Growing the Geospatial Workforce

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Empowering Colleges: Expanding the Geospatial Workforce

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GeoTech Center New Funding

Growing the Workforce

The National Geospatial Technology Center of Excellence was notified in March of 2017 that it has received funding for an additional five years from the National Science Foundation (NSF) - Advanced Technological Education (ATE) (DUE 1700496).
GeoTech Team

- Vince DiNoto – Director/PI (Kentucky)
- Ann Johnson – Assoc. Director/co-PI (Idaho)
- Ken Yanow – Assoc. Director/co-PI (California)
- Nicole Ernst – Assoc. Director/co-PI (Pennsylvania)
- Rich Schultz – Assoc. Director/co-PI (Illinois)
- Rodney Jackson – Senior Team (North Carolina)
- Chris Cruz – Senior Team (California)
- Ming Tsou – Senior Team (California)
- Thomas Mueller – Senior Team (Pennsylvania)
- Wing Cheung – Senior Team (California)
- Adam Dastrup – Senior Team (Utah)
- John Johnson – Senior Team (California)
Consultants and Evaluator

- Global Skills Exchange (GSX) – David Wilcox
- U.S. GeoIntelligence Foundation (USGIF) – Daryl Murdock
- Washington State University – Candiya Mann
What’s New?

The GeoTech Center will concentrate efforts on developing curriculum and professional development in areas which are rapidly evolving as related to Growing the Workforce, through both traditional and non-traditional educational offerings.
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How does UAS Technologies fit into geospatial offerings?
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How does UAS Technologies fit into geospatial offerings?

Is there a place for GeoINT and location based intelligence in two-year college programs?
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What are the needs of the incumbent workforce?
What’s New?

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How does UAS Technologies fit into geospatial offerings?

Is there a place for GeoINT and location based intelligence in two-year college programs?

What are the needs of the incumbent workforce?

How has the field of study evolved since the last GTCM update?
Applied Research: Emerging Trends – investigate the needed skills and competencies for the GST workforce Domain.

GOAL 1 ACTIVITIES
Goal 1 Activities

Applied Research: Emerging Trends – investigate the needed skills and competencies for the GST Workforce Domain.

• White Papers on trends
• MOUs with organizations
• DACUMs on UAS Imagery/Operator
### Meta-DACUM in UAS technologies

- **Design a Curriculum process used**
- **Multiple DACUMs combined to form the Meta-DACUM**
- **Displayed is the Meta-DACUM for GIS and Remote Sensing**
Goal 1 Activities

Applied Research: Emerging Trends – investigate the needed skills and competencies for the GST workforce Domain.

- White Papers on trends
- MOUs with organizations
- DACUMs on UAS Imagery/Operator
- EBOK Crosswalk
- GTCM updates
GTCM

- [http://www.careeronestop.org/competencymodel/competency-models/geospatial-technology.aspx](http://www.careeronestop.org/competencymodel/competency-models/geospatial-technology.aspx) or off the GeoTech Center website
Content in the GTCM

Positioning and Data Acquisition

Knowledge of the unique geometric and thematic properties of geospatial data, the factors that affect data quality, and data production technologies. Includes data collection, data capture methods and technologies used to collect georeferenced observations and measurements.

Critical Work Functions

- Use specialized geospatial software to transform ellipsoid, datum, and/or map projection to georegister one set of geospatial data to another
- Geocode a list of address-referenced locations to map data encoded with geographic coordinates and attributed with address ranges
- Discuss examples of systematic and unsystematic land partitioning systems in the U.S. and their implications for land records
- Recognize that land records are administered differently around the world
- Explain the distinction between a property boundary and its representations, such as deed lines, lines on imagery, boundary depictions in cadastral (land records) databases
- Plot a legal boundary description from a deed or plat
- Design an integrated measurement system solution for acquiring and processing geospatial data
- Identify sampling strategies for field data collection, including systematic, random, and stratified methods
Updates of GTCM

• This significant documents was last updated approximately 4 years ago.
• The process will begin in the fall of 2017 and be repeated in the fall of 2020.
• In the last update more than 200 people reviewed each of the first five tiers.
Goal 1 Activities

Applied Research: Emerging Trends – investigate the needed skills and competencies for the GST workforce Domain.

• White Papers on trends
• MOUs with organizations
• DACUMs on UAS Imagery/Operator
• EBOK Crosswalk
• GTCM updates
• Program Content Tool
<table>
<thead>
<tr>
<th>ID#</th>
<th>MD#</th>
<th>GTCM</th>
<th>101 - Intro to</th>
<th>102 - Spatial Analysis</th>
<th>103 - Data Acc &amp; Visual</th>
<th>104 - Cartogr. &amp; Remote</th>
<th>105 - Geo Programming</th>
<th>All Dev</th>
<th>Competency Cluster</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>MK</td>
<td>Explain how scale affects data collection and management</td>
<td>3</td>
<td>2</td>
<td>2</td>
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<tr>
<td>2</td>
<td>A11</td>
<td>Create and build topology (subtypes and domains)</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
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<tr>
<td>3</td>
<td>MK</td>
<td>Describe the characteristics and appropriate uses of common coordinate systems, projections, datums, and geoids</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
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<tr>
<td>4</td>
<td>A11</td>
<td>Validate spatial and tabular data (e.g., topology, build, verification)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td>5</td>
<td>C2</td>
<td>Define data's spatial reference</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
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<tr>
<td>6</td>
<td>C3</td>
<td>Transform spatial data (e.g., reprojections)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
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<td>7</td>
<td>MK</td>
<td>Apply appropriate projections</td>
<td>1</td>
<td>3</td>
<td>2</td>
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<td>3</td>
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<tr>
<td>8</td>
<td>C2</td>
<td>Describe different methods of indicating locations (e.g., decimal degrees, UTM, military grid)</td>
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<td>2</td>
<td>3</td>
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<td>1</td>
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<td>9</td>
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<td>Calculate scale transformations.</td>
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<td>1</td>
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<td>10</td>
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<td>Resolve spatial conflicts</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
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<td>0</td>
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<tr>
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<td>MK</td>
<td>Determine appropriate scale</td>
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<td>2</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>3</td>
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<td>T2 Number Operations and Computation - addition, subtraction, multiplication, and division</td>
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<td>0</td>
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<tr>
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<td>MK</td>
<td>T2 Number Systems and Relationships - whole numbers, decimals, fractions, and percentages</td>
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<td>2</td>
<td>2</td>
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<td>T2 Measurement and Estimation - measurement of time, temperature, distances, length, width, height, perimeter, area, volume, weight, velocity, and speed; unit conversion; numerical analysis</td>
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<td>MK</td>
<td>T2 Geometry - size, shape, and position of features using geometric principles to solve problems</td>
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**Go to the GTMC Competency Model**

Enter course name(s) in the columns to the right; cut/paste for additional columns or delete as needed.
Enter 0 through 4 for each course based on the Scale Below.
Refer to the "Definitions" tab in this worksheet for a explanation of how it should be included in the cluster.
Goal 1 Activities

Applied Research: Emerging Trends – investigate the needed skills and competencies for the GST workforce Domain.

- White Papers on trends
- MOUs with organizations
- DACUMs on UAS Imagery/Operator
- EBOK Crosswalk
- GTCM updates
- Program Content Tool
- Personal Assessment Tool
Personal Assessment Tool

- More than 180 items selected to assist individuals in knowing how prepared they are for the GISP exam. Accessible from the GeoTech Center’s Website.
- Responders use a modified Bloom’s Taxonomy to self assess.
- Results classified into 43 unique study areas based upon major categories.
- Results returned with descriptive assessment of abilities.
- N>195, reviewed N>400.
- Supplemental personal assessment may be developed in areas outside of the GISP exam.
- Remote Sensing will be added.
Curricular Materials Development – Prep materials for certifications, develop problem-centered, contextual and relevant materials

GOAL 2 ACTIVITIES
Goal 2 Activities

Curricular Materials Development – Prep materials for certifications, develop problem-centered, contextual and relevant materials

• GEOINT Bridge Certificate
• Concept Modules and Test Prep Materials
CoP Needs!

• Interviewed 120 professionals
  – Provide study materials for those seeking personal growth and/or certification in geospatial technology.
  – High quality materials requested include: study guide, practice questions for GISP Exam, a study guide/book
  – Potentially in person test prep workshops
Goal 2 Activities

Curricular Materials Development – Prep materials for certifications, develop problem-centered, contextual and relevant materials

• GEOINT Bridge Certificate
• Concept Modules and Prep Materials
• Micro credentials/Badges
• Demonstration Videos
• Learning Modules
Curriculum Steps include

• The modularization of courses into individual concepts.
• Develop additional case studies for specific subjects that utilize GST and STEM.
• Work directly with the GST workforce
Goal 2 Activities

Curricular Materials Development – Prep materials for certifications, develop problem-centered, contextual and relevant materials

- GEOINT Bridge Certificate
- Concept Modules and Prep Materials
- Micro credentials/Badges
- Demonstration Videos
- Learning Modules
- Model Courses updates
Model Courses

- GST 100 Awareness/General Education GST Course
- GST 101 Introduction to Geospatial Technology
- GST 102 Spatial Analysis
- GST 103 Data Acquisition and Management
- GST 104 Cartographic Design and Visualization

- GST 105 Introduction to Remote Sensing
- GST 106 Introduction to Geospatial Programming
- GST 107 Geospatial Web Application and Development
- GST 108 Capstone
- GST 109 Internship
Goal 2 Activities

Curricular Materials Development – Prep materials for certifications, develop problem-centered, contextual and relevant materials

• GEOINT Bridge Certificate
• Concept Modules and Prep Materials
• Micro credentials/Badges
• Demonstration Videos
• Learning Modules
• Model Courses updates
• UAS Curriculum
Lots of UAS Programs

- Numerous programs have been funded by NSF – ATE and they have solid curriculum.
- There are lots of different focuses to the final outcomes, but what are the common elements.
- The only real agreement is Part 107.
Goal 2 Activities

Curricular Materials Development – Prep materials for certifications, develop problem-centered, contextual and relevant materials

• GEOINT Bridge Certificate
• Concept Modules and Prep Materials
• Micro credentials/Badges
• Demonstration Videos
• Learning Modules
• Model Courses updates
• UAS Curriculum
• Career Pathways
• MOOC (Massive Open Online Course)
• Create business models using Business Canvas
Applied Research: Underserved and Underrepresented Populations – best practices to increase and retain populations including veterans, women, minorities and persons with disabilities

GOAL 3 ACTIVITIES
Goal 3 Activities

Applied Research: Underserved and Underrepresented Populations – best practices to increase and retain populations including veterans, women, minorities and persons with disabilities

• Research Best Practices
• Basic Skills Needs – what are members of the GST community lacking?
Weaknesses (no particular order)

• Knowledge of digital file management
Weaknesses (no particular order)

- Knowledge of digital file management
- Knowledge of statistics (e.g., descriptives, summary statistics, and R-squared)
Weaknesses (no particular order)

• Knowledge of digital file management
• Knowledge of statistics (e.g., descriptives, summary statistics, and R-squared)
• Knowledge of basic programming (e.g., scripting, object oriented, query, and extensible)
Weaknesses (no particular order)

• Knowledge of digital file management
• Knowledge of statistics (e.g., descriptives, summary statistics, and R-squared)
• Knowledge of basic programming (e.g., scripting, object oriented, query, and extensible)
• Knowledge of metadata and its standards (e.g., ISO and FGDC)
Weaknesses (no particular order)

- Knowledge of digital file management
- Knowledge of statistics (e.g., descriptives, summary statistics, and R-squared)
- Knowledge of basic programming (e.g., scripting, object oriented, query, and extensible)
- Knowledge of metadata and its standards (e.g., ISO and FGDC)
- Knowledge of selection queries (e.g., attribute, spatial, and location)
Strengths (no particular order)

• Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping
Strengths (no particular order)

• Knowledge of graphic representation techniques, including thematic mapping, multivariante displays, and web mapping

• Knowledge of principles of map design, including symbolization, color use, and topography, for a variety of print and digital formats
Strengths (no particular order)

• Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping

• Knowledge of principles of map design, including symbolization, color use, and topography, for a variety of print and digital formats

• Knowledge of contour mapping
Strengths (no particular order)

• Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping
• Knowledge of principles of map design, including symbolization, color use, and topography, for a variety of print and digital formats
• Knowledge of contour mapping
• Understanding of how the selection of data classification and/or symbolization techniques affect the message of the thematic map
Strengths (no particular order)

• Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping
• Knowledge of principles of map design, including symbolization, color use, and topography, for a variety of print and digital formats
• Knowledge of contour mapping
• Understanding of how the selection of data classification and/or symbolization techniques affect the message of the thematic map
• Knowledge of security restrictions on data (e.g., user permissions and access rights);
Strengths (no particular order)

- Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping
- Knowledge of principles of map design, including symbolization, color use, and topography, for a variety of print and digital formats
- Knowledge of contour mapping
- Understanding of how the selection of data classification and/or symbolization techniques affect the message of the thematic map
- Knowledge of security restrictions on data (e.g., user permissions and access rights);
- Knowledge of different field types
Strengths (no particular order)

• Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping
• Knowledge of principles of map design, including symbolization, color use, and topography, for a variety of print and digital formats
• Knowledge of contour mapping
• Understanding of how the selection of data classification and/or symbolization techniques affect the message of the thematic map
• Knowledge of security restrictions on data (e.g., user permissions and access rights);
• Knowledge of different field types
• Knowledge of archiving and retrieval
Goal 3 Activities

Applied Research: Underserved and Underrepresented Populations – best practices to increase and retain populations including veterans, women, minorities and persons with disabilities

- Research Best Practices
- Basic Skills Needs – what are members of the GST community lacking?
- Dissemination
- Veterans and other underrepresented populations
- Mentoring, minority serving institutions
Professional Development and Program Support – Develop and Implement PD for secondary and post-secondary in emerging uses of GST

GOAL 4 ACTIVITIES
Goal 4 Activities

Professional Development and Program Support – Develop and Implement PD for secondary and post-secondary in emerging uses of GST

- Workshops, Exploratoriums, Conferences – four regional conferences and one national conference
- Webinars in partnership with other organizations such as Directions Magazine
- Community of Practice – using collaborative tools, like field data collection
Syllabus Repository

• Contains syllabi at all levels
  – Introductory
  – Specialized courses
  – Graduate courses

• Presented as given without any modifications
Current Institutions

- California University of Pennsylvania
- California State University Northridge
- Del Mar College
- Drew University
- Eastern Kentucky University
- Foothill College
- Idaho State University
- Jefferson Community & Technical College
- Michigan State University
- Palomar College
- Sacramento City College
- San Diego Mesa College
- Sewanee University
- South Dakota State University
- Southern New Hampshire University
- The University of Akron
- University of Colorado Denver
- University of Denver
- University of Louisville
- University of West Florida
Goal 4 Activities

Professional Development and Program Support – Develop and Implement PD for secondary and post-secondary in emerging uses of GST

- Workshops, Exploratoriums, Conferences - four regional conferences and one National conference
- Webinars
- Community of Practice – using collaborative tools, like field data collection
- Newsletters
- Listserv and social media, YouTube Video
- Annual Educational Awards (current three awarded, but may change and will be announced in the fall)
- Mentoring – program revisions and creation (we will visit and work with your program)
- Two different student competitions, one in mapping and the other in UAS
Questions and Answers

http://www.geotechcenter.org/geotech-centers-presentations.html

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