The need for improved articulation among education, credentialing, and workforce growth and management organizations

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The “Good News”

- Increased awareness about all things geospatial
- Increased funding at the community and junior college level
- Influx of capital investment in geospatial firms
- Discussion about the need for new standard occupational codes for the geospatial industry
- TREMENDOUS INFLUX INTO THE “GEOSPATIAL WORKFORCE”

Geospatial Services: A $1.6 Trillion Growth Engine for the U.S. Economy

How Consumers and Businesses Benefit from Location-Based Information

Heikki Henttu, Jean Manuel Izaret, and David Potere (2012). "Geospatial Services: A $1.6 Trillion Growth Engine for the U.S. Economy". A study commissioned by Google. As viewed at: https://www.bcg.com/documents/file109372.pdf

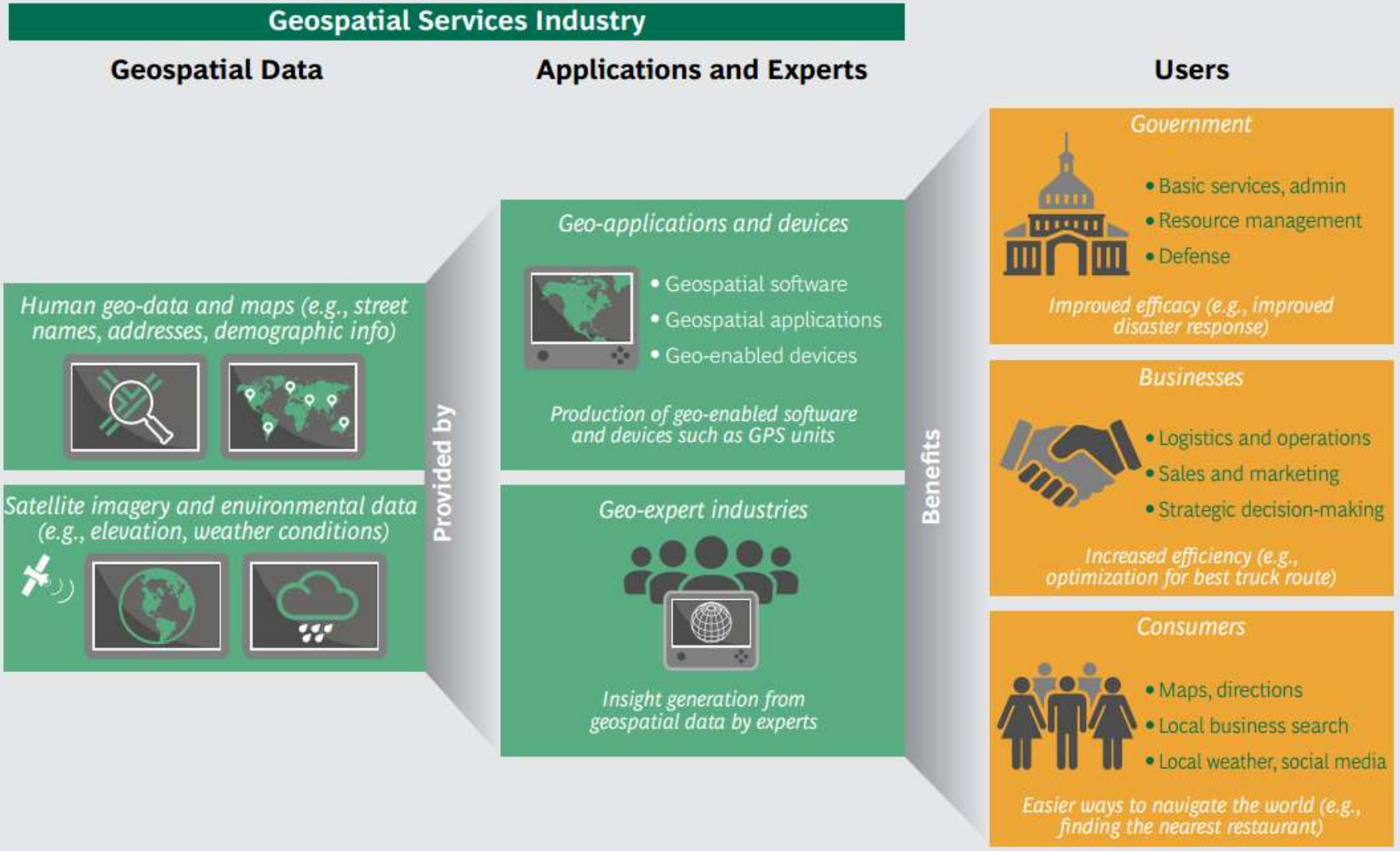
EXHIBIT 1 | Geospatial Services Have a Multiplier Effect on the Economy

Geospatial Services: Big, Essential, and Growing

Although still young, the geospatial services industry is already an enormous force in the U.S. economy, generating annual revenues of almost $75 billion (more than the U.S. paper industry), and providing jobs for 500,000 people—more than the number of airlines jobs and almost as many jobs as in residential construction.

The economic impact of the industry extends much further. Together, geospatial services companies drive $1.6 trillion in revenues and $1.4 trillion in cost savings throughout the U.S. economy. (See Exhibit 1.)

EXHIBIT 2 | The Geospatial Services Landscape



Source: BCG analysis.

The President's High Growth Job Training Initiative

In remarks to operating engineers on Labor Day 2003, President Bush laid out his groundbreaking approach for closing skills gaps: "The High Growth Job Training Initiative in this administration is aiming to give workers the skills they need to realize their dreams. It's a collaborative effort to help team up people with the jobs that are needed, to make sure that the changes in our economy don't leave people behind."

This initiative represents the first step in a series of actions that the Department of Labor's Employment and Training Administration (ETA) has taken to engage business, education and the workforce investment system to work together to develop solutions to the workforce challenges facing high growth industries. Fields like health care, information technology, and advanced manufacturing have jobs and solid career paths left open due to a lack of people qualified to fill them. The High Growth Job Training Initiative targets education and skills development resources toward helping workers gain the skills they need to build successful careers in these and other growing industries.

To put this approach into action, ETA identified 14 sectors that fit within the following criteria: (1) they are projected to add substantial numbers of new jobs to the economy or affect the growth of other industries; or (2) they are existing or emerging businesses being transformed by technology and innovation requiring new skills sets for workers. The sectors include:

- Advanced Manufacturing
- Aerospace
- Automotive
- Biotechnology
- Construction
- Energy
- Financial Services
- Geospatial Technology
- Health Care
- Homeland Security
- Hospitality
- Information Technology
- Retail
- Transportation

1.2 MILLION GEOSPATIAL PROFESSIONALS BY 2018!

Of note: the Dept. of Labor's Employment and Training Administration (ETA) tagged Geospatial Technologies as a "High Growth Industry" in March of 2010. They estimated that the geospatial technology profession will experience a growth of over 330,000 geospatial professionals between 2008 and 2018. This growth figure would bring the number of geospatial professionals to just under 1.2 million and is supported by similar estimates by other geospatial organizations. As quoted by the Geospatial Information & Technology Association (GITA), "uses for geospatial technology are so widespread and diverse, the market is growing at an annual rate of almost 35 percent, with the commercial subsection of the market expanding at the rate of 100 percent each year. "

???

FACT CERTIFICATION

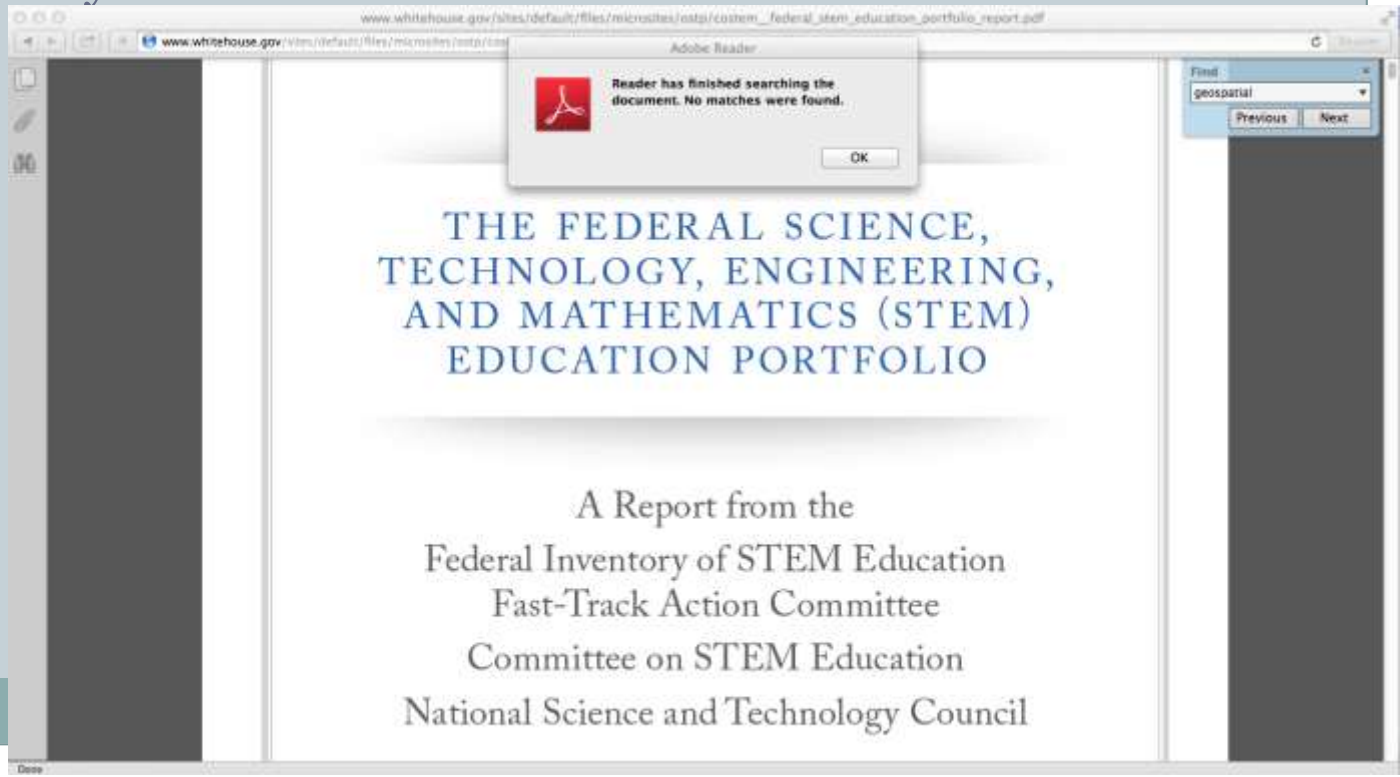
OR

How Were Such Amazing Statistics Tabulated?

- At the time of the DOLETA report, there were only 3 standard occupation codes for anything geospatial: Cartographer, Surveyor, and Photogrammatrist.
- The U.S. Federal Government does not have a contracting code for geospatial data or services.
- Until late 2010, there were no degree (CIP) codes for geospatial technologies in the collegiate/university system.
- An estimated 50% of formal geospatial coursework is taught by non-geography departments.

Mixed Messages?

- Are Geospatial Technologies considered a STEM discipline?
  - NSF says “Yes”
  - White House says “No”



Academic Challenges

- Difficulty in identifying a true geospatial curriculum pathway for students wishing to enter the workforce.
  - No true degree programs
  - No accrediting body
  - No standardized curriculum facilitating transfer of credit from community/junior college system to universities
- Lack of funding to build programs at the university level, especially within state-funded schools
  - Many state schools are moving to a funding formula which reimburses the university budget based on cost of instruction
  - Courses taught by a geography department are typically weighted at a multiplier of "1" – GIS needs costly hardware, more physical space per student, etc…

Formula Funding Weights Reflect the Variable Costs by Discipline and Level

	Lower Division	Upper Division	Masters	Doctoral
Liberal Arts	1.00	1.77	4.01	9.94
Science	1.67	2.93	7.29	20.05
Fine Arts	1.50	2.51	5.65	9.78
Business	1.18	1.68	3.70	19.08
Engineering	2.46	3.51	7.39	17.05
Teacher Ed	1.33	1.79	2.68	7.70

Example: (SCH x Weight x Rate per weighted SCH)

* Rate set by the Legislature
  - Liberal Arts Freshman taking 15 hrs =
    15 SCH x 1.0 x $59.02 = $885.30 <less tuition>, net = $135.30
  - Science Masters student taking 9 hrs =
    9 SCH x 7.29 x $59.02 = $3,872.30 <less tuition>, = $2,972.30

Courtesy the University of Texas at San Antonio (2008)

Articulation and Credentialing Problems

- GISP, CP, RLS, certifications and licenses and the list goes on…
- UCGIS Body of Knowledge, GCTM, etc.. – curriculum models galore.
- Which curriculum model articulates to what credential?
- Which credentials align with which positions?
- Which academic program supports which credential?
- Are those who teach geospatial technologies appropriately credentialed and in possession of the right experience/skill sets?

Workforce Challenges

- Numerous competing interests offering credentials
- Employers cannot readily identify qualifications of job candidates
  - Numerous certificates offered by both academia and industry
  - Numerous certification programs
  - Confusion between a certificate and certification
- Employers are challenged in finding appropriate professional development programs, especially those new to the geospatial domain

Shifting Sands

- Increasing certifications
  - GIS Professional (GISCI)
  - Certified Geospatial Manager (URISA)
  - Certified Photogrammetrist, Certified Mapping Scientist… (ASPRS)
  - Academic certificates and certification
  - Esri/vendor-specific certificates and certification
- Emergence of degree code within academia (2010) coupled to decreased funding. GIS programs are beginning to shutter their doors
- Increased workplace demand for credentials and experience

URISA Salary Survey: Are We Saturating the Employment Marketplace?

Table 3. Respondents' Average Salaries by Employer Type

Employer Type	2006	2010	% Change
Municipal Government	$59,361	$61,711	4.0%
County Government	$55,208	$56,607	2.5%
State or Provincial Agency	$56,341	$60,942	8.2%
Regional Consortium / Regional Agency	$60,842	$52,500	-13.7%
Federal Agency	$71,032	$66,875	-5.9%
Private Sector	$65,236	$65,675	0.7%
Public Utility	$55,663	$67,652	21.5%
University/Research Organizations	$61,956	$58,900	- 4.9%
Student	$31,731	$21,667	-31.7%
Other	$58,750	$57,935	-1.4%

Salaries have not kept pace with inflation. Bureau of Labor Statistics estimates that $59,361 in 2006 should have been 64,206 in 2010 (7.5%).

The Coming Crisis

- Absent a definition of the geospatial industry, our activities will continue to diffuse and eventually become indistinct from the vertical markets they now serve
- Academia will saturate (if it hasn't already) the geospatial jobs marketplace
- An increasing diversity in academic preparation will continue to confound potential employers
- Credentials will become meaningless – there will be too many for anyone to make sense of or for them to be of value
- Large GIS companies trying to be everything to everyone will lose market position to more agile start-ups as core products and services lose base

Corrective Actions

- Geospatial as an Applied Science
  - As Computer Science gave rise to Computer Information Systems, it's time for Geography to deliver Geospatial Information Science and Technologies as an Applied Science Discipline
  - Academic major which provides a broad base of geospatial coursework addressing workforce and credentialing needs for journeymen (include in depth coursework in surveying, geostats, programming, web services, systems architecture, photogrammetry, remote sensing, GIS, visualization, mobile technologies)
  - Develop more cooperative education programs

Corrective Actions

- Re-vamp graduate professional program curriculum
- Maintain generalist to specialist approach by leveraging broad spectrum journeymen undergrad programs to create master's level specialist programs with heavy coursework in vertical markets
  - Oil and gas
  - Disaster/emergency response
  - Healthcare
  - Planning
  - Environmental Science…

Corrective Actions

- Professional societies and trade groups need to unite to create a system of “portable, transparent, and modular credentials” (Darryl Murdock, USGIF)
- No organization “gives anything up”, but rather commits to interoperability in credentialing
- All credentials become ABET accredited
- Academic curriculum incorporate credentialing process
- Incentives for faculty to gain industry credentials

Corrective Actions

- Federal Government assumes a leadership role which facilitates coordinates among professional societies, industry, government, and academia (FGDC gets a funding increase to make this happen?)
- Federal Government improves industry/contracting data collection
- Federal Government evaluates proposals based upon credentials (does not require them aka Brooks Act – something gentler is needed otherwise innovation gets stymied)
- The “Geospatial Industry” gains definition…

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http://www.gita.org