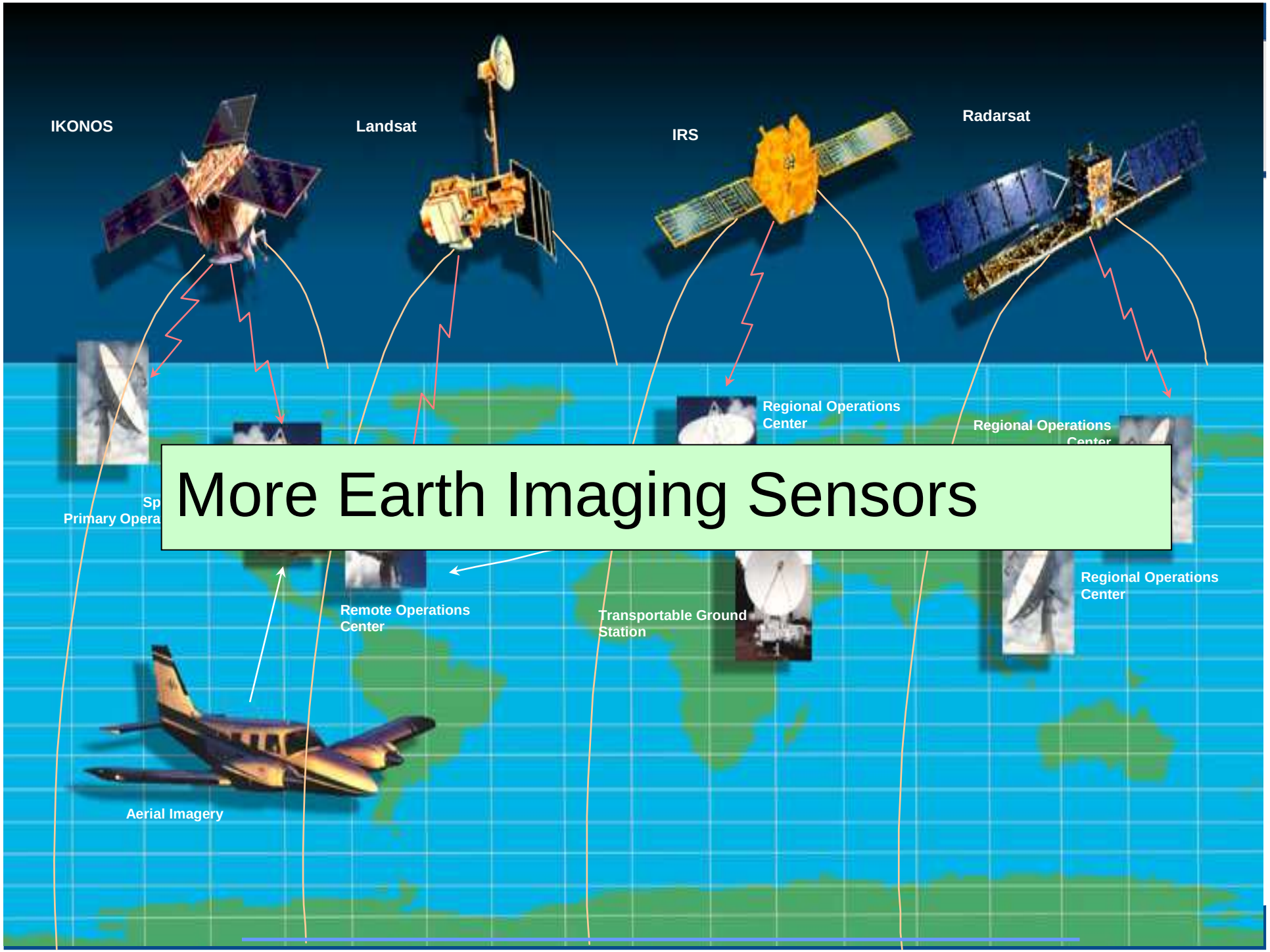
| WBS | Task | EV Method | Deliverable | Weight | Total Products | Products Completed | Percent of Completion |
|---|---|---|---|---|---|---|---|
| A | Acquisition | | WM | | | | 100% |
| A.1 | Aerial Photography Acquisition | FF | Film | | N/A | N/A | N/A |
| A.2 | Film Scanning | FF | Images | 100% | 902 | 902 | 100% |
| B | Aerial Triangulation | | WM | | | | 100% |
| B.1 | Bulk Orientation | PC-MG | Models E/O | 75% | 885 | 885 | 100% |
| B.2 | Single Image Resection | PC-MG | Images E/O | 25% | 902 | 902 | 100% |
| C | Collection | | WM | | | | 0% |
| C.1 | Feature Collection | PC-MG | Mapsheet | 66% | 48 | 0 | 0% |
| C.2 | Elevations | | WM | 33% | | | 0% |
| C.2.1 | DTM Collection | PC-MG | Mapsheet | 66% | 48 | 0 | 0% |
| C.2.2 | DEM Generation | PCE | DEM | 33% | 24 | 0 | 0% |
| D | Orthophoto Production | | WM | | | | 0% |
| D.1 | Rectification | FF | Ortho | 50% | 1,248 | 0 | 0% |
| D.2 | Image Dodging | PCE | Ortho | 35% | 1,248 | 0 | 0% |
| D.3 | Ortho Mosaic | FF | Ortho | 15% | 1,248 | 0 | 0% |

| EV Methods | | |
|---|---|---|
| | WM | Weighted Milestones |
| | FF | Fixed Formula |
| | PCE | Percent Complete Estimates |
| | PC-MG | Percent Complete with Milestone Gates |

# The evolution of Photogrammetry

INTERGRAPH

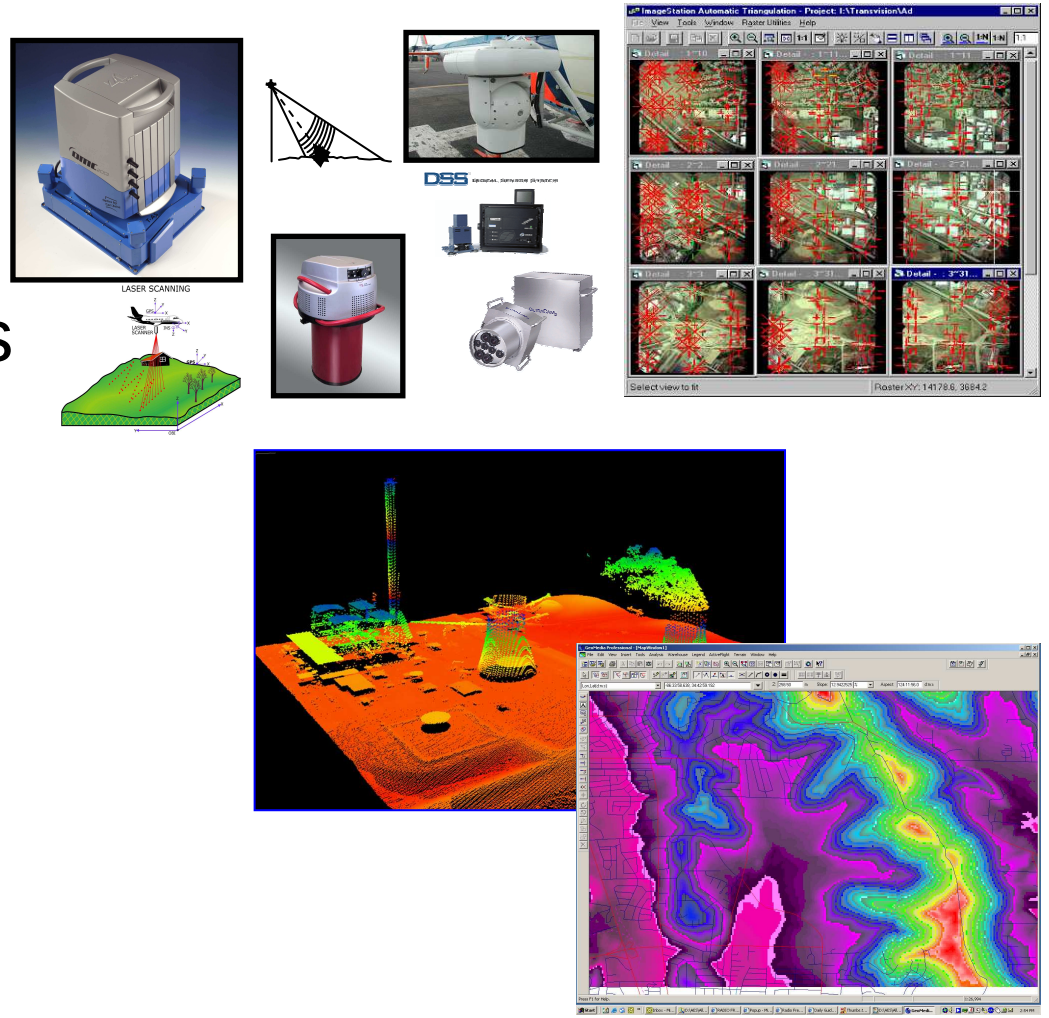
- Analogue
- Analytical
- Digital
  - now
  - tomorrow
  - **What´s coming next ?**

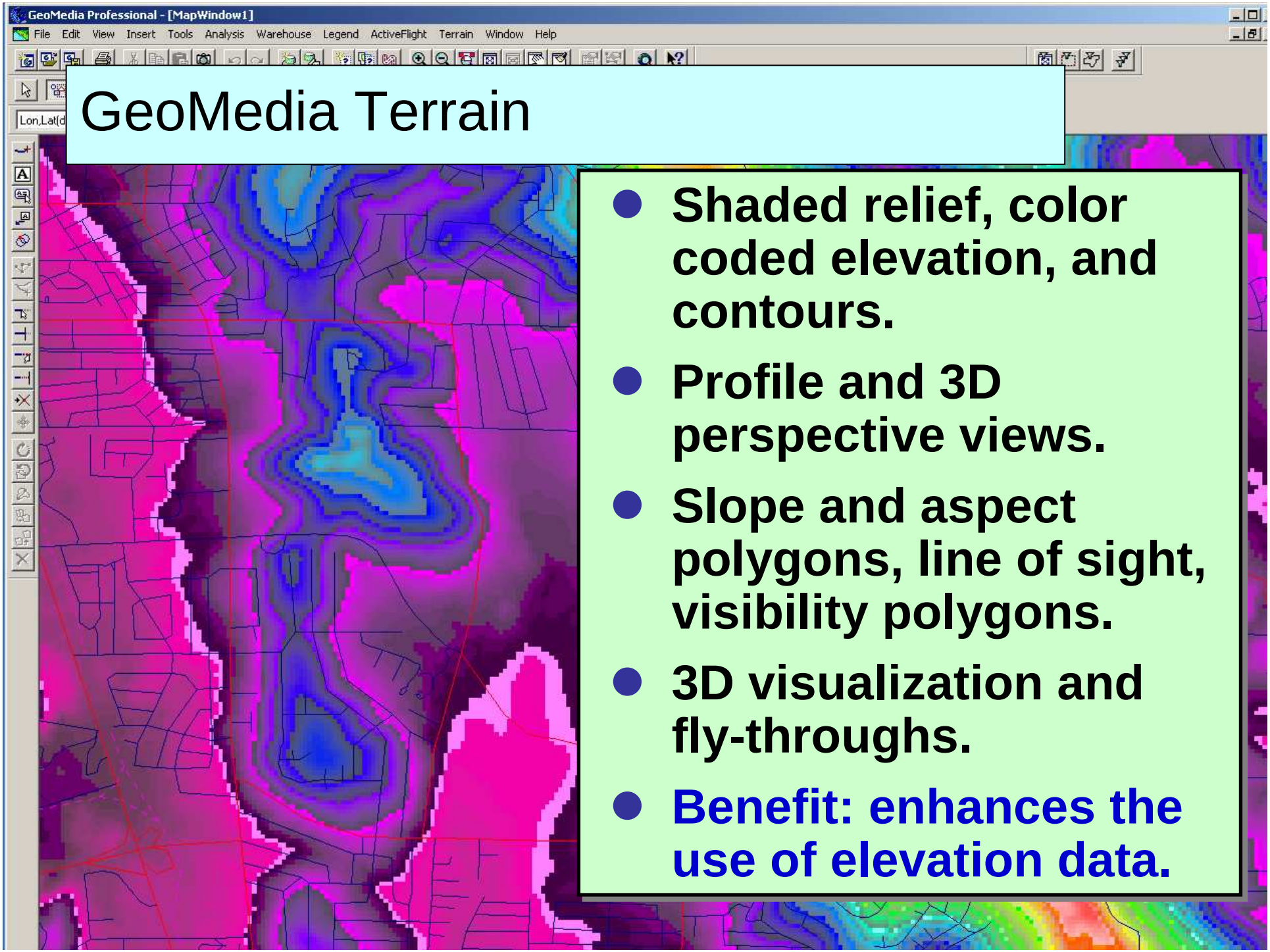



# More Earth Imaging Sensors

# Our Response to More Sensors

- Support for more airborne & satellite sensor triangulations
- Improve processing tools for elevation data
- Enhancements to GeoMedia Terrain






# GeoMedia Terrain

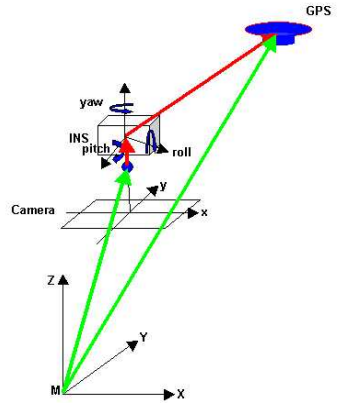
- **Shaded relief, color coded elevation, and contours.**
- **Profile and 3D perspective views.**
- **Slope and aspect polygons, line of sight, visibility polygons.**
- **3D visualization and fly-throughs.**
- **Benefit: enhances the use of elevation data.**

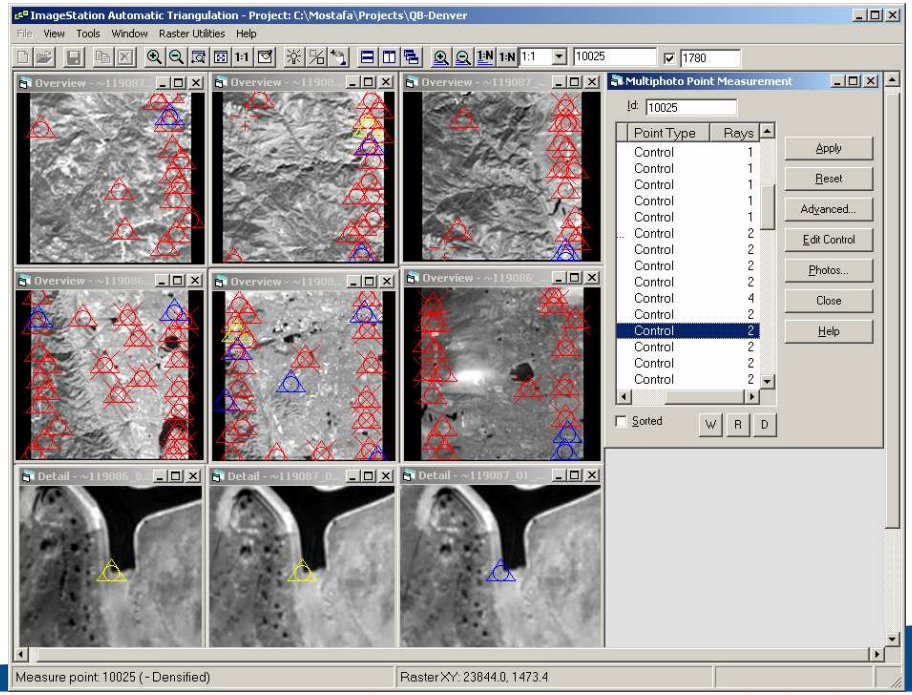
# In-flight Camera Calibrations

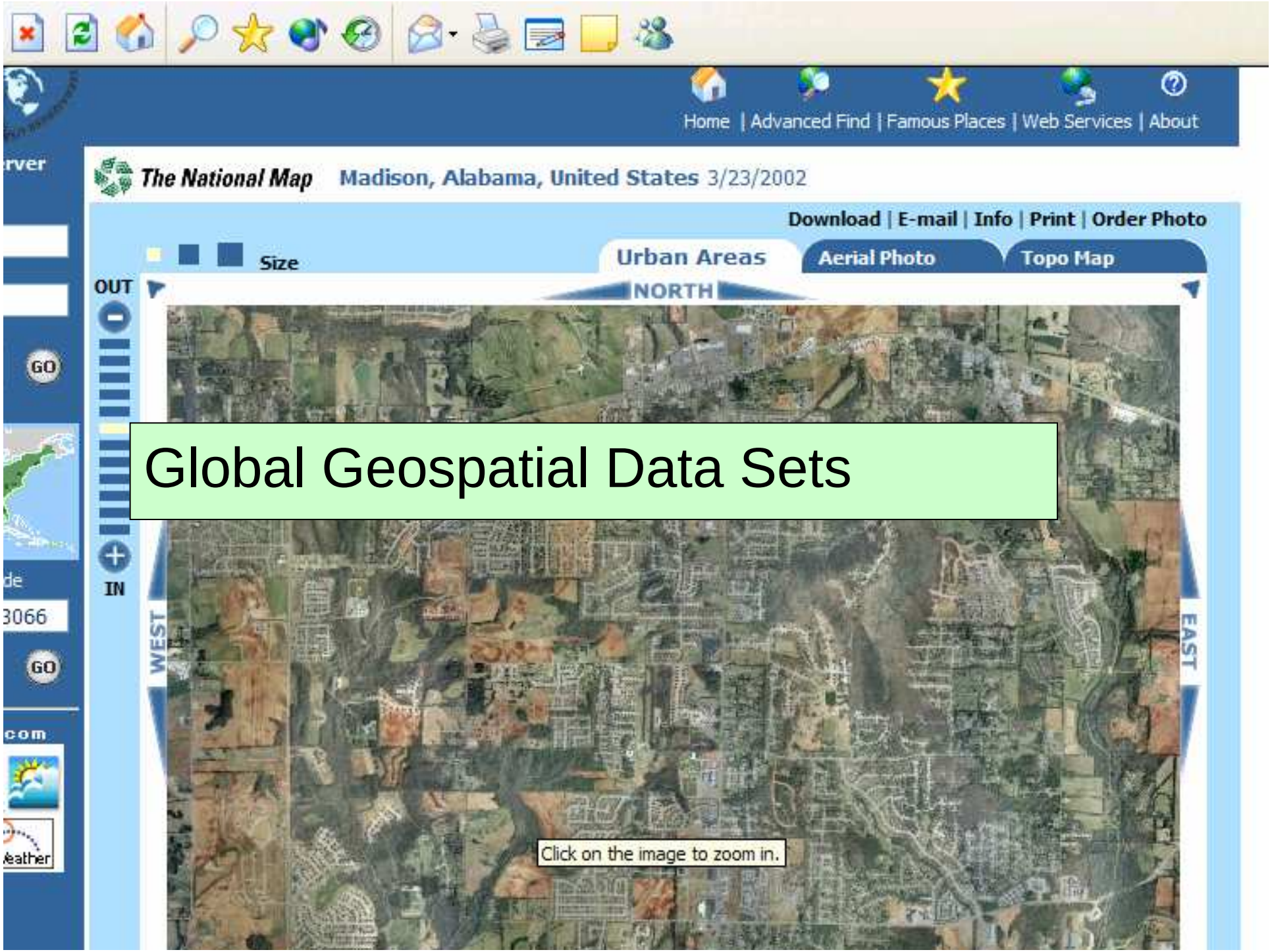
In-flight Camera Calibrations

# Our response

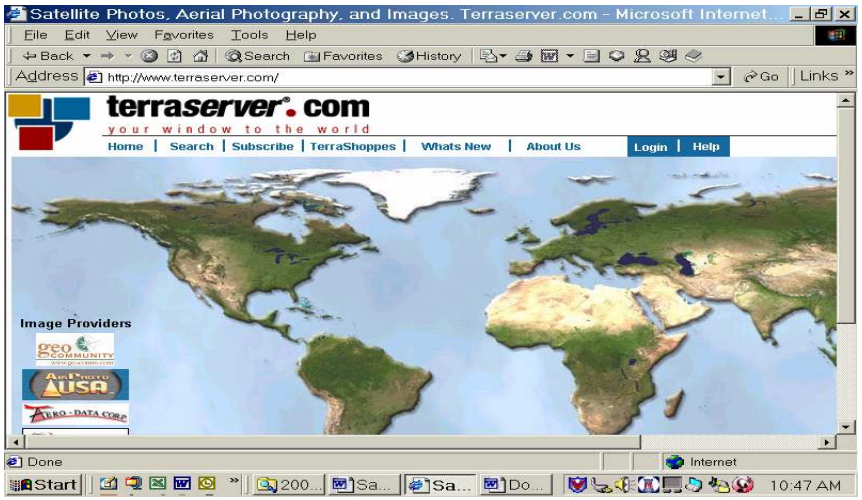
- Provide customers tools (ISAT) to do self calibrations
- Working with USGS to define in-flight calibration process and acceptance criteria




Home | Advanced Find | Famous Places | Web Services | About
The National Map
Madison, Alabama, United States 3/23/2002
Download | E-mail | Info | Print | Order Photo
Size
Urban Areas
Aerial Photo
Topo Map
OUT
IN
NORTH
WEST
EAST
Global Geospatial Data Sets
Click on the image to zoom in.
GO
GO

# Image Data Repositories.



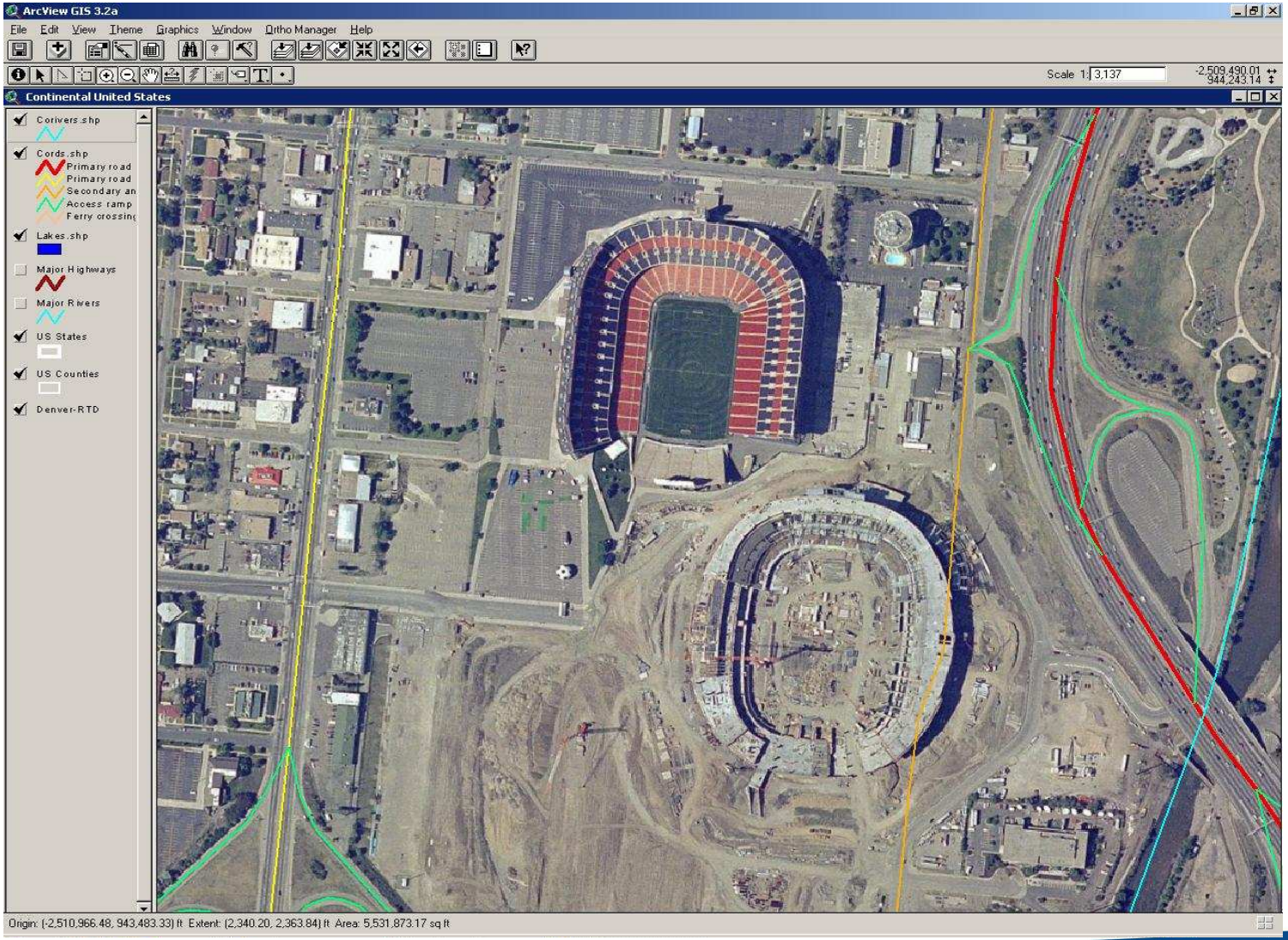
- Satellite Images.
- Aerial Imagery.
- LIDAR and Radar Images.
- Federal, State and Local data repositories.

Global Geospatial Data Sets

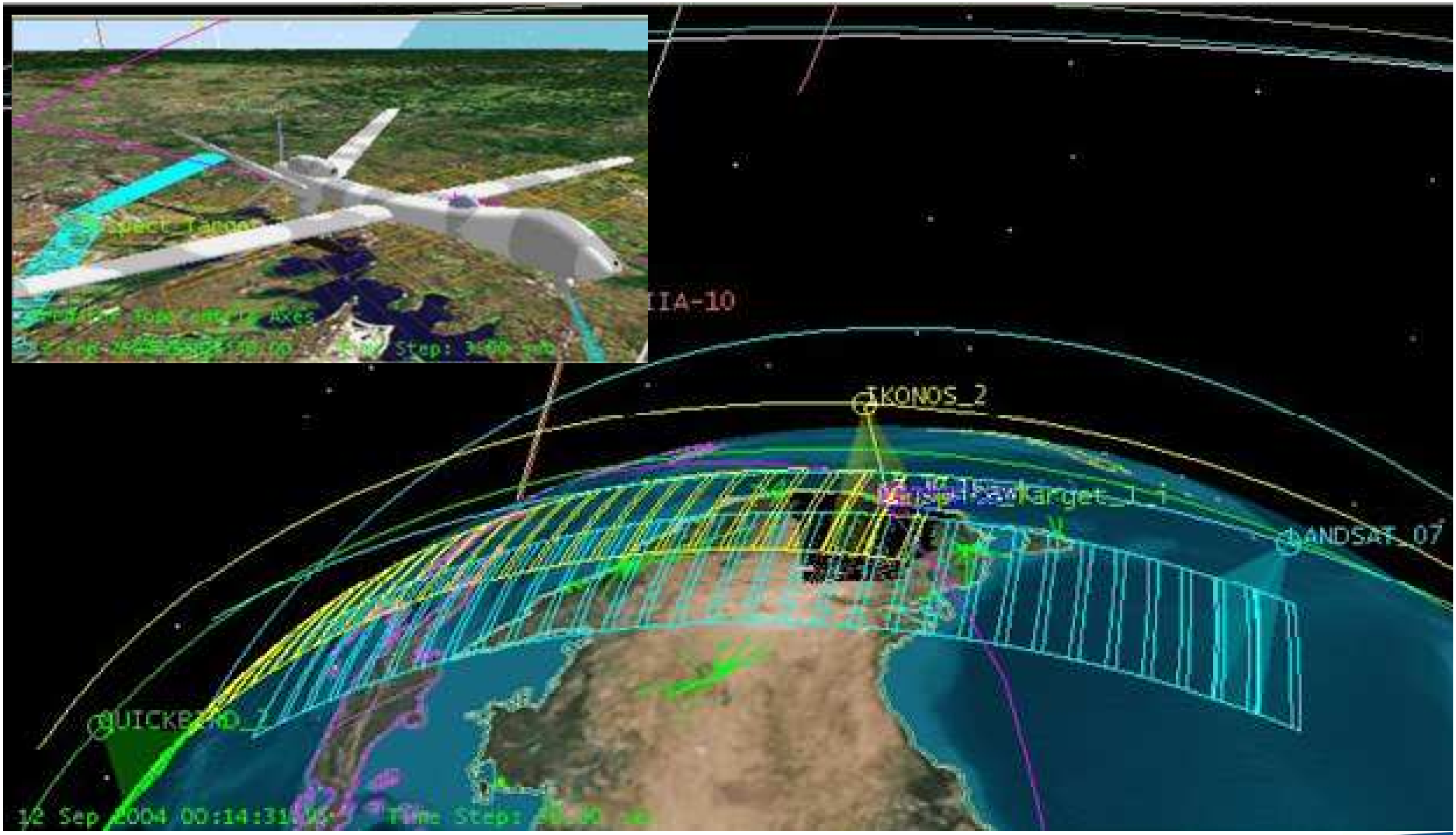
# Essential Elements

- Open (metadata)
- Accessible (catalog)
- Served (web services)
- Licensed (in many cases, free)
- Standardized

# Our Response:
# TerraShare



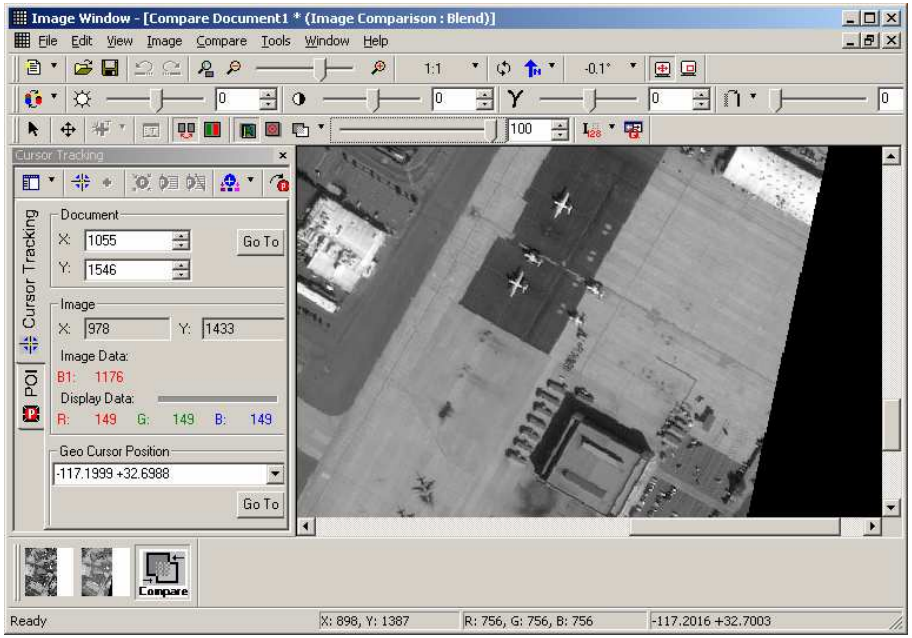
# Image Analysis/Change Detection

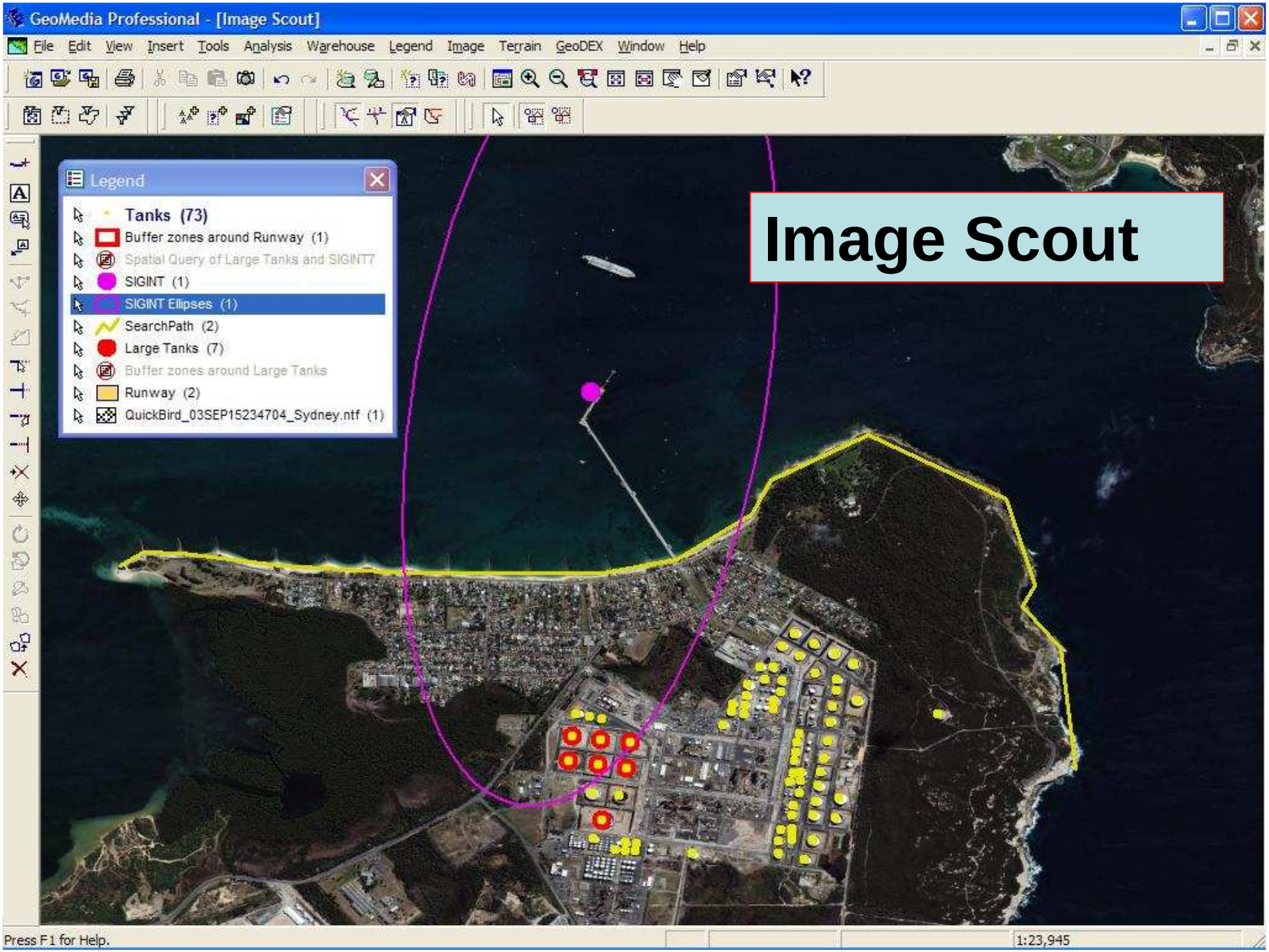


# Enhanced GeoMedia Imaging

- Advanced Image processing capabilities in optimized Image Window
- Image enhancement capabilities for precise information extraction
- Image comparison – change detection capabilities
- Automatic image roam for systematic search

## GeoMedia Image Light Table



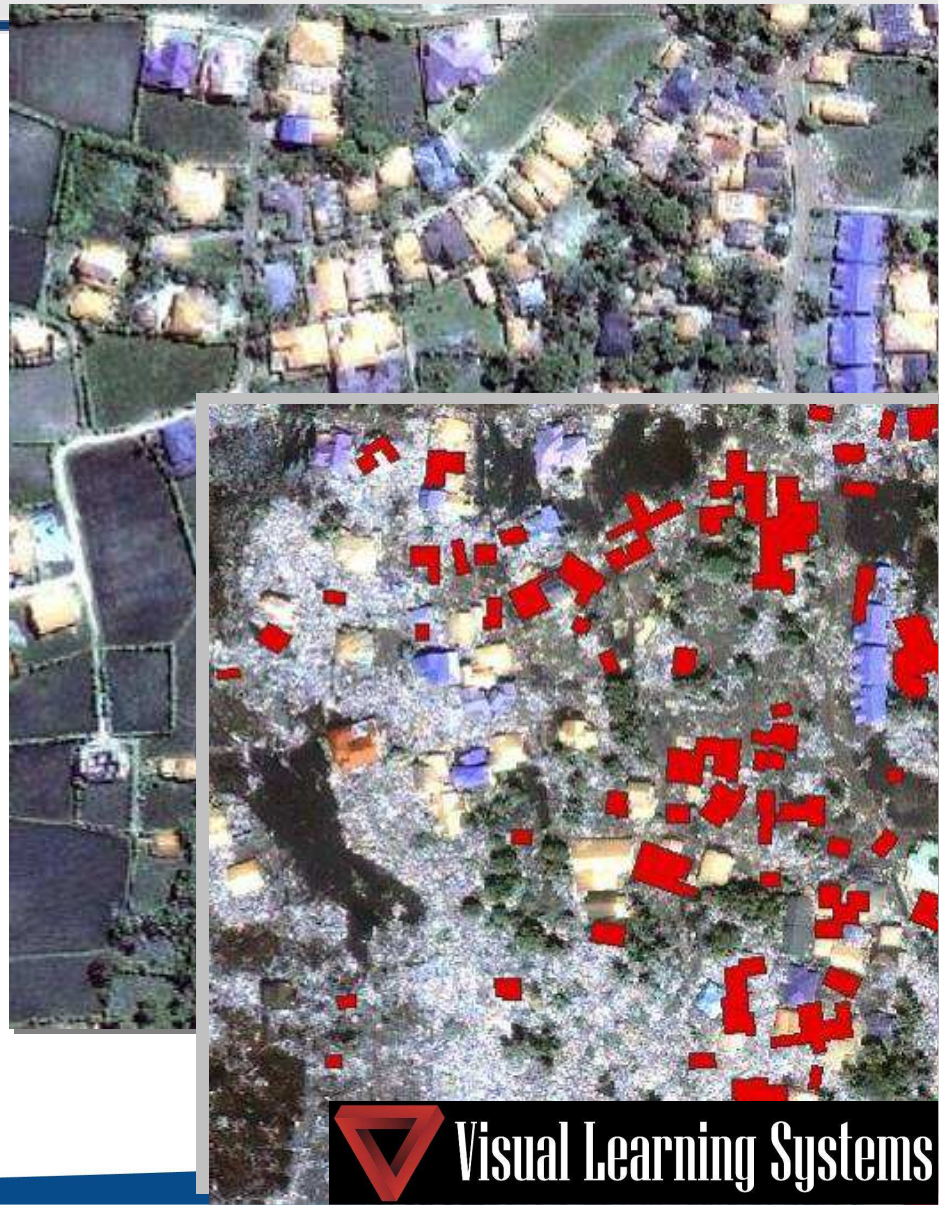

GeoMedia Professional - [Image Scout]
File Edit View Insert Tools Analysis Warehouse Legend Image Terrain GeoDEX Window Help
Legend
Tanks (73)
Buffer zones around Runway (1)
Spatial Query of Large Tanks and SIGINT7
SIGINT (1)
SIGINT Ellipses (1)
SearchPath (2)
Large Tanks (7)
Buffer zones around Large Tanks
Runway (2)
QuickBird_03SEP15234704_Sydney.ntf (1)
Image Scout
Press F1 for Help.
1:23,945

Coming in 2005:

# Feature Analyst for GeoMedia

INTERGRAPH

1. **Automated feature extraction**
2. **Multi-class features**
3. **3-D feature extraction**
4. **Stereo extraction**
5. **Smart vector editing**
6. **Auto extraction of buildings, bare earth, and trees from DEMs**
7. **Change detection from multi-date images**

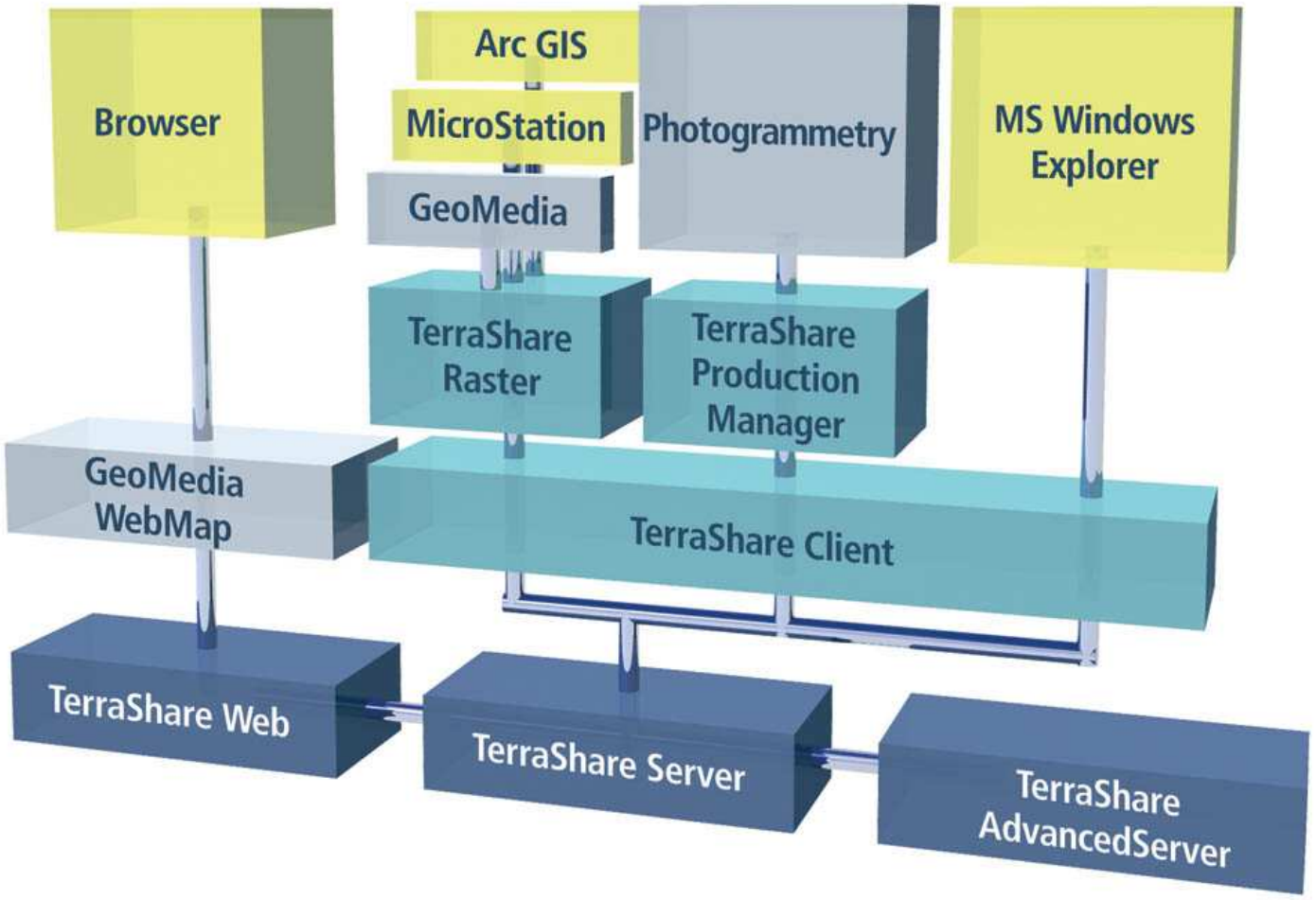


Enterprise Data Assets
Spatially Enabled Enterprises…
Customers (external)
Planning
Surveying
Engineering

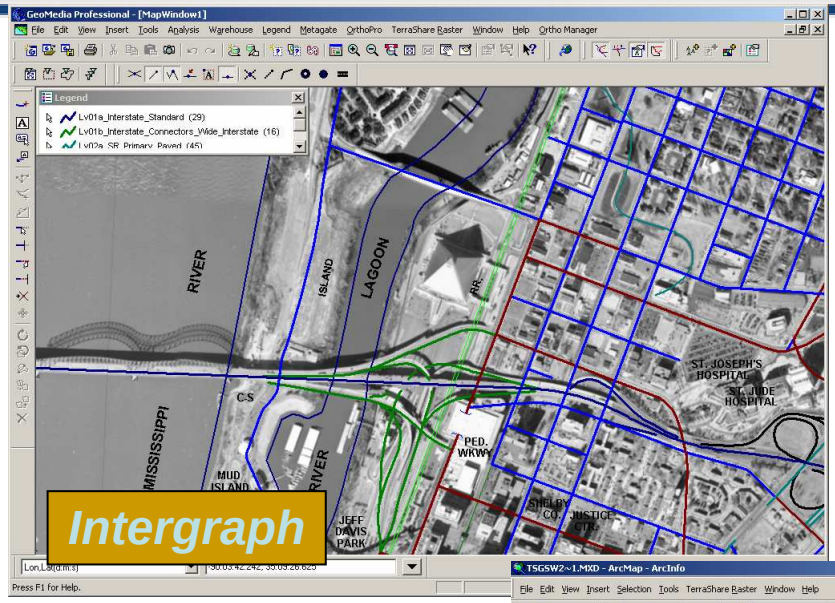
# Enterprise Geospatial Integration

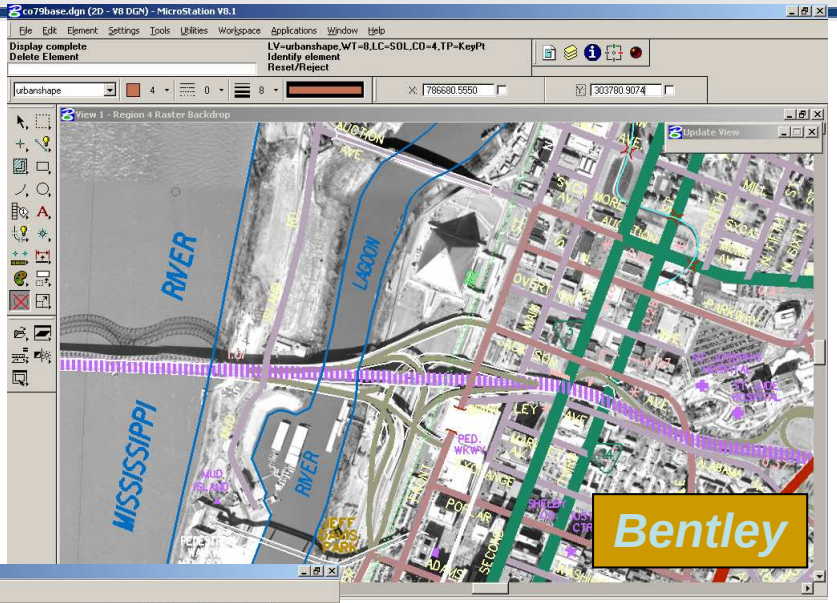
1. Within corporate IT environment
2. Integrated with other applications
3. Using distributed processing
4. Includes standard development tools
5. Data shared in distributed environment
6. Managed from within a single, integrated environment

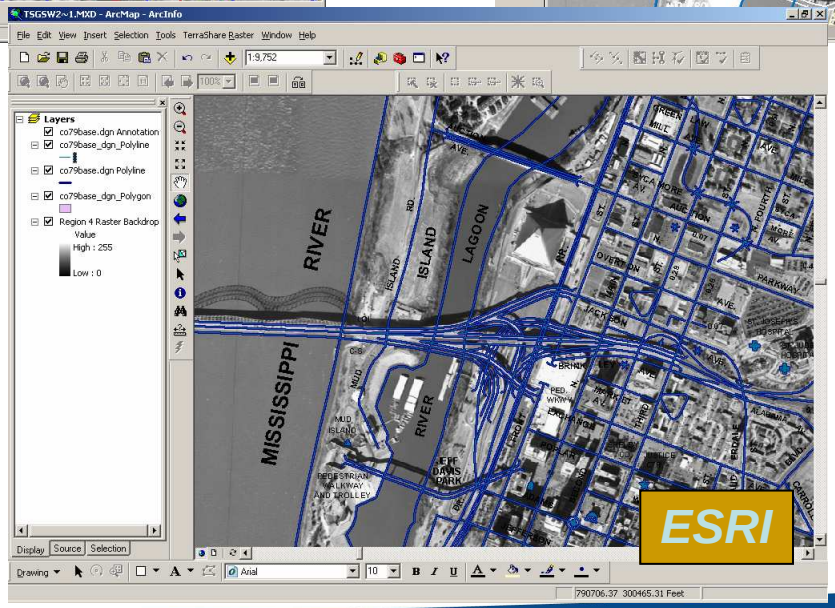
Our Response:
# TerraShare Product Suite



# Seamless Access on the Desktop



# A Look to the Future…

| From: | To: |
| --- | --- |
| ▪ **Film processing.** | ➢ **Digital Imaging.** |
| ▪ **Serial Processing.** | ➢ **Seamless Computing** |
| ▪ **Models.** | ➢ **Blocks.** |
| ▪ **Proprietary files** | ➢ **Open standards** |
| ▪ **Stand-Alone** | ➢ **Interoperable** |
| ▪ **Single vender focus** | ➢ **Multi-vender reality** |
| ▪ **Workstations** | ➢ **Web** |
| ▪ **GIS-centric** | ➢ **IT-centric.** |
| ▪ **Enterprise-wide** | ➢ **World-wide** |