Introduction:

http://geospatialrevolution.psu.edu/episode1/complete

13 min video presentation of geospatial technologies

Why study geospatial technology?

https://ny.pbslearningmedia.org/resource/psu10sci.vid.geospatial.whystudy/why-study-gis-geospatial-revolution/#.WMQ3J28rLxl

In this clip from Penn State Public Broadcasting's Geospatial Revolution project, the importance of studying geospatial technology is explored.

Geospatial Technology definition:

Set of tools for mapping and data analysis related to the Earth, including atmosphere, hydrosphere, biosphere and noosphere (see https://en.wikipedia.org/wiki/Noosphere).

These tools can be grouped into four main categories:

1. **GPS**: global positioning systems: data collection
2. **Remote Sensing**: observations of the Earth from space: data classification
3. **Geographic Information Systems**: manipulation, analysis and visualization of geographic data: data organization and use
4. **Internet Mapping and Analysis**: interactive integration of GPS, Remote Sensing and GIS data over the Internet: data availability and distribution/decision making/collaborative work/real-time applications.

References:

https://www.aaas.org/content/what-are-geospatial-technologies#about

https://www.aaas.org/page/geospatial-technologies-project

Data Acquisition and Integration: typical tasks

1. File formats (e.g. shapefiles + image OR hardcopy map + shapefile + image)
2. Data reading and conversions (see examples below):
   a. NASA data reading by ArcGIS (data conversion)
   b. Conversion of information from hardcopy into digital vector format
   c. Adding custom background map to GPS data logger
   d. Combining data (raster and vector) with different resolutions (might be necessary to resample or make conversions from vector to raster)
   e. Combining input data from GPS, satellites and existing vector/raster GIS data
   f. Digitizing new data using background information (hardcopy maps, images, etc.)
   g. Modeling (e.g. fire propagation, tsunami effect on coastal population, hydrologic response of watersheds, sea-level rise, etc.)

Data acquisition and integration: an example from Yuri Gorokhovich research:

Landslide risk assessment in Guatemala (2016):

https://link.springer.com/article/10.1007/s11069-015-2109-8

Coastal data integration (2014):

http://environment.yale.edu/climate-communication-OFF/files/Gorokovich_and_Leiserowitz_(2014)_Integrating_coastal_vulnerability_and_subistence_resource_mapping_in_NW_AK.pdf

Comparison between GPS and satellite data (2006):

https://www.sciencedirect.com/science/article/pii/S0034425706002008

Prioritizing Abandoned Coal Mine Reclamation in USA (2003):

https://link.springer.com/article/10.1007/s00267-003-3043-1

Historical Development of Gospatial Technologies in 20-21 Century:

Geospatial Technologies would not be possible without the development of computer industry since 1970s, but many principles and functions in these tools were used and developed more than 3,000 years. For example, geometric measurements and algebraic computations were known in Ancient world of Egypt and Asia. Earth measurements were conducted by Eratosthenes in 150s BCE, revolutionary geographic principles of navigation were in use in 18^{th} and 19^{th} centuries during great geographic discoveries. However, only in 20-century computer technology has allowed geospatial technologies to become what they are today.

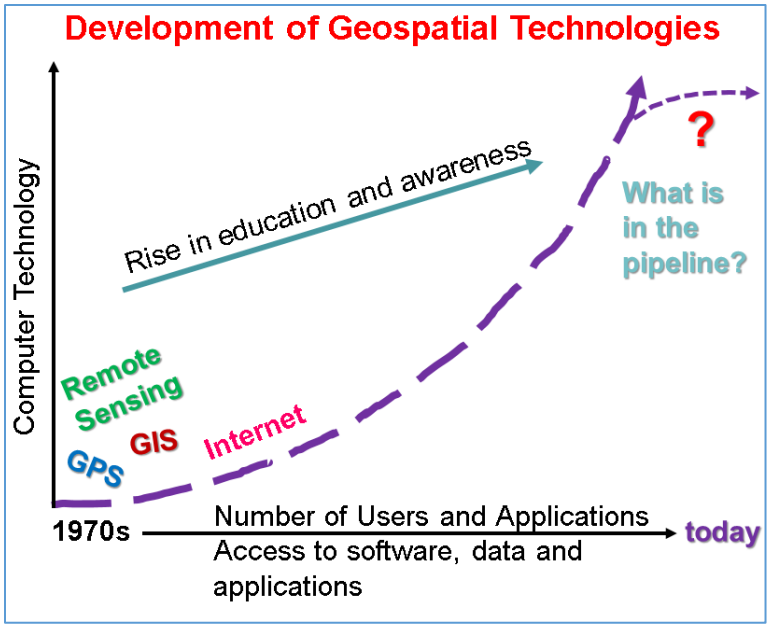

Figure shows the trend in geospatial technologies;

Adapted from:

Berry, J. 2007. A Multifaceted GIS Community, GEOWorld, January, 20 (1),16

Geotechnology Development Challenges:

Two major "human" challenges in geotechnology applications:

1. People can be knowledgeable in their own professional discipline but lack an understanding of geotechnology;
2. People understand geotechnology but do not know how to apply it in their own professional discipline.

Geotechnology Development Challenges:

Other major challenges:

1. Data formats (images vs vector vs text vs numbers vs tables, etc.)
2. Data resolution (scale in vector data, pixel size in raster data)
3. Spatial references (projected vs geographic coordinate system, datums, etc.)
4. Data ownership, collection and associated standards by various agencies/people/groups (e.g. map standards, data processing, data documentation, storage, etc.)

Jobs in the Geospatial Field:

GIS Jobs Clearinghouse: www.gjc.org

Geosearch: www.geosearch.com

GIS Careers: http://giscareers.com

Geotechnology Salaries:

https://www.sokanu.com/careers/geospatial-information-scientist/salary/

Geotechnology as a Core Tool:

Geotechnology as a Core Tool: Political Aspects (1 min)

https://ny.pbslearningmedia.org/resource/psu10sci.vid.geospatial.politicalaspects/geospatial-revolution-political-aspects/#.WMRjW28rJ9M

Monitoring Areas of Conflict (4 min)

https://ny.pbslearningmedia.org/resource/psu10sci.vid.geospatial.monitorcon/geospatial-revolution-gis-to-monitor-areas-of-conflict-geospatial-revolution-episode-3/#.WMRjlG8rJ9M

Interactive City: Portland (4 min)

https://ny.pbslearningmedia.org/resource/psu10sci.vid.geospatial.portland/geospatial-revolution-portland-an-interactive-city/#.WMRj2W8rJ9M

Bloomberg Businessweek (non-OER reference):

http://www.bloomberg.com/news/features/2015-07-08/satellite-images-show-economies-growing-and-shrinking-in-real-time

Geotechnology: competency model

Knowledge:

Geography, Computer (hardware, software), English Language (read, write), Mathematics (algebra, statistics, arithmetic, calculus, etc.), Use of Training and Educational materials.

Skills:

Reading, listening, understanding scientific information, writing, problem solving, critical thinking, speaking

Abilities:

Written and oral comprehension, oral expression, deductive and inductive reasoning, near vision, written expression.

Reference to Geographic Information Systems Technicians job requirements:

https://www.onetonline.org/link/summary/15-1199.05