



State of The Geospatial Field:

Expansion and Evolution in the
Anthropocene Epoch

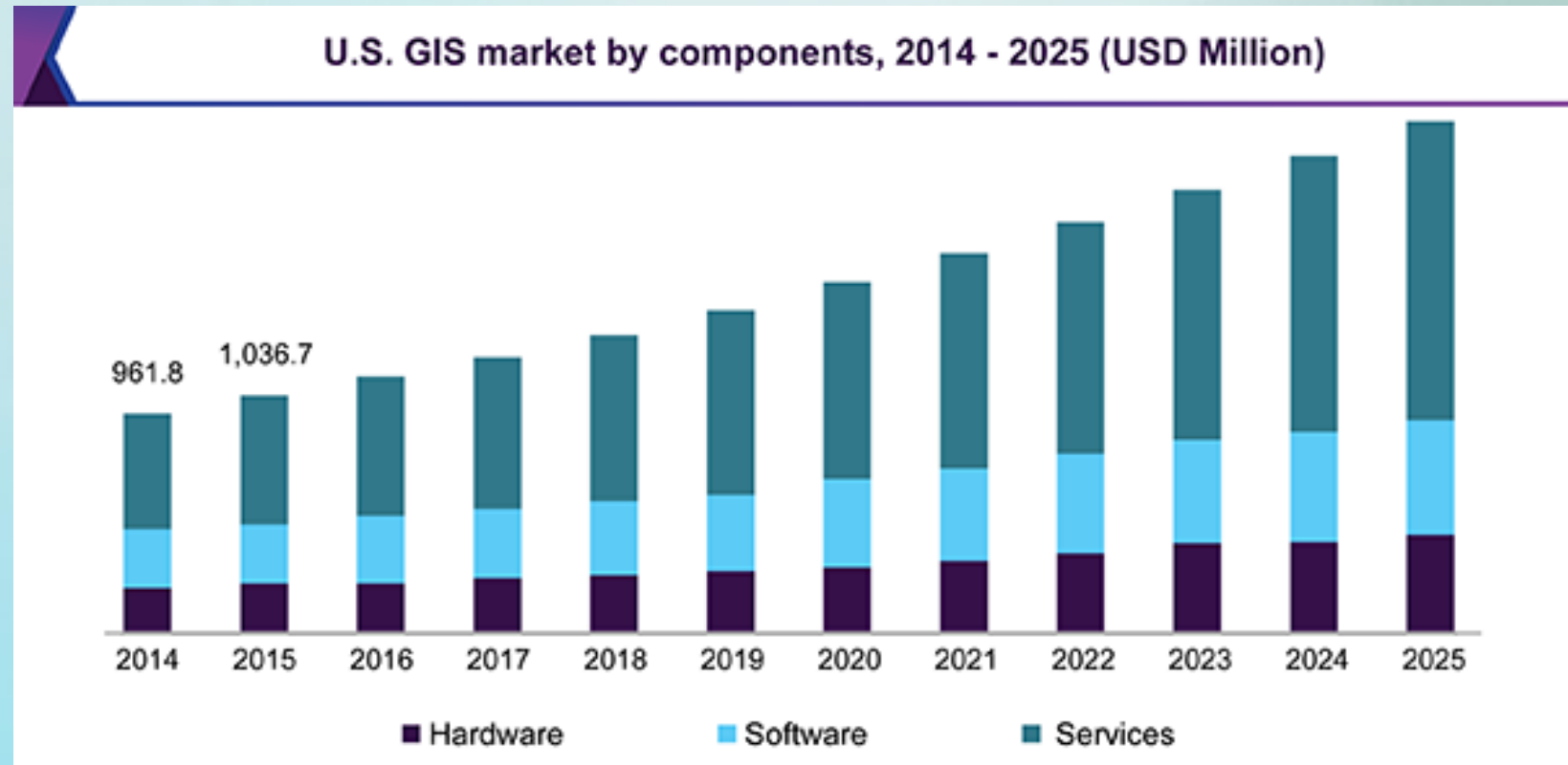
By Sam Matey for GEOG 401

Trends

- As the geospatial field expands, maps and data visualization are growing ever more intertwined, with no-code mapping platforms like Tableau, Excel's Map Chart function, Flourish, Mapbox, and many others occupying that user-friendly, business-oriented nexus.
- The availability of data is expanding immensely, both on the supply side, with ever more "big data" being collected, and on the demand side, with the democratization of spatial data analysis technologies.
- And an array of new technologies and platforms, from lidar to cubesats to miniaturized sensors, are transforming the scope and scale of what geospatial data can discover.

Trends

- Mapping as a service (often dependent on cloud storage) is becoming an increasingly dominant part of the expanding geospatial world, as described in this infographic from [Grand View Research's forecast report](#).
- This also underscores an overwhelming “mega-trend”: the rapid growth of the market for data-informed geospatial analysis across business, government, and civil society.



Competition

- As has been extensively documented, there is extensive competition within the geospatial field, between titans like Esri's ArcGIS ecosystem, open-source communities like QGIS, and coding platforms like Python and R, and no-code platforms like Tableau.
- Notably, there are several different “levels” of competition to consider here. There are wide-scale field architecture competitions (and cooperations) between different platforms like Python, R, QGIS, or ArcGIS. Then, there are company-level competitions: for example, dozens of different companies use R or Python for their mapping and data analysis. Notably, these overlap considerably: Esri is both a platform creator for many other GIS-using companies, and a company unto itself that is competing with other platform creators.

Competition: Who Leads the Geospatial Field?

Out of such a broad field, defining the ten most influential organizational players in the geospatial field is a subjective and variable question: are we including corporations only? Online coding communities? Platform creating entities only, or major data suppliers as well? Taking a broad view, the list below may serve as a useful starting point:

Longstanding Titans:

- Google (with [Google Maps](#))
- Government agencies (from [NASA](#) to [USGS](#) to [Copernicus](#), vital data providers)
- The [Python](#) community
- The [R](#) community
- [Esri](#) (with the ArcGIS ecosystem)
- The [QGIS](#) community

Newer Innovators:

- [Planet](#) (with its cubesat network)
- [Tableau](#) (with its no-code creation platform)
- [CARTO](#) (SaaS, no-code and open-source options)
- [OpenStreetMap](#) (free and crowdsourced, the Wikipedia of maps)

Technology

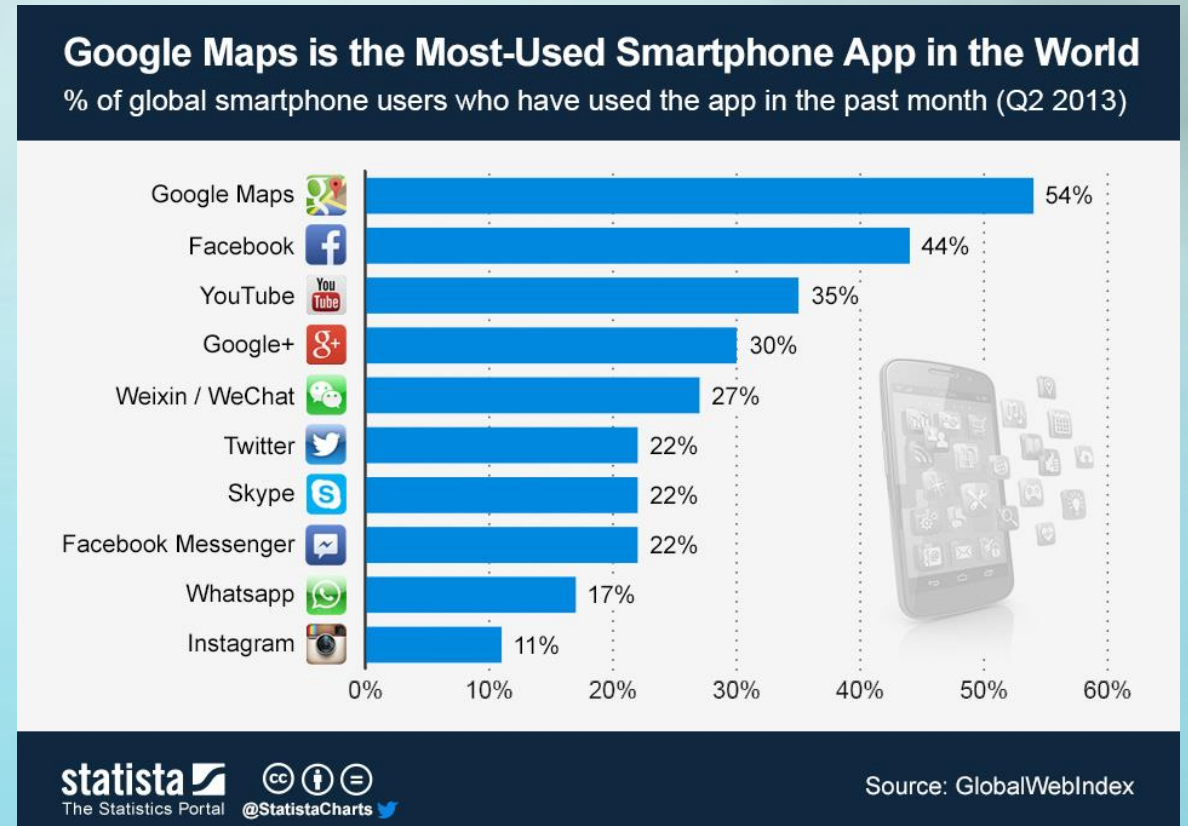
- The geospatial field is improving its technology at an astonishing rate. Geospatial data collection is expanding from passive observing to active scanning, as [Lidar](#) (3-D laser imaging) being used for everything from discovering [lost cities in the jungle](#) to [mapping the surface of Mars](#).
- As [many geospatial publications](#) have discussed, the 2020s are seeing the rise of “sensors everywhere,” from self-driving cars to drones to the Internet of Things to more and more complex sensors in the already-omnipresent smartphones.
- Increased global satellite data availability, in part due to the rising commercialization of low-Earth orbit in the 2010s, is already transforming the geospatial sector. For example, recent startup [Planet](#) has successfully built and paid for the launch of 200 earth observation “cubesats.” Their network, the largest in history now images all of Earth’s landmass daily at [3.7-meter resolution](#) in four spectral bands (RGB & NIR).

Technology

- Furthermore, the geospatial field's definition is expanding, as geospatial technology becomes omnipresent. [85% of Americans](#) have a smartphone, and an ever-growing multitude of smartphone apps can collect or at least request personal geo-positioning data to better connect you to local goods, services, or everywhere. This location information is used for a multitude of geospatial projects, from [questionably ethical surveillance](#) to [communities of crowdsourced wildlife and environmental research](#).
- It would be impossible to replace geospatial data, given how integral it has become to the modern world in everything from individuals' route-finding to nation-states' continent-scale decision-making. However, it is at risk, if risk is the word, of becoming subsumed, simply one of many omnipresent aspects of a digitized, data-rich, interconnected civilization.
- For example, working with digital spreadsheets like Excel, for example used to be a specialized field. Now it's part of almost every finance, business, or management-related job. As geospatial data becomes more and more common and accessible, "the geospatial field" may come to include almost every remotely data-related job on the planet.

Customers/Users

- The customers and users of geospatial data are growing increasingly numerous and diverse.
- With the rise of hyper-intuitive visualizations like Google Maps (over 1 billion users), and the most used app in the world and map-creating functionality added to platforms like Excel (over 750 million users) a substantial fraction of Earth's population can be described as users of geospatial data.



Politics, Economy & Society

- The origins of GIS, and the growth of the geospatial field as a whole, are closely tied to the history of the United States in the 1990s and 2000s. The end of the Cold War led to President Clinton making accurate GPS data publicly available for the first time, making modern GIS work possible, while the War on Terror led to ever-increasing demand for extremely accurate GIS technology.
- Surveying the current landscape, there is one force that may have a similarly galvanizing impact on the geospatial field: climate change. The world's maps are literally changing day by day, in the real world, from heat distributions and weather patterns to species ranges to the shape of coastlines. This new and rapidly changing world of the Anthropocene *needs* rapidly updating spatial data visualization and analysis, more than ever before.

Politics, Economy & Society

Given this background, we are already starting to see increased political connectivity and economic focus relating to climate change issues, across the geospatial community.

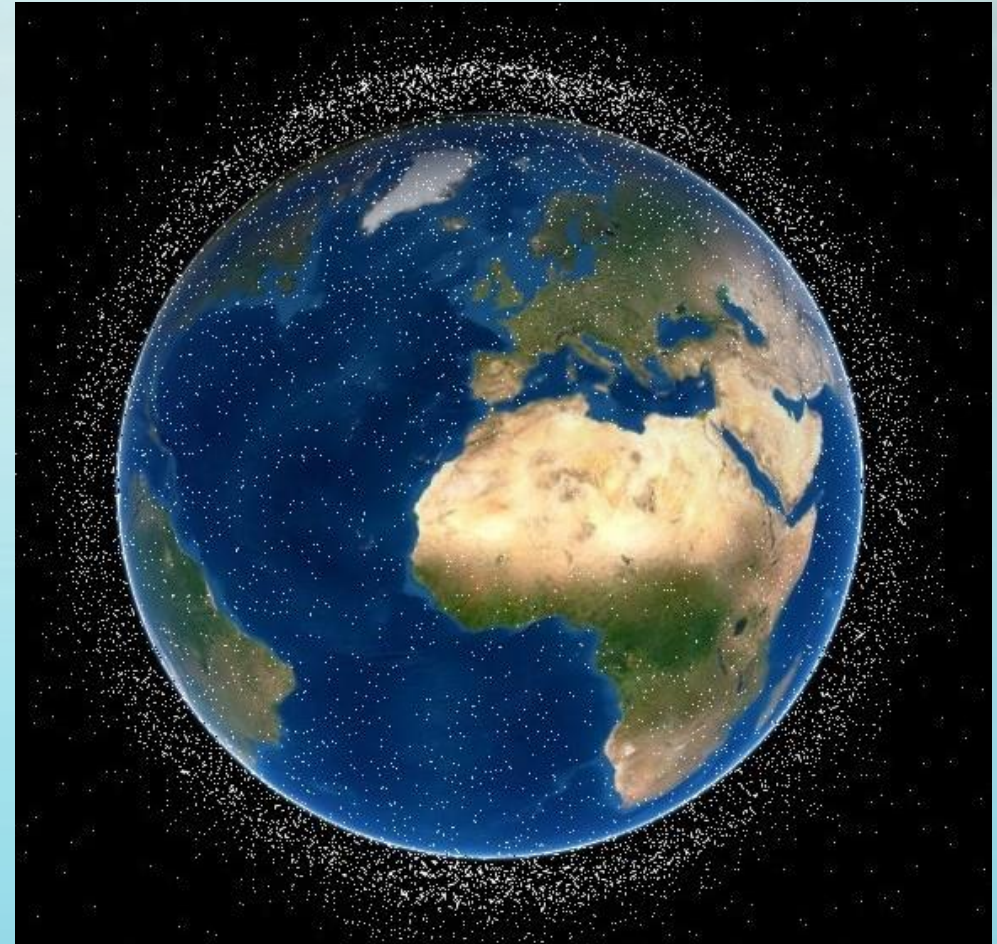
- The Ordnance Survey of the UK recently [convened a workshop](#) with global mapping agencies, resulting in a joint commitment to focus on collaborative work around climate change.
- Google Maps is launching a [service](#) to find new routes to help users shrink their carbon footprint.
- ESRI is putting [climate change](#) at the center of their business, promoting use of GIS for [climate risk analytics](#) and hosting renowned climate scientist Dr. Katherine Hayhoe as the [keynote speaker](#) at the 2020 Esri Science Symposium.
- And all-new environmental scientist-led global data platforms, like the nascent [Restor](#), are pushing the envelope of both geospatial technology and socioeconomic interrelationships with geospatial data.

Workforce

- The geospatial workforce is variegated and fast-growing, with the particular peculiarity that a majority of those working with geospatial data might not even identify themselves as such.
- The [CARTO report on spatial data science](#) estimates that communities working with spatial data range from an approximately 200,000-strong “core” of GIS-specific professionals, to an estimated 40 million data analysts that may interact with geospatial data in their projects!
- This “hidden geospatial” aspect is reflected in US Bureau of Labor Statistics information: the specific “cartographers and photogrammetrists” category is [described](#) as having limited employment growth, yet “computer and information research scientists” (including spatial data science) is [described](#) as having extremely rapid job growth.
- When building and training a new geospatial workforce, it will likely be beneficial to look beyond the job title into specific experience working with geospatial data.

Summary: Moving Forward with Geospatial Work

- The geospatial field is changing rapidly, with new technologies quickly becoming integral to new research, and new companies and communities providing new data, platforms, and insights.
- The profile of the geospatial consumer and/or worker is diverse and spread across many industries and walks of life.
- Climate change is increasingly crucial to the future of spatial data science and analysis, potentially even a new *raison d'être* and certainly a central driver of research, collaboration and development.



[Esri map of Earth and satellites.](#)