What Is Geospatial Information Science and Engineering?

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Geospatial Information and Supporting Technologies
Prevalent throughout our lives, studies, and work.

 Data: Satellite images, digital maps, aerial and street-level photography, location data,....

Technologies: GIS, GPS/GNSS, webenabled applications, in-vehicle navigation, location-based services,...

**Geospatial Information and Supporting Technologies** Applications abound. - We use them every day. Information content and volume is enormous and continually increasing. Technologies are continually advancing and new technologies are continually emerging.

**Geospatial Information and Supporting Technologies** Is there something special about geospatial data and information? Where are these technologies coming from – what disciplinary background? Is there a science that underlies geospatial information, its technologies, and its applications?

What is the role of engineering in all this?

Geospatial Information Science and Engineering

The broad view presented here is the opinion of the presenter.

This view has not been universally adopted, especially in the USA.

It is more prevalent in Canada, Europe, and Australia.

Components

Visualization / Human Understanding

Spatial / Temporal Functional Models

Data Acquisition Systems

Spatial / Temporal Data Models

Geodesy

Spatial / Temporal Reference Frameworks

# Geodesy

 Size and shape of the Earth and its gravity field (they are changing all the time).

# **Terrestrial Reference Systems**





#### Horizontal and Vertical Datums



**Map Projections** 



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Information Engineering and Architecture

Geodesy

# Information Engineering and Architecture





#### **Conceptual Models**

# Symbolic Modeling Languages



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Imaging Systems LiDAR/GPS/MMS

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# **Data Acquisition Systems**



Frame Cameras and Digital Scanners (Air and Space Borne)





### LiDAR and GNSS/GPS





Mobile Mapping Systems

# Components

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Image Processing Softcopy Photo Spatial Analysis

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# **Discipline-Specific Functional Models**







#### **Image Processing**

### Softcopy Photogrammetry



Land Ownership Systems



**Groundwater Flow** 



Traffic Engineering and Logistics

# **Discipline-Specific** Functional Models



#### **Highway Design and Construction**







#### **Automated Machine Guidance**

Cartography Map Animation Virtual Reality

Image Processing Softcopy Photo Spatial Analysis

Imaging Systems LiDAR/GPS/MMS

Information Engineering and Architecture

Geodesy

# Components

Visualization / Human Understanding

Spatial / Temporal Functional Models

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# Human Understanding







#### Cartography





#### **Animations and Simulations**

Virtual Reality and Immersive Environments

Image Processing Softcopy Photo Spatial Analysis

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Where's the Engineering?

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# Design

Image Processing Softcopy Photo Spatial Analysis

Imaging Systems LiDAR/GPS/MMS

Information Engineering and Architecture

Geodesy

Visualization / Human Understanding

Spatial / Temporal Functional Models

Data Acquisition Systems

Spatial / Temporal Data Models

Spatial / Temporal Reference Frameworks Design

Quality Assurance / Quality Control

#### Information Technologies, Systems, and Products

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Quality Contro Quality Assurance /

Design

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**Geospatial Information Science and Engineering**