

A Space-Place (Splatial) GIScience Framework for Transdisciplinary Geospatial Humanities

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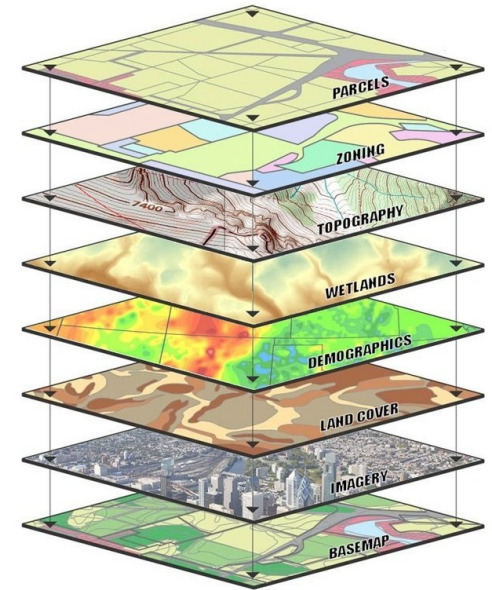
GIScience & Humanities?

Bring Humans into GIScience!

Conventional GIS:

- Conventional GIS follow the traditional cartographic approach of representing *locations* in *physical space* as static map layers.
- It is mainly based on the *Newtonian absolute space* using *Euclidean geometry* and *Cartesian coordination system*.
- This conceptualization of space has major **limitations of considering humans!**

GIS Map Layers

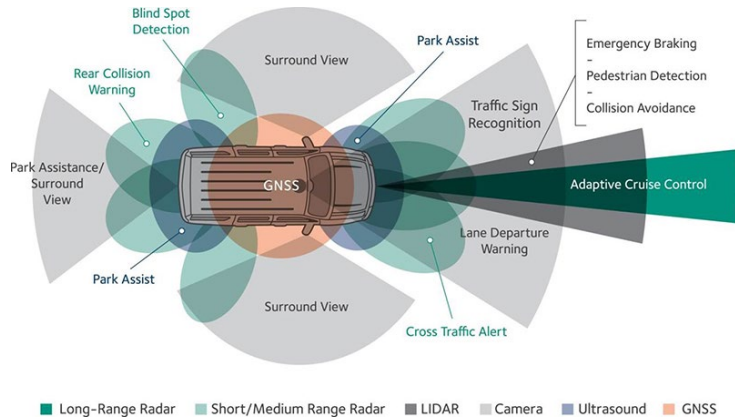


(<https://www.newbrightonmn.gov/departments/community-assets-development/geographic-information-systems-gis/>)

Some Examples

Autonomous Vehicles:

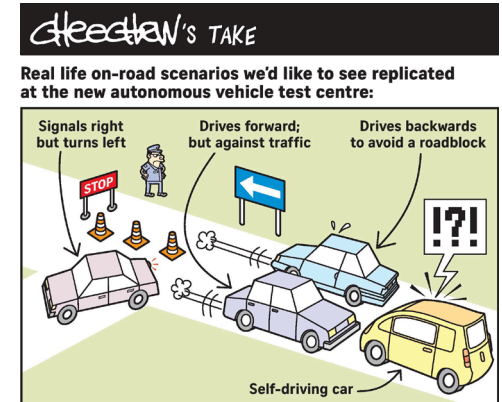
- What are the requirements of GIS to support autonomous vehicles?



(<https://www.novatel.com/industries/autonomous-vehicles/>)



(Source: Google Images)



(<https://www.straitstimes.com/opinion/cartoons/punchlines-nov-24-2017>)

GIS Databases for Autonomous Vehicles:

- What is the **positional accuracy** required to support autonomous vehicles?
 - Current in-vehicle navigation: 10 - 15 m
 - Traffic lane: 3 - 5 m
 - Parking: 5 - 10 cm

(Source: Google Images)

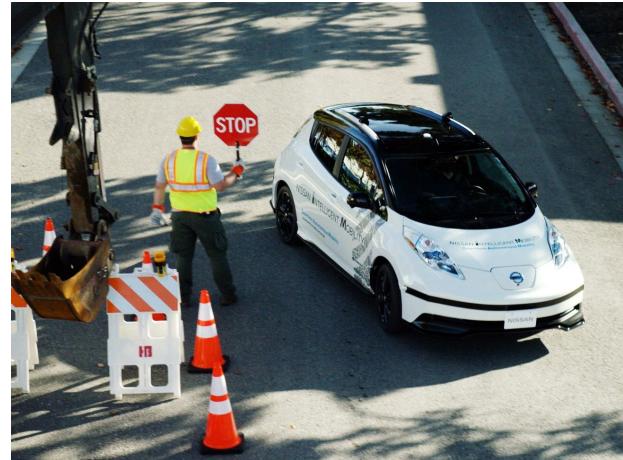


Autonomous Vehicles – Human Interactions:

- How much do you trust autonomous vehicles?
 - We need **AV-Human communications/interactions/dialogues**.
 - AV need to understand the **context**.



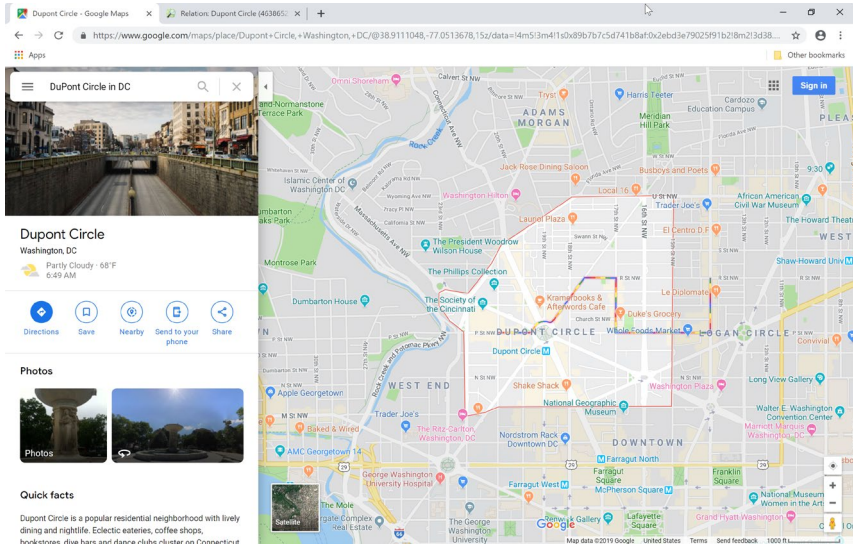
(<https://www.popsi.com/people-want-to-interact-even-with-an-autonomous-car>)



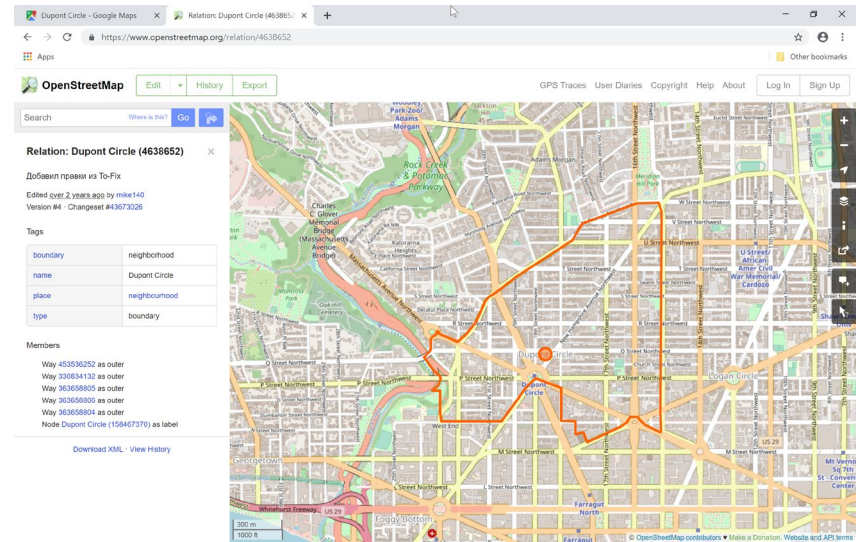
(<https://www.wired.com/2017/01/missans-self-driving-teleoperation/>)

DuPont Circle in Washington DC:

- Google Maps vs. OpenStreetMap



June 8, 2019



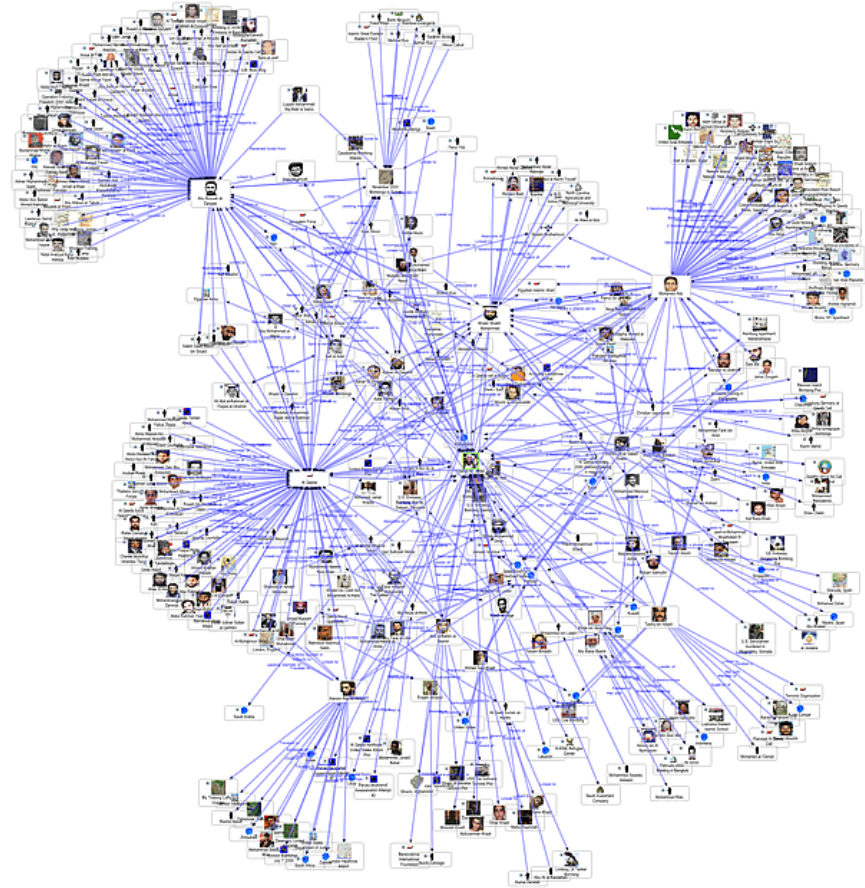
June 8, 2019

(Source: Google Maps & OpenStreetMap)



Social Networks:

- How people are related to each other?
- Focus is on “topological relations” rather than “absolute locations”.



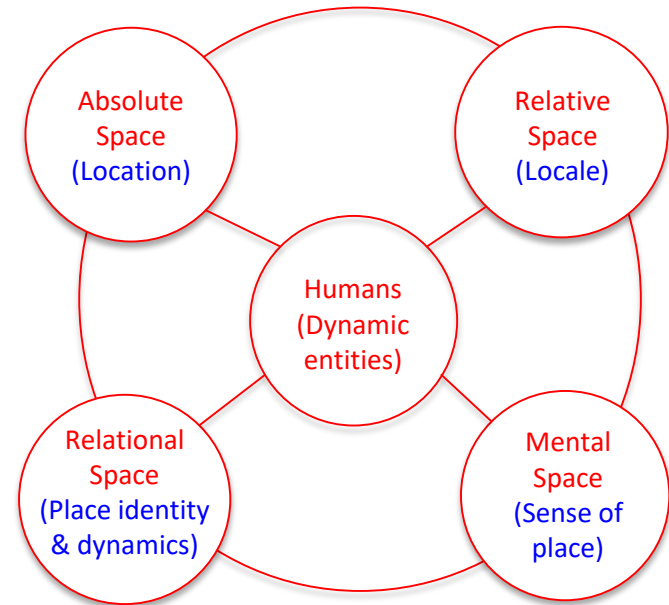
- How do we represent the following concepts in GIS?
 - For example,
 - What are the “locations” of Google, Amazon, or Twitter?
 - Where are your friends in your Facebook social networks?
 - Would your and my story maps of DC tell the same story?

The Google logo, featuring the word "Google" in its characteristic multi-colored font.The Amazon logo, consisting of the word "amazon" in a black, lowercase, sans-serif font with a curved orange arrow underneath.The Twitter logo, featuring a blue bird silhouette above the word "twitter" in a blue, lowercase, sans-serif font.The Facebook logo, which is a white, lowercase, sans-serif font "facebook" centered within a dark blue rectangular background.The Story Map ArcGIS logo, featuring the text "Story Map" in a large, black, serif font, with the ArcGIS logo (a globe icon) and the text "ArcGIS" below it.

A Space-Place (Splatial) GIScience Framework

A Space-Place (Splatial) GIScience Framework for Human Dynamics Research:

- Shaw and Sui (2018, *Transactions in GIS*) proposed a “Multi-Space GIScience Framework for Human Dynamics Research.”
- This Splatial GIScience framework extends the previous work to integrate the concepts of **space** and **place** (Shaw & Sui, 2019, forthcoming special issue on “Smart Spaces and Places” of the *Annals of AAG*.)



Four Types of Space:

- *Absolute space*: It works with **absolute locations** in space and focuses on questions such as “**where are the different objects?**”
- *Relative space*: It works with **relative locations** to a fixed or moving object and focuses on questions such as “**what are around us?**”
- *Relational space*: It works with **relations** to other objects and focuses on questions such as “**what are related to us?**”
- *Mental space*: It works with the **cognitive and mental aspects** of space and focuses on questions such as “**what do people have in mind?**”

Integrate “Space” and “Place”:

- Yi-Fu Tuan (1977) indicates that **place** is an area in a space that humans have given meaning to it.
- Agnew (2011) suggests that **the concept of place usually includes three pillars: location** (as defined by latitude and longitude), **locale** (as defined by both physical/environmental and socioeconomic/cultural context), and a **sense of place** (as defined by human subjective perception/attachment to a particular location/locale).

- Wainwright and Barnes (2009) discuss **three views to the relationships between space and place** in geography.
 - The first view is *place trumps space*, which was advocated by humanistic geographers in the 1970s and considered **space as a background context for places**.
 - The second view is *space trumps place*, which considers **places as the sites/stops/pauses/staging posts** of actions/flows/interconnections taking place in space. Space therefore plays a more critical role than places under this view.
 - The third view is *relational space and place – “splace”*, which suggests that **“Space and place are relational, ... It is the connections that are fundamental.** There is no clear division between space and place because both are cut from the same cloth of multiplicitous relations (Wainwright and Barnes 2009, p. 970).”

Our View:

- We are in favor of the **third view** and subsequently extend our multi-space framework to a spatial framework that **integrates multiple aspects of both space and place** to better consider humans.
- First, **absolute space** is associated with the concept of *location*, which **suggests a specific position or site** that can be conveniently **represented by the coordinates** based on the concepts of absolute space used in conventional GIS.
- The concept of *locale* is closely related to **relative space**. In other words, our attention **focuses mainly on the situation rather than the site** of an object (e.g., a moving autonomous vehicle.)

- When we deal with **relational space**, the focus shifts to *place identity and dynamics*. As relational space is based on topological relations rather than specific locations, place identity and dynamics among places or individuals (e.g., online social network) become critical in a relational network .
- **Mental space** in the spatial framework is associated with *sense of place*, which attempts to reflect what people have in mind about a location, a locale, or a place identity that are associated with absolute space, relative space, and relational space, respectively (e.g., story map.)

Summary:

- This **Space-Place (Splatial) GIScience Framework** expands and enhances the conventional GIS to integrate **multiple concepts of space and place** that transcends traditional disciplinary boundaries.
- This Splatial GIScience Framework is **more intuitive to human thinking** when dealing with various scenarios in our daily lives.
- We hope this Splatial GIScience Framework provides a useful foundation for **transdisciplinary Geospatial Humanities research**.

Thank You!

Questions, Comments & Suggestions?

For additional information,
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