Why “Geospatial Big Data ™?"

We Are the Innovators of Our Industry

Geospatial Big Data™ is the next Frontier!
DigitalGlobe’s global infrastructure provides real-time coverage of over 45% of Earth’s land surface

Secure data center that processes over 1 billion km² of imagery annually and disseminates over multiple networks to thousands of downstream users.

Secure, 24/7 mission operations center that flies a 6-satellite constellation and supports secure interfaces with US Government

12 Remote Ground Terminals globally with real-time coverage of over 45% of Earth’s land surface
DigitalGlobe high performance satellite capacity can address many global missions simultaneously

<table>
<thead>
<tr>
<th>Target Areas</th>
<th>Percent Land Area</th>
<th>Group Area (sqkm)</th>
<th>Recovery Rate</th>
<th>Applied Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Land Use Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Areas</td>
<td>1.50%</td>
<td>2,224,500</td>
<td>100%</td>
<td>115,674,000</td>
</tr>
<tr>
<td>LOC Corridors</td>
<td>3.00%</td>
<td>4,449,000</td>
<td>100%</td>
<td>231,348,000</td>
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<tr>
<td>Arable Land</td>
<td>13.13%</td>
<td>19,471,790</td>
<td>50%</td>
<td>778,871,600</td>
</tr>
<tr>
<td>Permanent Crops</td>
<td>4.71%</td>
<td>6,984,930</td>
<td>50%</td>
<td>279,397,200</td>
</tr>
<tr>
<td>Permanent Pastures</td>
<td>26.00%</td>
<td>38,558,000</td>
<td>100%</td>
<td>77,116,000</td>
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<tr>
<td>Forests</td>
<td>32.00%</td>
<td>47,456,000</td>
<td>100%</td>
<td>94,912,000</td>
</tr>
<tr>
<td>Other (e.g., barren)</td>
<td>9.95%</td>
<td>14,755,850</td>
<td>100%</td>
<td>14,755,850</td>
</tr>
<tr>
<td>Antarctica</td>
<td>9.71%</td>
<td>14,399,930</td>
<td>100%</td>
<td>14,399,930</td>
</tr>
<tr>
<td><strong>Total Land Area</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>148,300,000</strong></td>
<td></td>
<td><strong>1,606,474,580</strong></td>
</tr>
</tbody>
</table>
What is “Geospatial Big Data™”? 

- It is a living digital inventory of the surface of the earth: every structure, vehicle, road, tree, rock, field and patch of dirt.

- It is enabled by DigitalGlobe’s ability to collect over 1 billion km2 of high resolution satellite imagery every year.

- It is possible because we can convert this imagery automatically and at scale into searchable, analytics ready information layers.

- It enables us to answer two kinds of questions:
  - “Show me there” — tell me everything we know about a particular place; and
  - “Show me where” — tell me where I need to pay attention.
How do we compare with other Big Data silos?

Archive Size (Petabytes)

- Facebook Images/Video: ~100
- DigitalGlobe Imagery: 63
- Netflix Video: ~3
- Walmart Customer Data: ~3

Sources: Facebook IPO Prospectus, May 2012; Bloomberg, May 2013; SAS, 2012
Our Vision:

“to provide a living digital inventory of everything on the surface of the planet”

FUSION WITH NON-IMAGE DATA + MACHINE LEARNING & CROWDSOURCING + MODELS & KNOWLEDGE BASES

Global A Priory Knowledge → Local Hi-res Multi-temporal Measurements → Local Hi-res Knowledge → Global Augmented Knowledge
We can process and see the world every day
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Examples of GBD™Layers

Base Layers
• Surface Reflectance
• Country Scale Orthomosaics
• 3D Terrain Data

Very High Resolution LULC Maps
• Agricultural: field boundaries
• Agricultural: crop identification
• Agricultural: crop monitoring
• Agricultural: crop rotation
• Forestry: forest acreage determination
• Forestry: tree species differentiation
• Geology Maps

Objects and Facilities Detection
• Car, plane, containers counts
• Parking Lot identification
• Oil tank detection and measurements

Quantifying Human Presence
• Built-up extent
• Building footprints
• Building centroids and areas
• Population density estimates
• Village boundaries with population counts
• Detection of building patterns: slums
• Detection of new construction
• Detection of building improvements

Disaster and Crisis Management
• Damaged houses
• Burned houses
• Flooded houses
• Debris fields
• Downed trees
• Plane wreckage
Monitor crop rotation

Leon, Spain, crop inventorying, June 2011
Monitor crop rotation
Monitor factory output

Manufactured Cars: 11787  Employee Cars: 1497

WEEK 1
Monitor factory output

Manufactured Cars: 5579  Employee Cars: 1762

WEEK 4
Monitor factory output

Manufactured Cars: 8061  Employee Cars: 2749

WEEK 9
Identify new construction and new buildings

12/18/2013
Identify new construction and new buildings
Identify new construction and new buildings
Identify new construction and new buildings
Identify man-made structures

Japan: 377,944 Km²
Processed in 3 hours

3 x 48 core clusters to process daily take

24 x 48 core clusters to process the globe in 10 days
Mapping Unchartered Territory in Africa
Producing High-res Res Population Density Estimates
DigitalGlobe Population Density Estimates

DigitalGlobe’s WV2 (50m cells)
Producing High-res Res Population Density Estimates
Population Density Estimates Available Today

LandScan (1Km cells)
But….machine learning is hard

Use Humans and Machines!

Imagery → Automated Processing → Crowd

Expert Analysis ← Key features ← Reliability Algorithm

CrowdRank™
How might we quickly analyze this image?
We could have a human analyst examine it
Two analysts would make the job go faster
Many analysts would speed it even more
Our CrowdRank™ Technology Develops the Consensus of the Crowd
...Into This Damage Map, In an Hour
...which can be searched and analyzed to form useful information

Destroyed Property Value = $1.95M
MH 370: World’s largest crowdsourcing project?
Media Frenzy Drives Traffic to DigitalGlobe

Volunteers pore over satellite images

Crowdsourcing to solve plane mystery?

Around 2.9 million areas of interest have been tagged by internet users scouring satellite data as investigations continue into the crew of the missing Boeing 777-200.

Three million Internet users viewed images online.

HTTP Requests per Minute
Some impressive statistics…

CROWD

8 MILLION
GUEST USER
ACCOUNTS

MAPS VIEWED

775 MILLION
MAP VIEWS

IMAGERY ANALYZED

NEW EMAIL ADDRESSES

911 THOUSAND
EMAILS CAPTURED

TAGS

14 MILLION
TAGS PLACED

SERVER LOAD

500 THOUSAND
HTTP REQUESTS
PER SECOND

@
Conclusion

Through a combination of computer vision, machine learning, crowdsourcing, DigitalGlobe has begun turning large volumes of raw very high resolution imagery into actionable knowledge scaling to state and country sized regions. These dynamically evolving Geospatial Big Data™ layers enable the information and insight applications that will make us, by 2020, the indispensable source of information about our changing planet.