



**Rethinking Geospatial Technology**

**Incorporating Geospatial  
Concepts not just  
technology in GIS-T  
Education**

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# **“GIS Education” -- not just training in software**

- **Hardware, software, data, process and people all in an infrastructure focused to utilize the power of a GIS**
  - **Software Training not enough**
  - **Concepts of GIS**
  - **Applications for GIS-T (Process and understanding of use and infrastructure)**
    - **Not just working in the same way, but redefining how the work is done and what kind of benefits can be gained from geospatial relationships and GIS**



# Three Groups need GIS-T Training/Education

- **Students** in degree programs
  - related to GIS that may work in transportation or majors leading to GIS-Transportation
- **Existing** transportation workforce
- **Continual** Education and Training
  - Rapid changing technology
    - Harvey Miller quoted  $\frac{1}{2}$  time learning and updating skills in the future



# **GIS-T Education for New Graduates**

- **GIS - was restricted to upper division or graduate programs**
  - A research tool – not really taught
  - Students were given access to the software and documentation
  - Spend a few months (self taught)
- **New software and uses**
  - Courses, programs and departments to GIS Centers
  - Incorporated as a “tool” in many programs
    - Many transportation programs



# **From Employers – what do they want in a new employee?**

- **Not Button Pushers, but “Critical Thinkers” - Problem solvers**
  - Think Spatially
  - Able to incorporate science, math and technology in a Transportation Application
  - Able to present problems and solutions clearly
    - using the best tools to make presentations with appropriate analysis and visualization
      - Maps, charts, tables, multimedia, Interactive, Web, etc.



# What to Include in GIS Education Program

- **Industry perspective -- 3 Major Areas**
  - **(1) Fundamental Principles behind technology**
    - Datum, projection, coordinate systems,
    - Cartography – for presentation to GIS-T user
    - Data -- acquisition, accuracy, transformation, database creation and management, metadata
    - Analysis -- overlay, geocoding, networks, modeling math/statistics, etc
    - Computer skills, programming
  - **(2) Hands on software/hardware use**
    - Still need to “learn and practice”
  - **(3) “Thinking skills”**
    - Project design – GIS-T topics
    - Implementation – local, regional and national T
    - Team work



# Technology

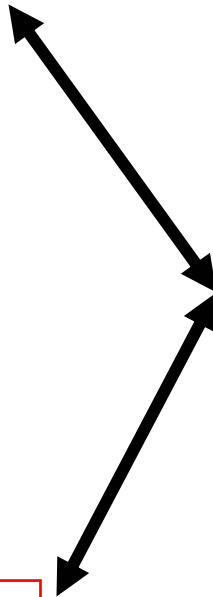
Software “buttons”

# Science

Basic to advanced  
concepts and algorithms,  
modeling, etc.

# Applications

GIS-T workflow and  
infrastructure for  
decision support





# **Why has GIS been slow to be introduced in programs**

- **Must fit the course(s) into an already overloaded program**
  - Only 8% of California State University students finish an undergraduate degree in 4 years
- **Instructors must have a “level” of GIS expertise**
  - “Time” – personal investment by the educator
- **Materials (texts, exercises, data, examples) to most effectively teach concepts important to Transportation**
- **Courses and programs need to be designed and approved – 2 to 3 year process**





**“The face we put on a  
GIS determines it’s  
future.”**

**Rita Caldwell Clark  
Assessor  
Shelby County, TN  
2001**



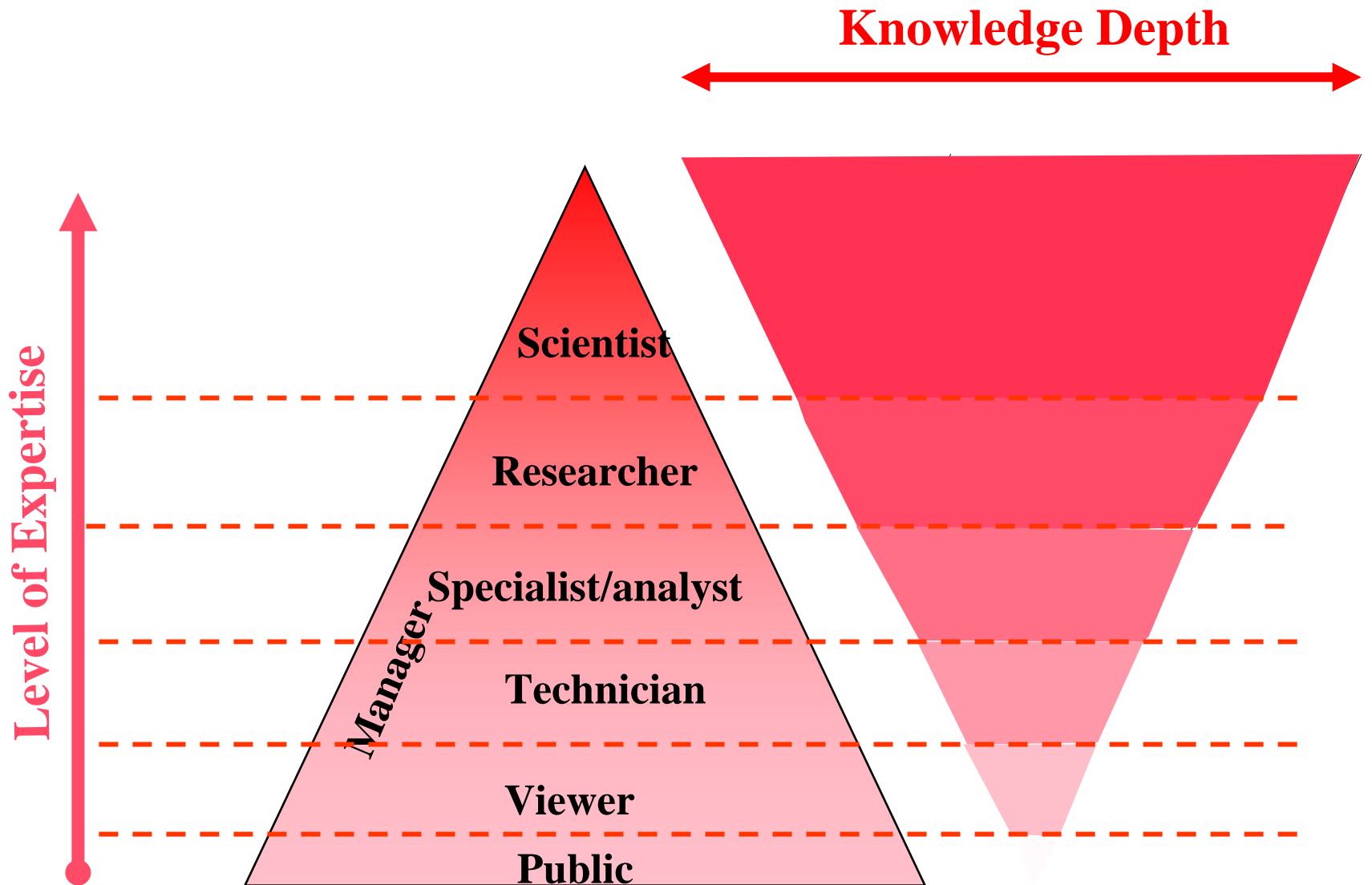
# Who should provide the GIS course/program for GIS-T?

- If the course is in Geography, will an Engineer take that course?
- If the course is in Business, will content be appropriate for an Engineer?
- Generally, all disciplines need “some basics” but what concepts are included?
  - Are they appropriate or sufficient for GIS-T
    - P-Chem for a Geologist
  - Can the “intro with concepts” be in any department and advanced in Transportation?
    - What happens to the “credits” for these courses?



# Who needs what type of GIS Education/Training?

- All levels of the Transportation workforce (managers to technicians) with a variety of different educational program options
  - Manager – to use it effectively and direct workflow effectively
  - Analysts and Specialist – advanced skills including programming and modeling skills
  - GIS Technicians – produce effective visualizations



**Ratio of 100 Viewer/Technician to 20 Analysts to 1 Researcher**



# Defining Educational Goals and Related Courses Content

- **Need input from Users to help define a “curriculum” for GIS and in long term, GIS-T Applications**
  - **UCGIS Model Curriculum –**
    - **Defining the Body Of Knowledge for GIS**
    - **When this Model is Completed need to define the GIS-T Application units and topic**
      - **[www.ucgis.org](http://www.ucgis.org) and link to Model Curriculum**



# What is “GIS”?

- **Can we lose the “G” and just become a branch of “IT”?**
  - Does “geography” or “geo” matter?
- **Is “S” for System or Science?**
  - GIS is information gained from “Spatial (geo/temporal) Relationships”



# GIS-T Education Questions

- Where and **how** does GIS fit in a Transportation curriculum?
- How much “GIS” does a user need
  - Can it be a “core course” with application specific additional courses
- Where, what and how should GIS be taught in the curriculum
- What type of programs fit the needs of working professionals
  - In house, extension courses, academic certificates, online, instructor lead



# Possible Action Items

- **Survey what programs exist in GIS-T**
  - What programs are successful
    - Survey graduates and employers
    - Provide a means for sharing curriculum, programs and materials
- **User's can make a difference**
  - Serve on Advisory Boards of programs
    - Help define how much G and IS and Education and Training should be included
  - Help educators get the “E” and “T” and exposure to the workplace needs
  - Educate those in “power” in workplace about the need for continual education