Empowering Colleges:
Expanding the Geospatial Workforce

Defining What The Geospatial Workforce Needs to Know

Focus on Diversity, Equity and Inclusion

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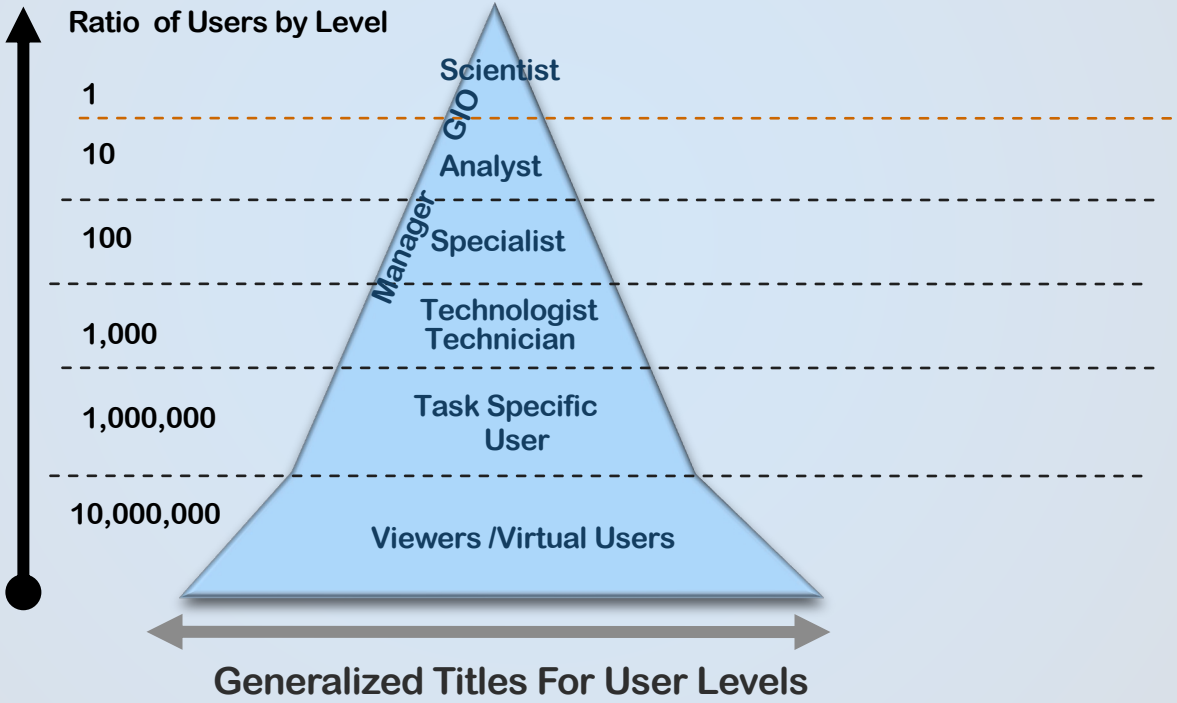
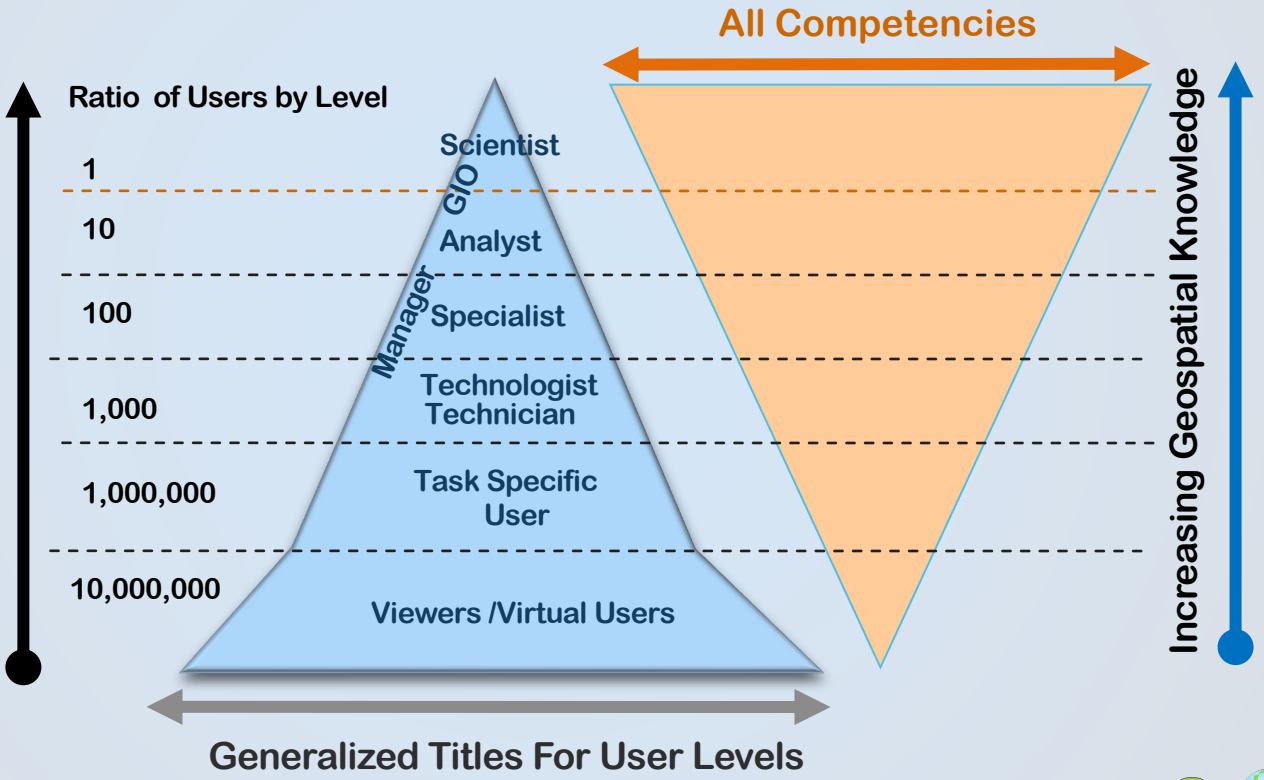
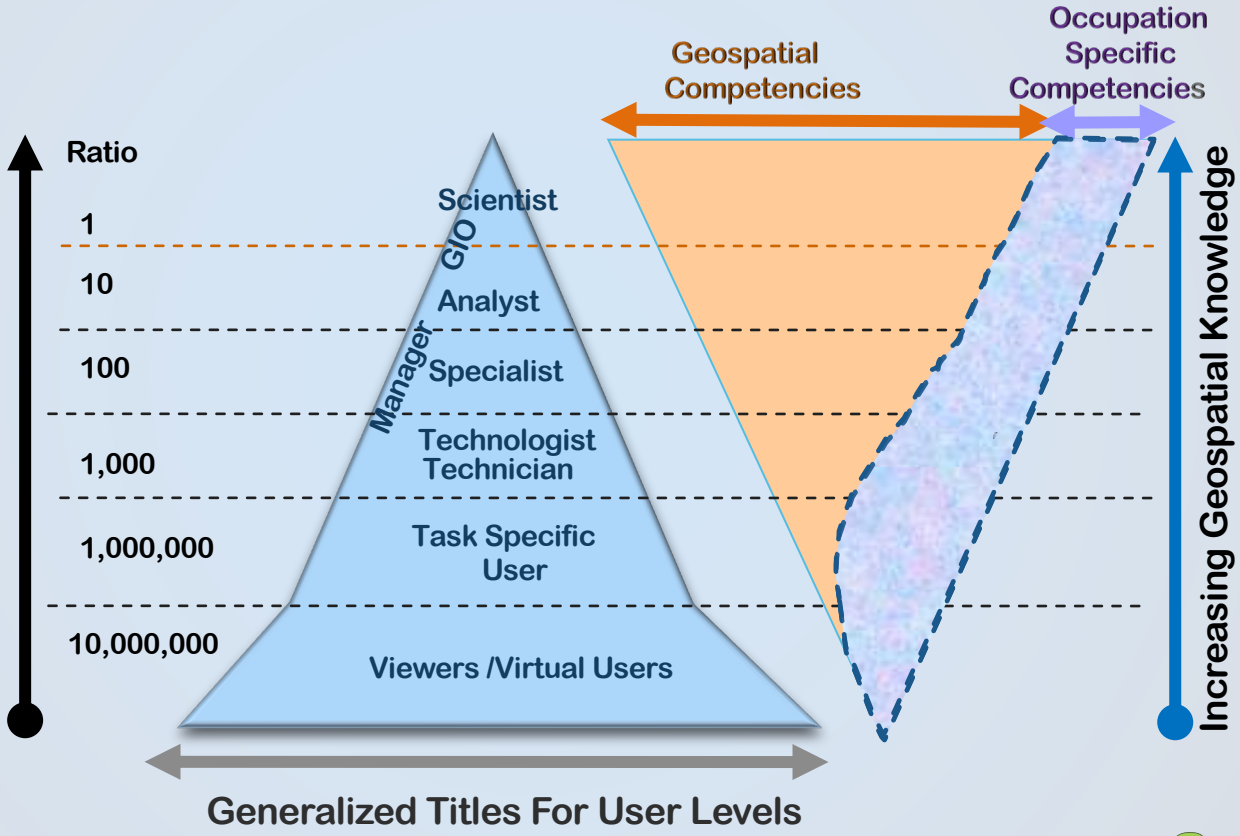
Geospatial Workforce and Users of the Technology



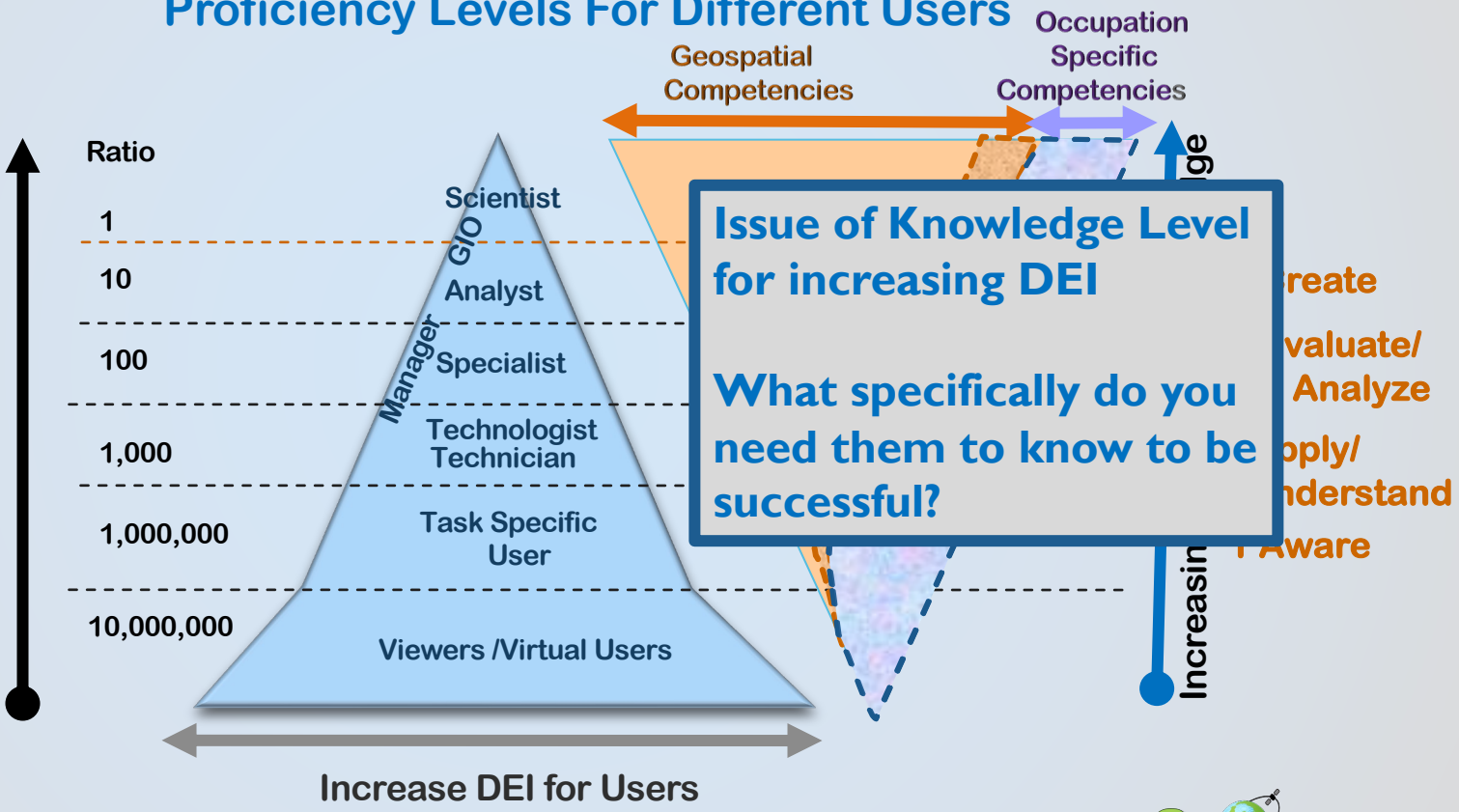
All Competencies For User Levels



Geospatial and Occupation Specific Competencies



Proficiency Levels For Different Users



Filling the Geospatial Knowledge Bucket - Nine Competency Categories

1. **Conceptual Foundations including Spatial and Critical Thinking**
2. **Geospatial Data Fundamentals**
3. **Data Acquisition**
4. **Database Design and Management**
5. **Geospatial Analysis**
6. **Cartography and Visualization**
7. **Application Development**
8. **Remote Sensing Fundamentals**
9. **Professional Practice**

Note: acknowledge use of similar terms and language from GISCI , GTCM and UCGIS Body of Knowledge

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Focus on DEI - skill levels and competency requirements still depend on employee work assignment

Example from Category 1 – Conceptual Foundations

1: **Aware** of critical and spatial thinking related to spatial patterns in places and timeframes for applications but cannot apply them independently

2: **Understand** use of critical and spatial thinking related to spatial patterns in places and timeframes for applications and can **apply** them with **signification guidance**

3: **Ability to use** critical and spatial thinking to analyze and evaluate patterns in places and timeframes for applications with **minimal guidance**.

4: **Ability to** use critical and spatial thinking related to spatial patterns in places and timeframes for different applications **without assistance** and **create** possible new methodology

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List of Skills and Competencies

- **Personal Assessment Tool**
  - Worker does a “Self Assessment”
- **Matching skill levels based on needed knowledge**
- **Customize the list for specific workforce user level**
- **Use it to identify strengths and weaknesses**

2	0	Unaware - No knolwedge of competency	
3	1	Aware- Can explain basic facts about competency	
4	2	Apply - Use competency with significiant guidance	
5	3	Analyze - Use competency with some guidance	
6	4	Evaluate - Use competency with little guidance	
7	5	Create - Use competency with no guidance and extend application	
8			
9		**1. Conceptual Foundations**	
10		1001 Conceptual foundations on which geographic information systems are based	1
11		1002 Spatial patterns and knowledge of how people and places are linked using spatial and critical thinking	1
12		1003 Geographic information relating to the Human-Environment Interaction, Regional Geography, Physical Geography, Cultural Geography	1
13		1004 Principles of geography applied to geospatial projects	1
14		1005 Problem statement outlining the problem and ways to solve it using geospatial technology	1
15		1006 Tobler's First Law: "everything is related to everything else, but near things are more related than distant things"	1
16		1007 Geometric approximations of the Earth's shape such as spheroids, ellipsoids, and geoids	1
17		1007 Map scale	1
18		1008 Map scale effect on collection or creation of data	1
19		1009 Datums	1
20		1010 Vertical datums	1
21		1011 Horizontal datums	1

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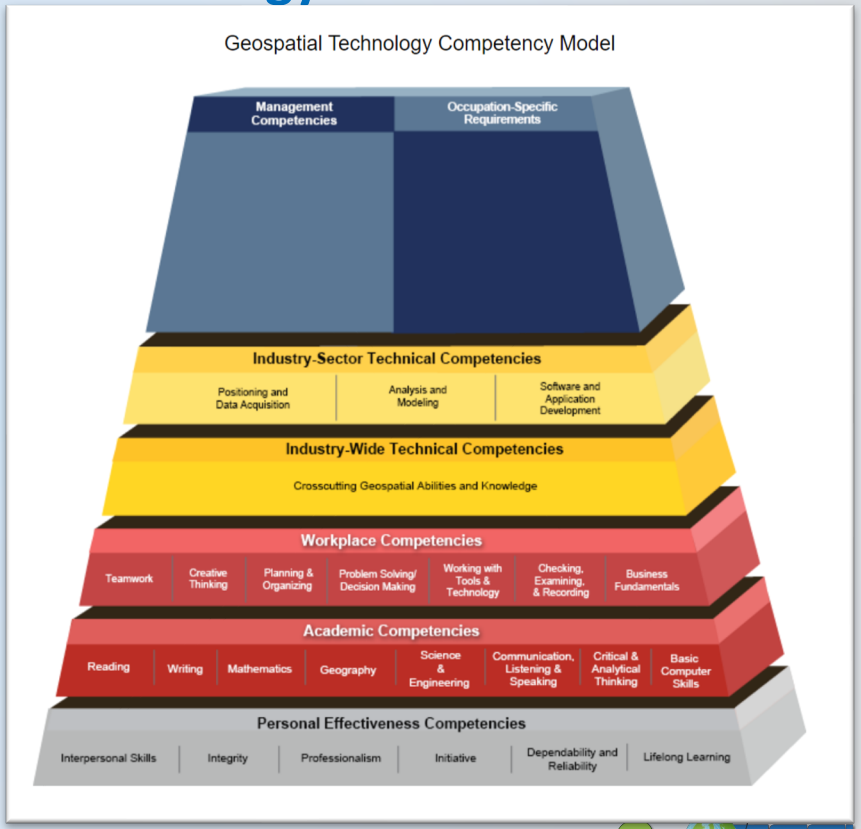
Resources Used to Create a List of Skills and Competencies

USA Department Of Labor Geospatial Technology Competency Model - GTCM

- Interactive 3D Model
- GTCM Updated in 2022/23 with industry input
  - provides one source for defining the skills and competencies needed by the workforce
- Tier 4 and 5 lists specific geospatial skills and competencies
  - Tier 5 divided into 3 areas: Data Acquisition, Analysis, and software development



https://www.careeronestop.org/competencymodel/competency-models/geospatial-technology.aspx

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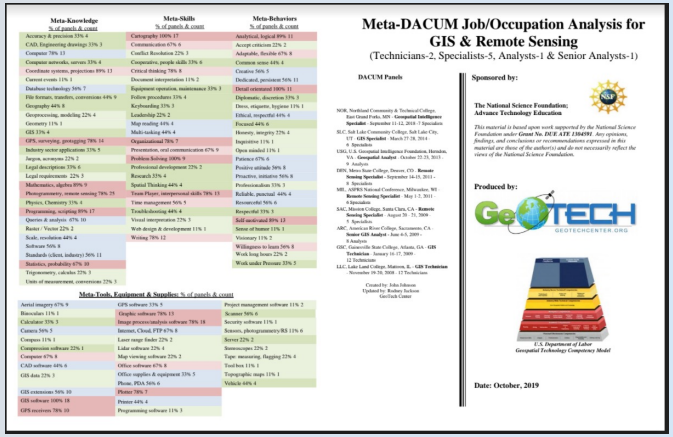
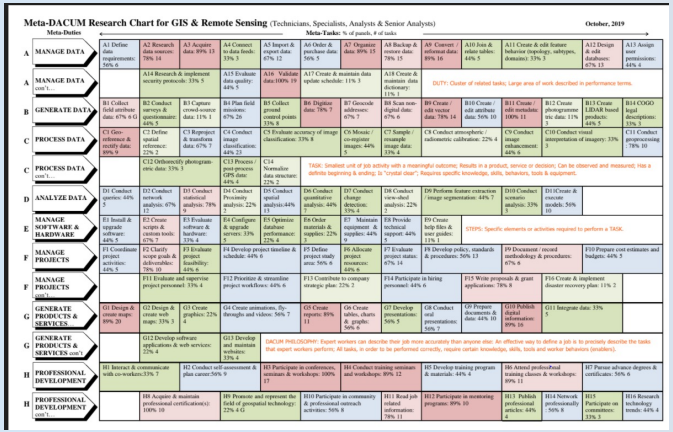
Another Source Of Industry Input - a DACUM

"Developing a Curriculum"



Meta-DACUM Job/Occupation Analysis for GIS & Remote Sensing

(Technicians-2, Specialists-5, Analysts-1 & Senior Analysts-1)



Meta-DACUM Research Chart for GIS & Remote Sensing (Technicians, Specialists, Analysts & Senior Analysts) October, 2019

New DACUMs will continue to be carried out and an updated MetaDACUM published

- Two-day intensive workshop where geospatial workers are asked to tell what they do and define what they need to know to do it
- Outcome is a DACUM chart
- Multiple DACUMS have been combined creating a MetaDACUM

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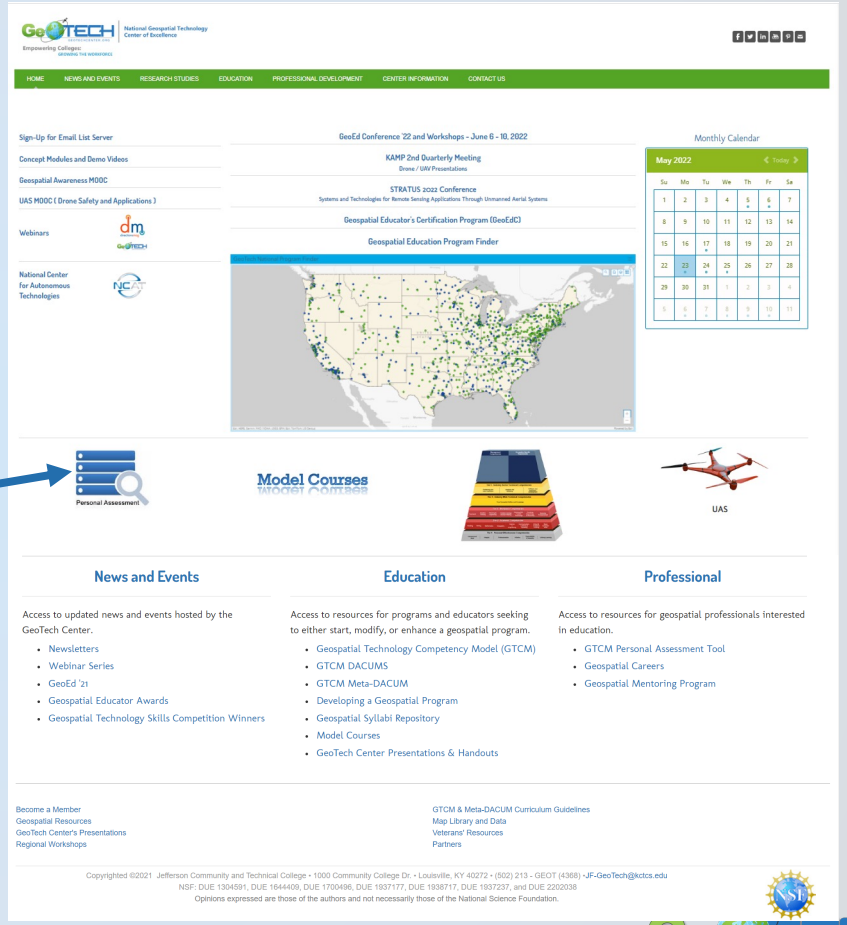
Resources to help fill in the knowledge gaps

- Assessment Tool
- 10 Model Courses
- Concept Module PPTs
- Demonstration Videos
- Learning Modules
- MOOC 's



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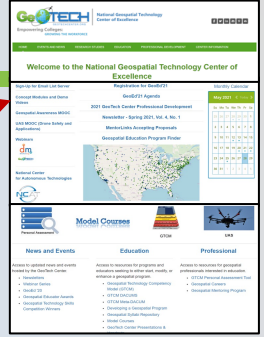
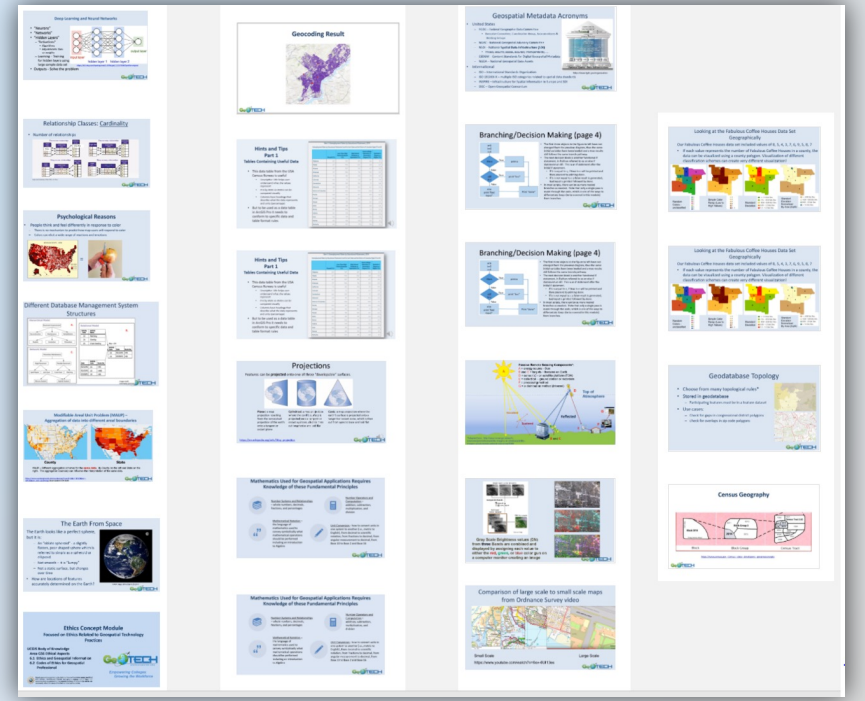


Concept Modules – Video Review of Important Concepts

- Artificial Intelligence, Machine Learning, Deep Learning & Internet of Things
- Data Management and Metadata
- Data Visualization and MAUP, Colors
- Map Projections, Datums, Scale
- Ethics
- Excel and CSV tables – hints and tips
- Mathematics and Statistics
- Geocoding
- Programming
- Remote Sensing
- Topology
- US Census

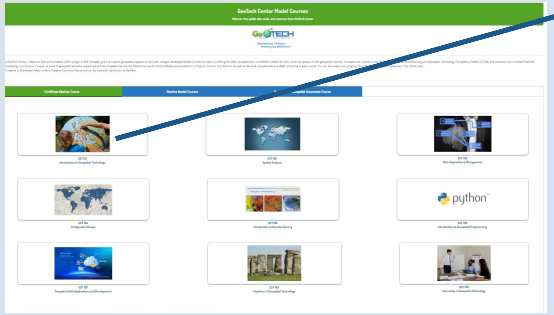
https://www.geotechcenter.org/concept-modules-and-demonstration-videos8203.html

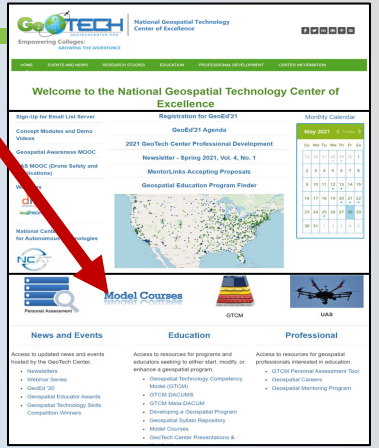


Model Courses

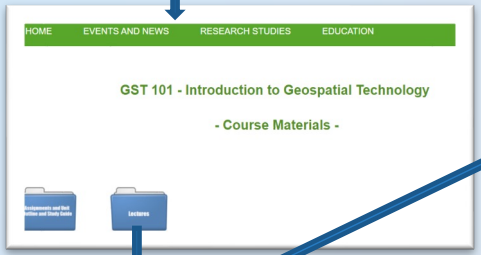
Click Here First

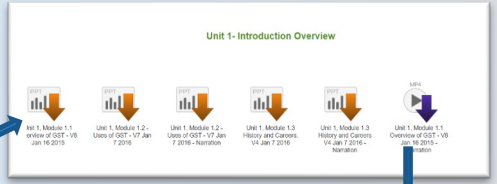
Certificate Model Courses



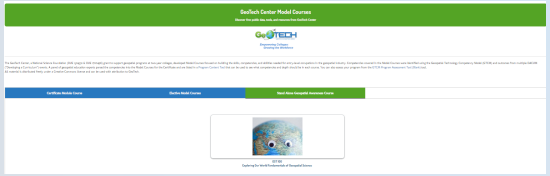


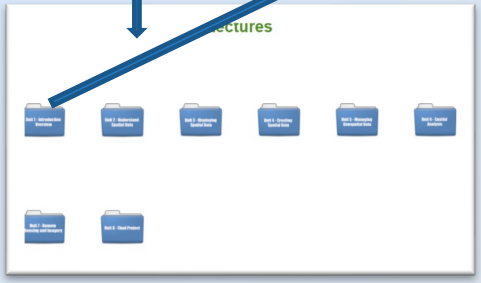
Elective Model Courses

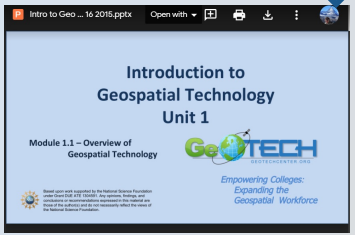




Awareness Model Course







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Thank You!

- Please contact me if you need help finding a resource or if you have suggestions for a resource you would like the GeoTech Center to **create** or **improve**!
- Ann Johnson – ann@baremt.com