GLOBAL MARKETING INSIGHTS, INC.

Geospatial Business Intelligence Experts™ providing:

-Geospatial Collaboration for Commercial, Academic, State, Federal and DOD clients.

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"History …To…Present"

Commercial

REMOTE SENSING

GIS USERS OF NORTHERN OHIO

(GUONO)

December 10th, 2012

GLOBAL MARKETING INSIGHTS, INC.

AGENDA

- Aerial and Satellite Imagery Past and Present
- Political Impacts &Economic Impacts
- State and Local Govt Data Needs
- Close

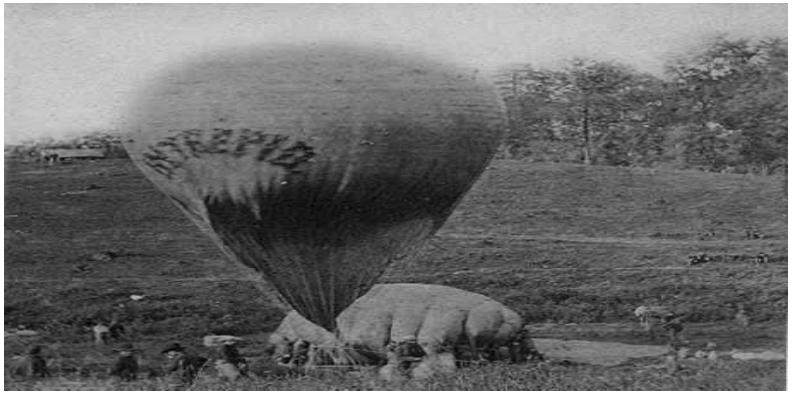
Remote Sensing History

The Following Are Various Remote Sensing Technologies And/or Methodologies Employed And/or Deployed And Driving Forces For Change/Adaptation:

- *Hot Air Balloons (1800's - Present)*
- *Pigeons (Early 1900's)*
- *Film Based Imagery Captured By Aircraft (Early 1900's – Present)*
- *Film and Digital Camera Imagery Commercial Market (1920's – Present)*
- *Extra-Atmosphere Military/Intelligence Imagery (Early 1960's – Present)*
- *Extra-Atmosphere Civilian/Commercial Imagery (Early 1970's – Present)*
- *Major Investment And Game Changers NGA Contracts (1999 – Present)*
- *Major Investment And Game Changers Google, Bing Maps (Present)*
- *Game Changers "The Human Sensor" (Present)*
- *What Comes Next????*

Remote Sensing History

Use of Hot Air Balloons With Film Cameras Operated By Photographer:



Balloon Intrepid Used For Aerial Photography By Union Army (1863)

San Francisco 1906 After The Great Earthquake

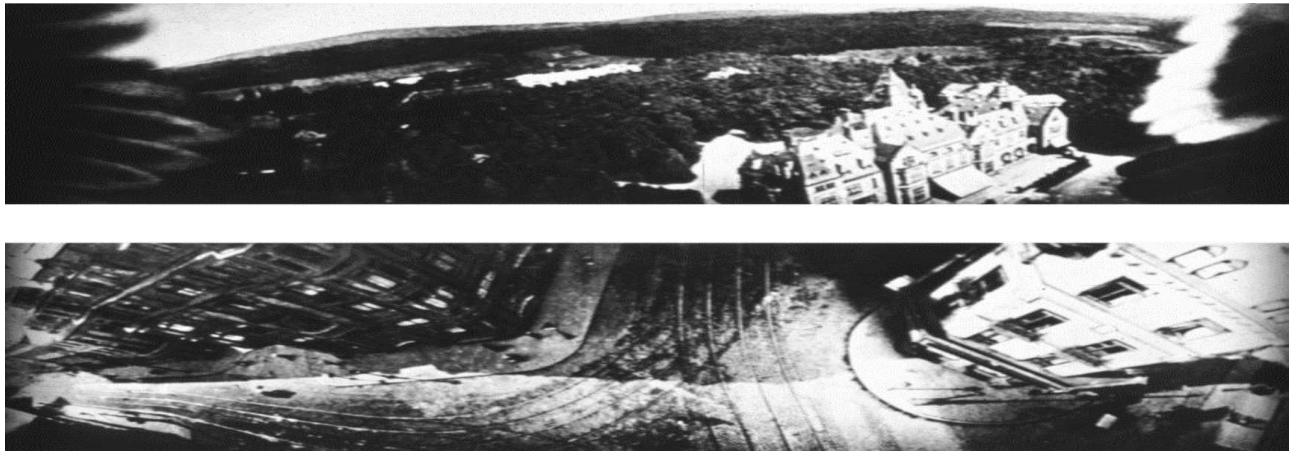
Remote Sensing History

Use of Pigeons With Cameras Attached:

"STOP THAT PIGEON!" Dick Dastardly

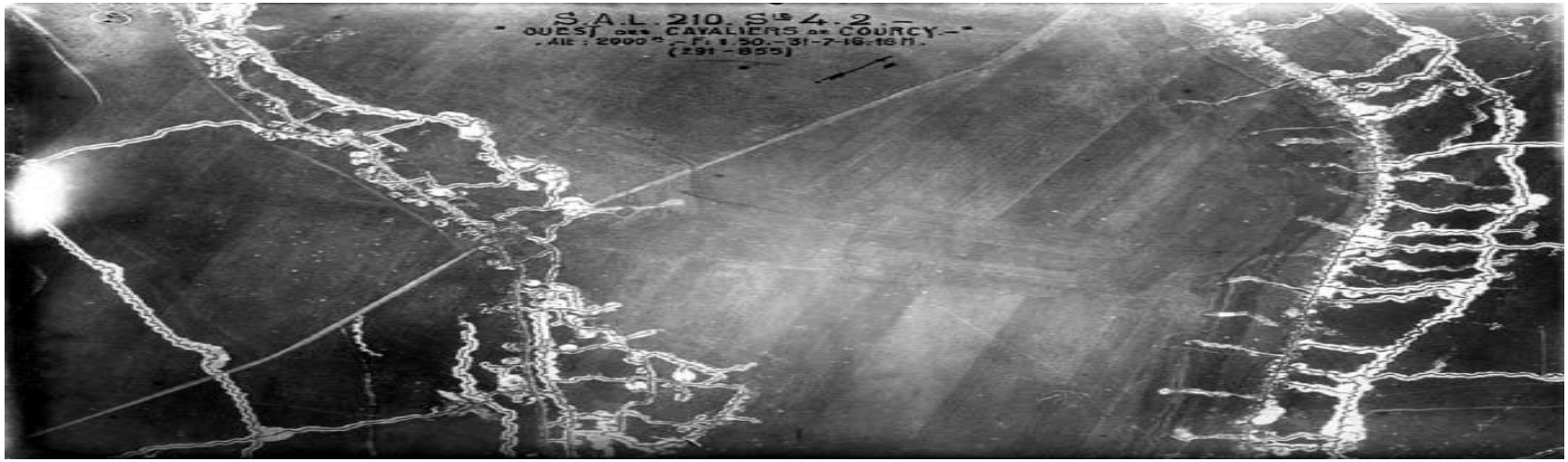
Carrier Pigeon With Camera Attached

Bavarian Pigeon Corps 1903



Pigeon Camera Imagery Obscured By Wings (Upper Image)

Remote Sensing History



Aerial Photograph Showing Trenches In France (1917)

WWII Era P-38 Lightning High Altitude Photo Reconnaissance Plane

Remote Sensing History

Military Use of Aircraft With Film Cameras:

SR-71 Blackbird Capable of Speeds
> 2,000 mph at > 70,000’

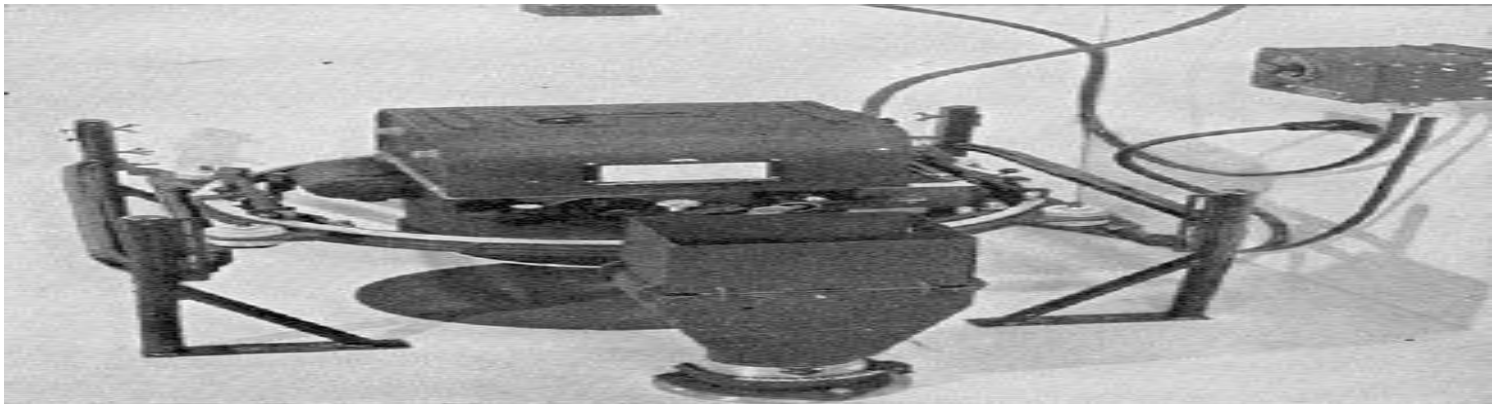
U-2 Aircraft Similar to Plane flown by F. Gary Powers Flown Shot Down in 1960

Remote Sensing History

Commercial Use of Aircraft With Film Cameras:

•*Grew Greatly After WWI*

Surplus Airco D.H. 9 WWI Bomber
Used For Commercial Air Photos

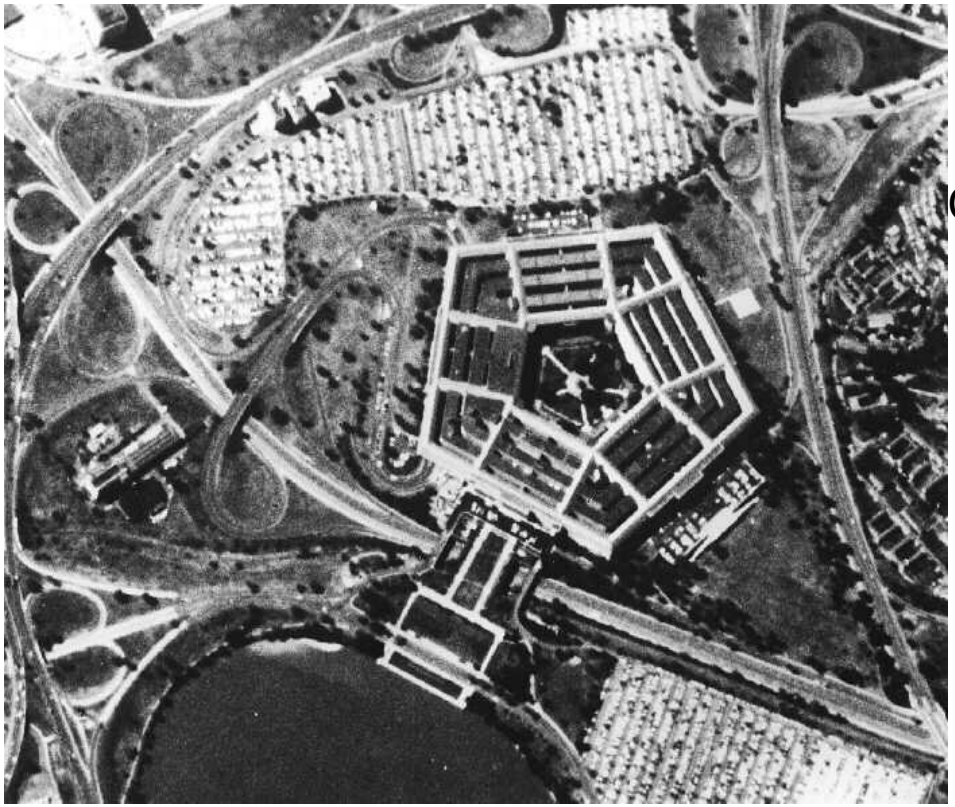


Fairchild Aerial Camera Late 1920's
Technology Remains in Use Today

Remote Sensing History

Extra Atmosphere Military/Intelligence Imagery:

•*Corona (1960's – Early 1970's)*

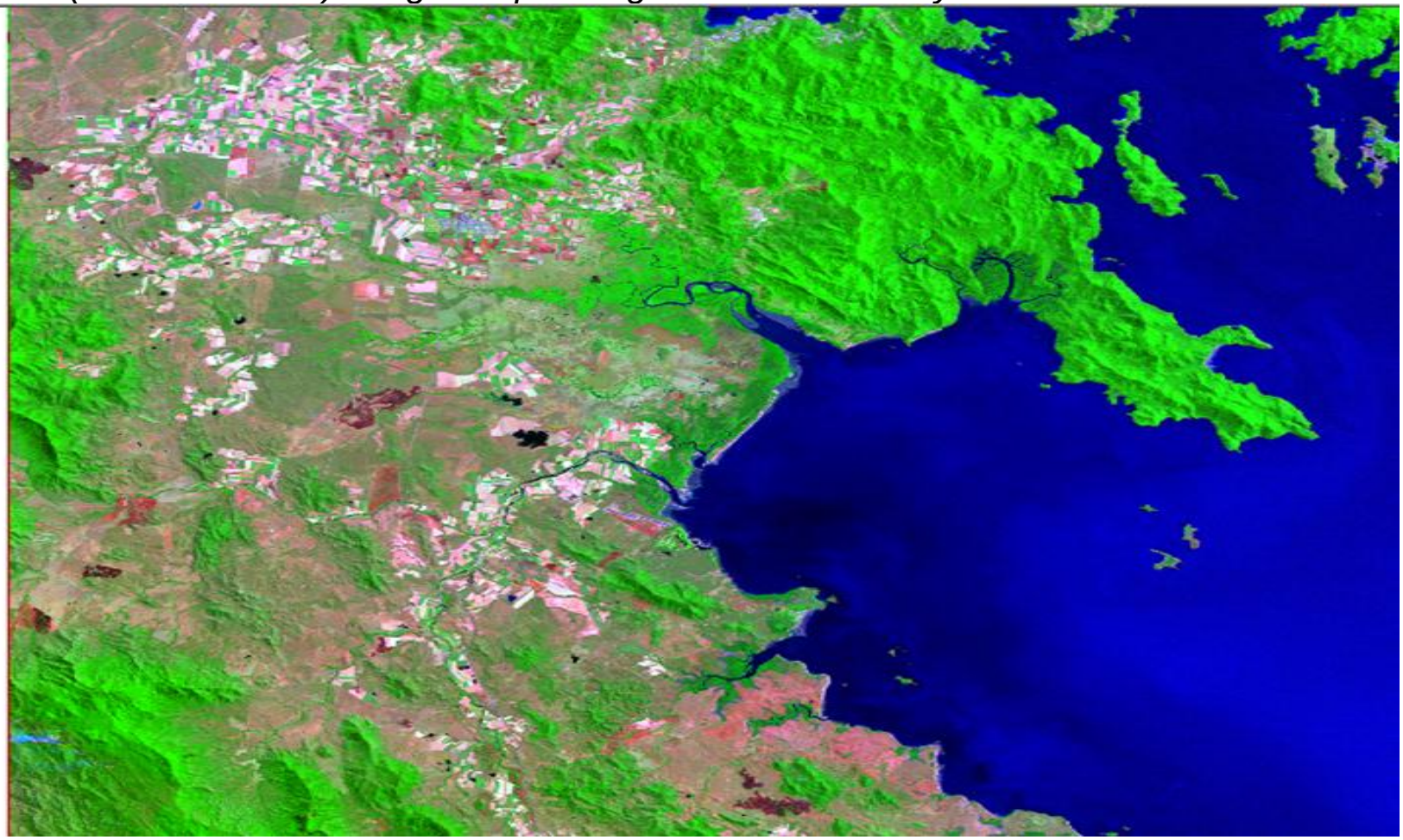


Corona Image of The Pentagon in The Late 1960's

Mid-Air Capture of Corona Film Canister

Remote Sensing History

- ***US*** *Landsat (1972 - Present) Longest Operating Satellite in History*



Landsat 5 30 Meter Multispectral Image

Aerial Today

-Moved from sensor companies to Conglomerates, Corporate Owners and New Entrants for example:

- Hexagon
- Microsoft
- Trimble
- Teledyne-Optech

-100’s of new sensors in development

-UAV’s and UAS’

Satellite's Today

OTHER US PROGRAMS:

- ***US Earthwatch*** *1994*

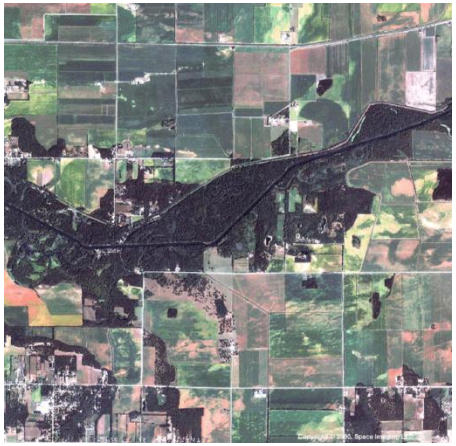
– *Became* ***Digital Globe*** *High Resolution*
Since 2001 3 Satellites Operating

- ***US OrbImage*** *1995*

Eventually merged in 1999 with ***Space Imaging*** *now*

– *Called* ***GEOEYE*** *providing High Resolution Data*

with 3 Satellites In Operation



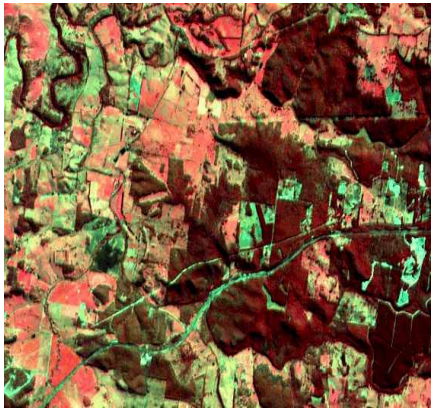
IKONOS 4 Meter

Multispectral Image

OTHER PROGRAMS:

- ***United Kingdom DMC***

2009 4 Satellites
Operating (Now owned by
EADS Astrium)



SPOT 5 20 Meter

Multispectral Image

Quickbird 2.4 Meter

Multispectral Image

US Investment started the Global Commercial Remote Sensing Market

- **The Landsat program was privatized through the 1984 Land Remote Sensing Commercialization Act (P.L. 98-365).**

This is still the core network used by all commercial satellite providers today…

POLITICS CHANGES
Viewpoints at the State Level

- The National Digital Ortho Program (NDOP) was chartered in 1993 as a consortium of federal agencies with the mission of "developing and maintaining national orthoimagery programs in the public domain."
- The National Agriculture Imagery Program (NAIP) began in 2002 flying five states as a pilot; in order to update the base layer with more current imagery flown during the growing season.
- By the end of the 2007 flying season, 46 continental U.S. states will have NAIP imagery as a base layer. One-meter NAIP imagery was acquired on a five-year cycle, but states that set up partnerships have been able to receive 1-meter imagery sooner than, or in addition to, the original plan.
- https://coes.apfo.usda.gov/index.html to access the imagery library

POLITICS CHANGES
Federal Viewpoints

- Congress replaced the Act with the Land Remote Sensing Policy Act of 1992 (P.L. 102-555), moving Landsat from Department of Commerce to the Department of Defense and NASA due to its importance to National Security and the Environment..

- All Commercial Satellite Companies must obtain an operating license from NOAA's commercial regulatory affairs office for such systems. (The first successful launch of a "commercial" imaging satellite, Space Imaging's Ikonos 2, was achieved in September 1999. It provided 1-meter data.)

Current US Licensees

- Ball Aerospace: SAR
- Cosmogia: Dove-1
- DigitalGlobe:
  - QuickBird-II follow-on
  - WorldView
- DISH Operating: EchoStar-11
- Drexel University:Dragonsat-1
- GeoEye:
  - IKONOS
  - GeoEye-1
  - GeoEye-2&3
- GeoMetWatch: GMW 1-6
- Kentucky Space: KySat-2
- Northrop Grumman:
  - Continuum
  - Trinidad
- Technica: EagleEye
- Skybox Imaging: SkySat-1
- University Of California, Irvine: UCISAT-1
- University of Michigan: M-Cubed

INDIA

IRS 1-B 23 Meter Multispectral Image

India IRS Series Since 1988

- *A, B, C, D, 10 Satellites in Service*

- **Resourcesat 1-4 series:**
  - Addition of new sensors with 12.5km swath based on 500mm optics
    - Liss-IV*n* at 2.5m, 3-4 bands, 5 day revisit
    - Liss-V*n* at 1.25m PAN, 5 day revisit
    - HSI*n* at 12.5m, 200 bands, 5 day revisit
- **Increased resolution for Cartosat Series: Cartosat 1, 1A, 2 and 2A operational**
  - PAN at 0.5m resolution
  - MSI at 2-4m, 4 bands
  - HSI at 8m, ~200 bands
  - Swath at 8-10km
- **RISAT – First IRS SAR system: Planned**
  - C-Band SAR
  - 10km swath in Spot mode, 240km swath in Scan mode
  - Resolution at 1m to 50m
  - Single/Dual polarization

OTHER COUNTRIES

- ***China Brazil – CBERS 1 and 2 since 1984, developing over 50 EO satellites***
- ***Russia – Resurs 1 others since 1995***
- ***Japan - Multispectral and Radar 1988***
- ***Israel – EROS A and B since 2000***
- ***France SPOT -*** *now* ***EADS Astrium Services*** *Since*
  - *1986 SPOT 5 Operating*
  - *Planned SPOT 6 and 7*
  - *Pleiades 1A and 1B planned*
- ***Europe -(e-Geos and other partners, ESA)***
  - *Cosmos SkyMed 1-4 (Radar Satellites 2005)*
- ***Canada - MDA Radar Satellites 1993***
- ***Canada – Blackbridge Group purchased German operated Rapid Eye System out of Bankruptcy – 5 Satellites*** BlackBridge Geomatics Corp., (previously Iunctus Geomatics, Corp.) the leading supplier of optical satellite imagery in Canada, announced today that it has acquired the assets RapidEye AG of Brandenburg an der Havel, Germany, a global provider of high-resolution imagery and geospatial solutions. The purchase was finalized on Monday, August 29, 2011 in Potsdam, Germany.
- ***SPAIN –*** *Elecnor Deimos 1*

OTHER Countries buying NOT building

- Nigeria
- Algeria
- Morocco
- Kenya
- Korea
- Somalia
- South America
- Turkey

Planned with ≥1meter Resolution

Region	Launch Year	Satellite	Manufacturer	Operator	Resolution
North America	2012 2013	SkySat-1 SkySat-2	Skybox Imaging	Skybox Imaging	TBD- approved for "high-res"
	4Q 2012	GeoEye-2	Lockheed Martin	GeoEye	.25m
	4Q 2014	Worldview-3	Ball Aerospace	DigitalGlobe	.31m
Europe	Dec 2011	Pleiades-1A	EADS Astrium	Astrium GIS	.5m (actual .7m)
	March 2013	Pleiades-1B	EADS Astrium	Astrium GIS	.5m
	2012	SPOT 6	EADS Astrium	Astrium GIS	1.5m
	2014	SPOT 7	EADS Astrium	Astrium GIS	1.5m
	Q3 2013	Deimos-2	Satrec Initiative	Elecnor-Deimos	1.0m
	2014	DMC3-A,-B,-C	SSTL	DMCii	1.0m
Middle East/Africa	TBD	EROS-C	IAI	ImageSat Int'l	.5m
	2012	Gokturk-2		Turkish Gov't	<1 m
	2013	Gokturk-1	Telespazio and Thales-Alenia	Turkish Gov't	.3m
Asia	2015	Cartosat 3A	ISRO	ISRO/Antrix	.3m
	2012	Kompsat 3	KARI, Astrium	KARI	.7m
	July 2012	Resurs-P1		Russia	.9m
Japan	2012; 2013; 2017; 2020	ASNARO or NEXTAR	NEC	PASCO	.7m to .5m with potentially .3m

Remote Sensing Triggering Events

Major Investment/Game Changers :

•*NGA (National Geospatial-Intelligence Agency) Invests Billions!*

- *1999 Funded IKONOS Space Imaging Now GeoEye*
- *Funded GeoEye 1 (2008) and Funding GeoEye 2*
- *2001 Funded Quickbird DigitalGlobe*
- *Funded WorldView 1 (2008) and 2 (2010) DigitalGlobe*
- *Purchasing Large Amounts of Commercial Imagery From All Sources*

As of 2012 Digital Globe and GeoEye merger under review by the Department of Justice

Remote Sensing Triggering Events

Major Investment/Game Changers:

- *Google and Bing Maps*
  - *Purchase Millions of Dollars of High Resolution Satellite Imagery Every Year (DigitalGlobe/GeoEye)*
  - *Microsoft Owns Bing & Vexcel A Major Digital Camera Manufacturer and is Funding R&D for Better Cameras*
  - *Purchase Millions of Dollars of Aerial Imagery Every Year*
  - *Providing Work For Numerous Aerial Imagery Companies in US and Abroad Updating Maps and Imagery*
- ***GOOGLE now has Google Earth and Google Earth Builder and "Big Data Query"***
- *NOW INDIA AND CHINA doing the same Map World and Bhuvan*

Millions of Dollars Invested Yearly In Commercial Remote Sensing

Remote Sensing Triggering Events

Game Changers:

- *The "Human Sensor"*
  - *Social Networking Allows For Real Time Postings of Visual and Textual Data*
  - *Bing and Google Allow For Comments and Changes to Map Data on the Fly*
  - *Cloud Computing Provides Software and Data Access to Millions*
  - *Geospatial Interfaces Continue to be Easier to Understand and Use*
  - *GPS Units in Vehicles, Phones, and* PDAs With Addresses and Descriptions of Businesses/Services Have Become Commonplace and Content is or can be Updated by Users Regularly

Remote Sensing Triggering Events

SOCIAL MEDIA

United States Geospatial Intelligence Foundation (USGIF)
Global

Basic Info

Name: United States Geospatial Intelligence Foundation (USGIF)
Category: Organizations – Non-Profit Organizations
Description: The United States Geospatial Intelligence Foundation (USGIF) is the only organization dedicated to promoting the geospatial intelligence tradecraft and building a stronger community of interest across industry, academia, government, professional organizations and individual stakeholders.

As a not-for-profit educational foundation, USGIF strives to bring together the community at-large and support life-long learning that will ensure a robust cadre of professionals and a healthy tradecraft now and in the future.

Join us as we pursue our mission.

Contact Info

Email: aimee.correnti@usgif.org
Website: http://www.usgif.org
Office: USGIF
Location: 2325 Dulles Corner Boulevard, Suite 450

Recent News

http://www.usgif.org/NewsMedia_PressReleases.aspx

Members

Displaying 8 of 188 members — See All

Catherine Ayers, Ray Atkinson, Geospatial Ita, Rod Sheppard, Daniel F. Bassill, Gis Elshayal Smart Gis, Amber Topoleski, Rick Steffers

The Wall

Join this Group

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Group Type

This is an open group. Anyone can join and invite others to join.

Officers

Aimee McGranahan Correnti (Washington, DC)
Vice President of Operations

Admins

- Lindsey Christine Dunn (George Mason)
- Jordan Fuhr (Washington, DC)
- Matthew Langan (Washington, DC)
- Carrie Layfield Drake (Kentucky)
- Aimee McGranahan Correnti (Washington, DC) (creator)

Events

See All

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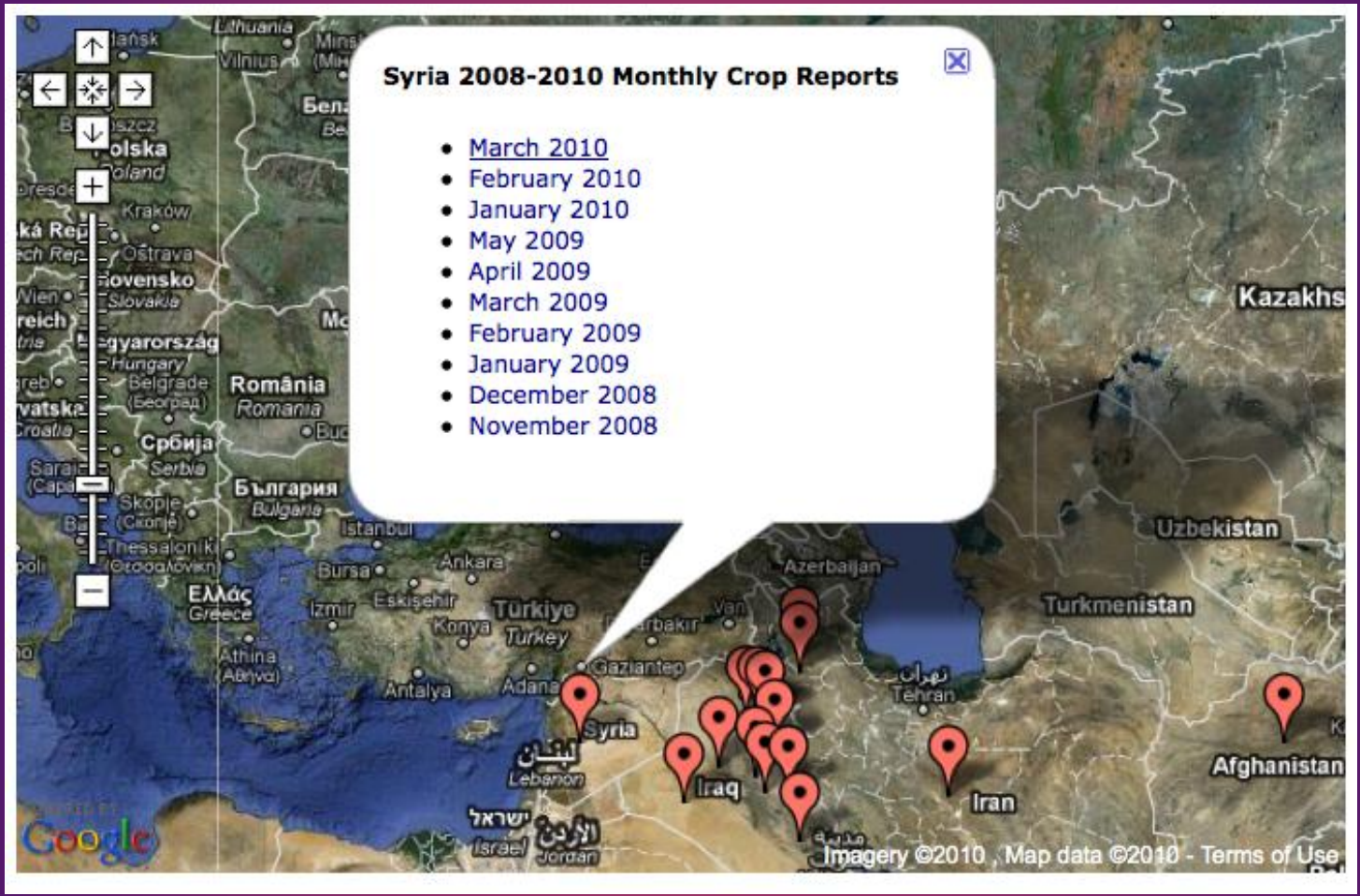
Remote Sensing Triggering Events

Community Sourced Data for Live Updates



Remote Sensing Triggering Events

What Comes Next???:

•*Holography/Virtual Reality*

- *Holography Will Allow For Persons to Appear to be in More Than a Single Place at Time Greatly Improving Person to Person Communications (Speaking/Personal Interaction Will Return)*
- *Virtual Reality 3-D(4-D)Screens Will Allow Homes Walls to Disappear and be Replaced by Pleasant Surrounding Images*
- *Cloud Computing and Communications Satellites provide Global Connections to Applications*
- *Geospatial Interfaces Will be as Easy to Use and As Simple Touch Screens*

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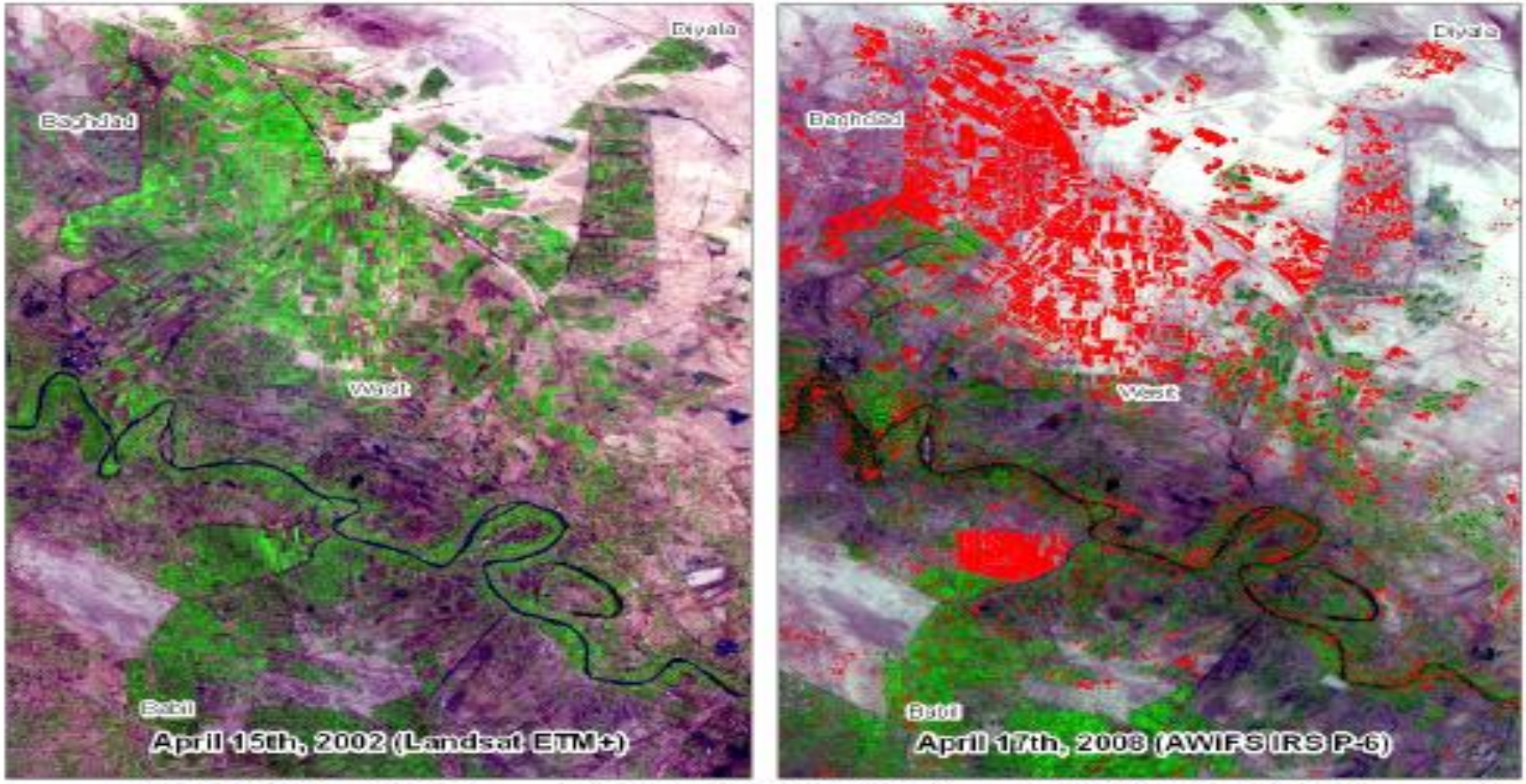
Remote Sensing Using Convergence of Evidence Methodology: used when local resources are not available.

Multi-temporal Change Detection: Comparison of Current and Archived Data



Spectral Bands 3,4 and 5

Data Source: Landsat ETM+/AWIFS IRS P-6
Data Provided by: Archive Explorer/NGA
Supporting: USDA/FAS/OCA
International Production Assessment Division

Spectral Bands 2, 3 and 4

USDA

Imagery Source: GeoINT On-Line 2010

Major Political and Technology Changes Impacting Remote Sensing Users "Research Excerpts"

NOAA 2012 Research Review

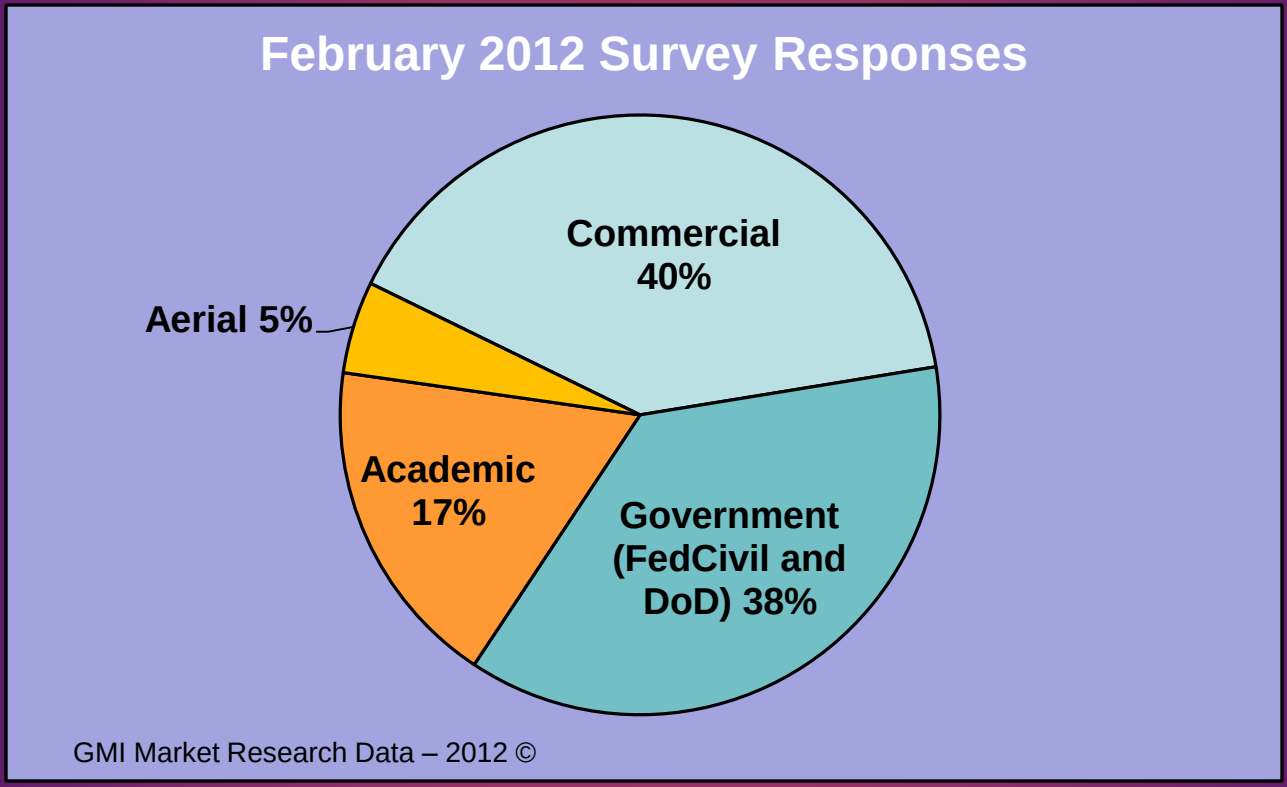
Determine impacts to remote sensing industry if the US Commercial EO Satellite Resolution Restriction is changed from .5m to .25m

NOAA 2012 Commercial EO Satellite Imagery Resolution Restriction Change On-Line Survey

- **On-line surveys:** Distributed to a US based population sample of approximately 12,000 GIS and Remote Sensing decision makers, and organizations

- **Results:** One Week collected approximately 1,000 on-line surveys in less than a week in the Gov't, Commercial and Academic and Aerial Industry Sectors

NOAA 2012Commercial EO Resolution Restriction Online Survey Results



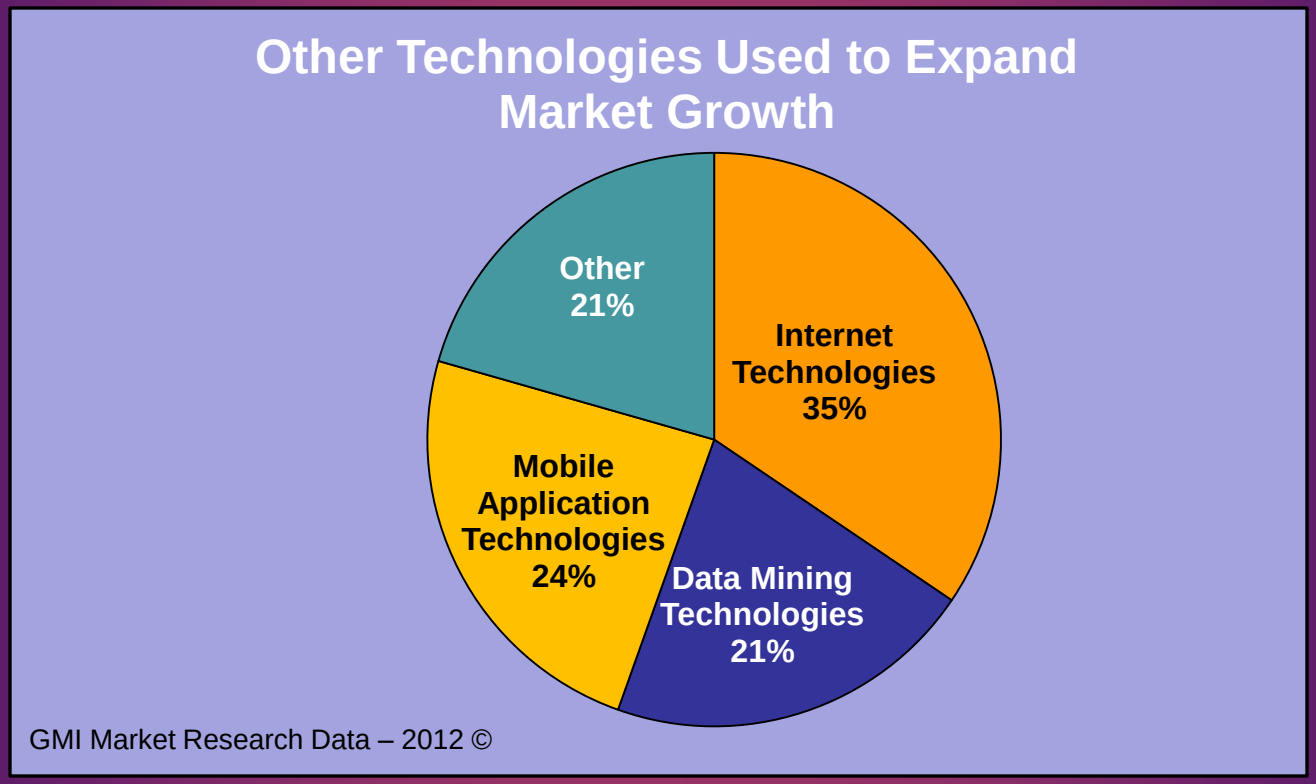
The NOAA February 2012 Commercial EO Resolution Restriction Survey was answered by participants representing the Commercial, Government, Academic and Aerial sectors of the EO industry.

Overview of Respondent Results

- **Majority of Respondents support the Commercial EO Satellite Imagery Resolution Restriction change to .25 meter.**

- **Majority of Aerial Industry predict a change in satellite resolution restriction will have a negative impact.**

Online Survey Responses-Commercial
What other technologies would you utilize to expand your market growth if the resolution restriction change to .25m takes place?

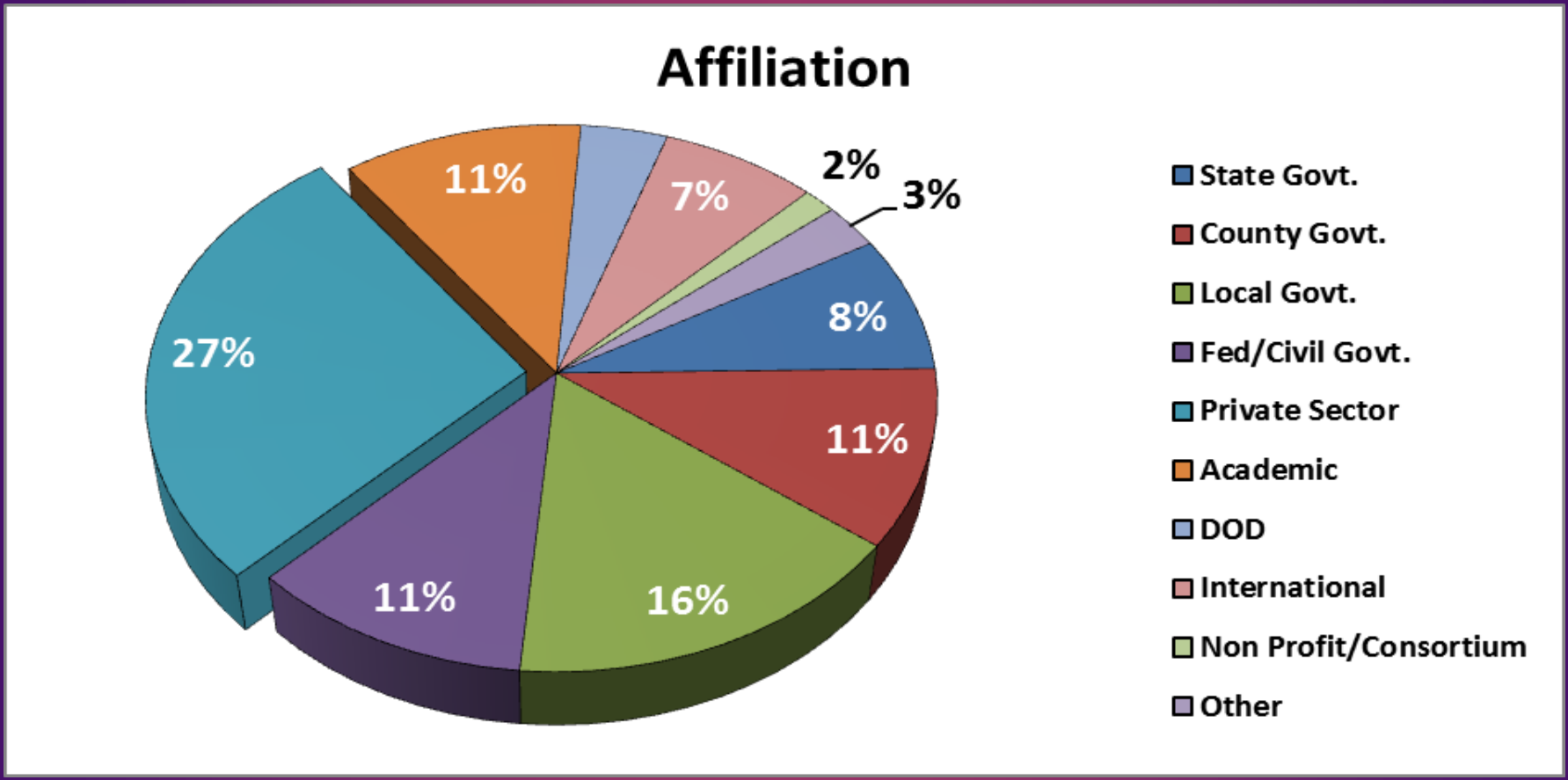


If the resolution restriction is changed, 35% of respondents will use internet technologies to leverage new opportunities for market growth, 24% will use mobile application technologies and 21% will use data mining technologies. The Other responses included All of the Above, Better Mapping and Value Added Services.

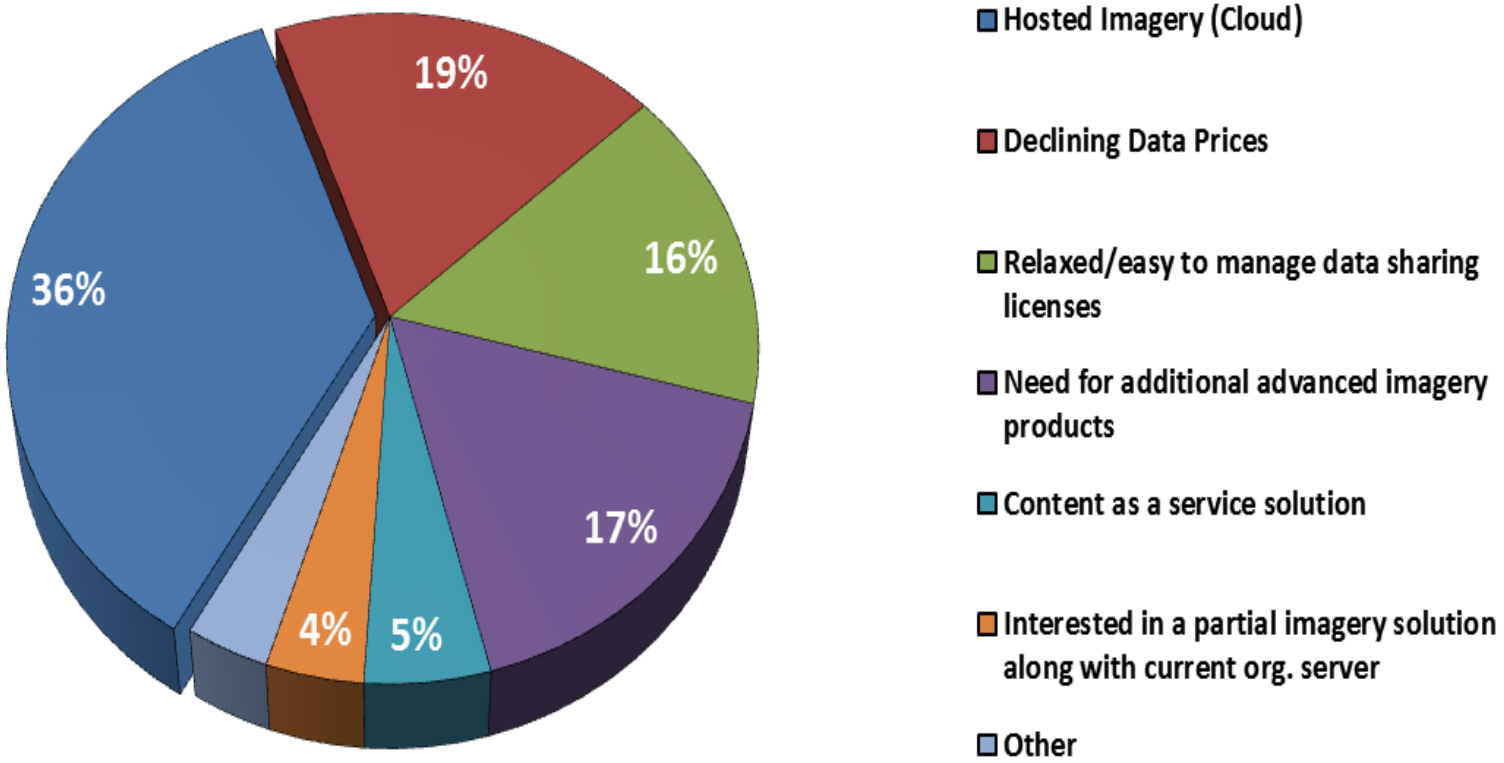
Technology Impacting Remote Sensing and State and Local Govt Usage

State and Local Gov't Research July 2012

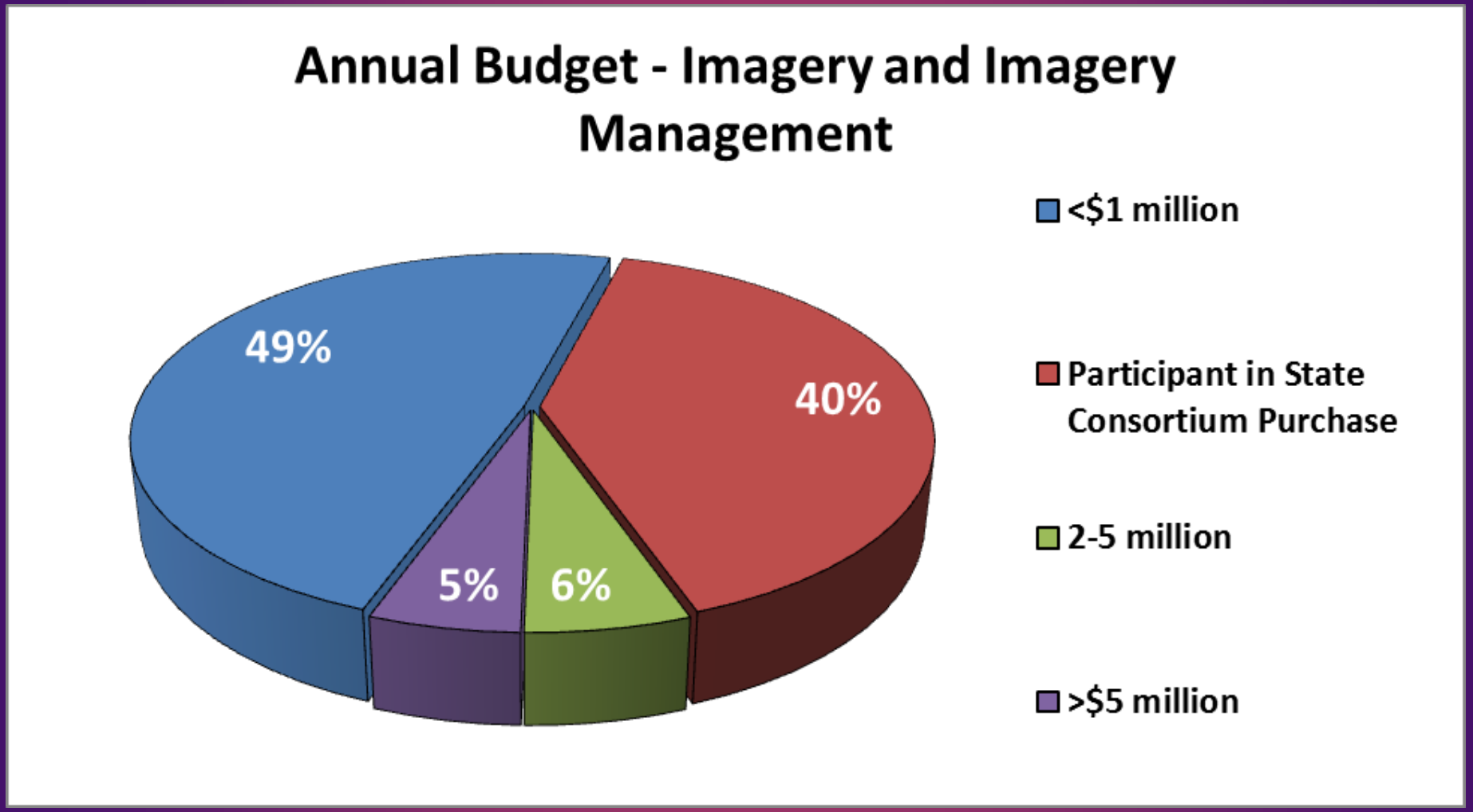
- 14,000 geospatial user audience; 130 countries



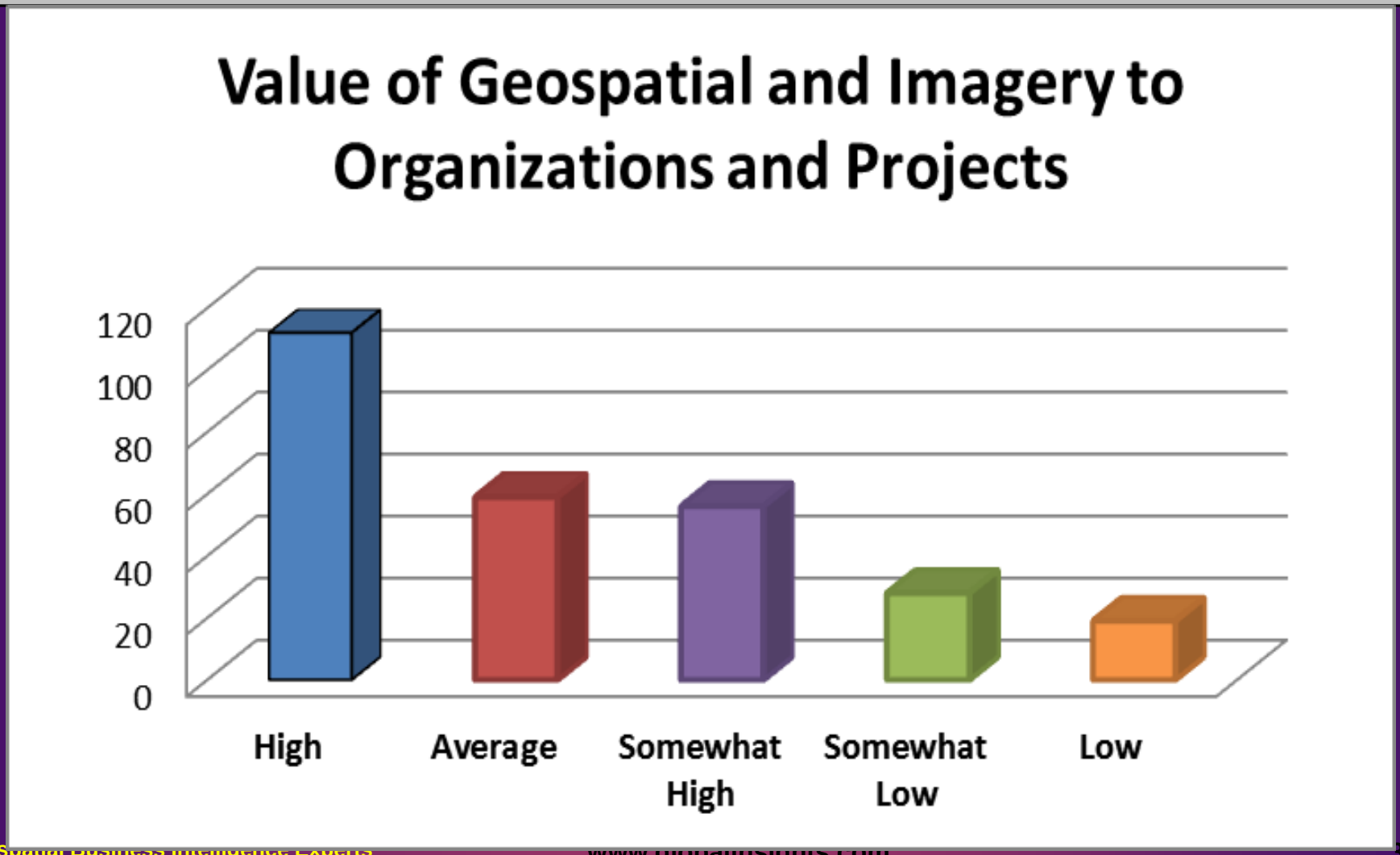
State and Local Govt Hosted Imagery (CLOUD) Biggest Impact on Imagery Buying Decisions



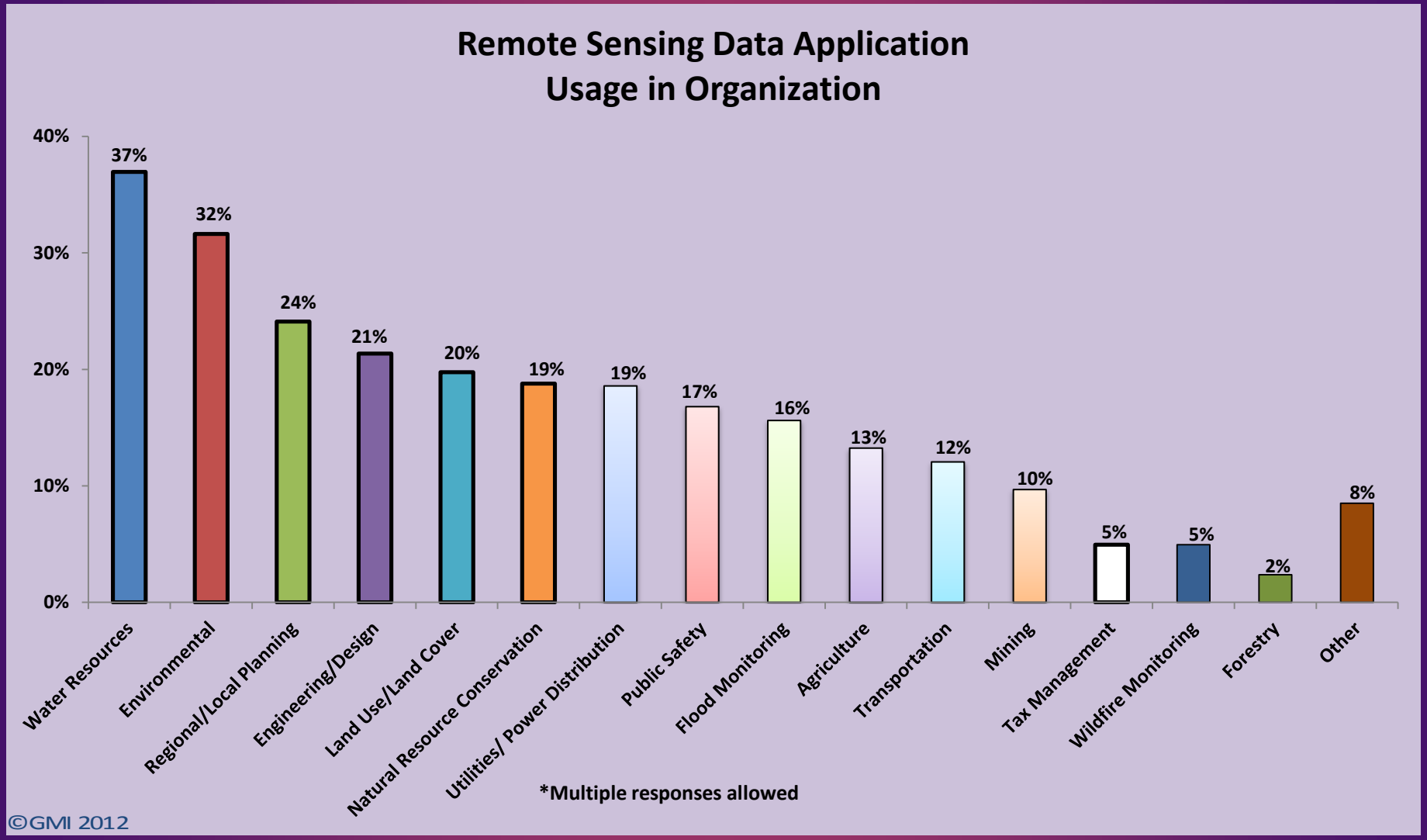
State and Local Govt Annual (US)Imagery and Imagery Management Budgets <$1M



State and Local Govt Imagery Value



State and Local Govt Applications needing Imagery On-Demand



©GMI 2012

FINAL SUMMARY

- Over 80% of Commercial respondents are in favor of a Commercial EO Satellite Imagery Resolution Restriction change to .25 meter.
- Aerial Industry believes they will be negatively impacted and will continue to build advanced sensor and sensor combinations.
- Value Added Service Providers view all coming sensors as a plus to their business especially if the Sensor is developed in the US
- State and Local Government will be using Data from other sources and will have to develop more collaborative and data sharing models to survive in coming years due to budget cuts.

Thank You!

For More Information Contact:

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