



UNIVERSITY OF NAPLES FEDERICO II
Department of Civil Engineering



COMPLUTENSE UNIVERSITY OF MADRID
Department of Human Geography

Assessing spatial accessibility to health care services in Madrid using big data and GIS

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tGIS

transporte infraestructuras y territorio
Grupo de Investigación de la Universidad Complutense de Madrid



**What is spatial
accessibility?**



-

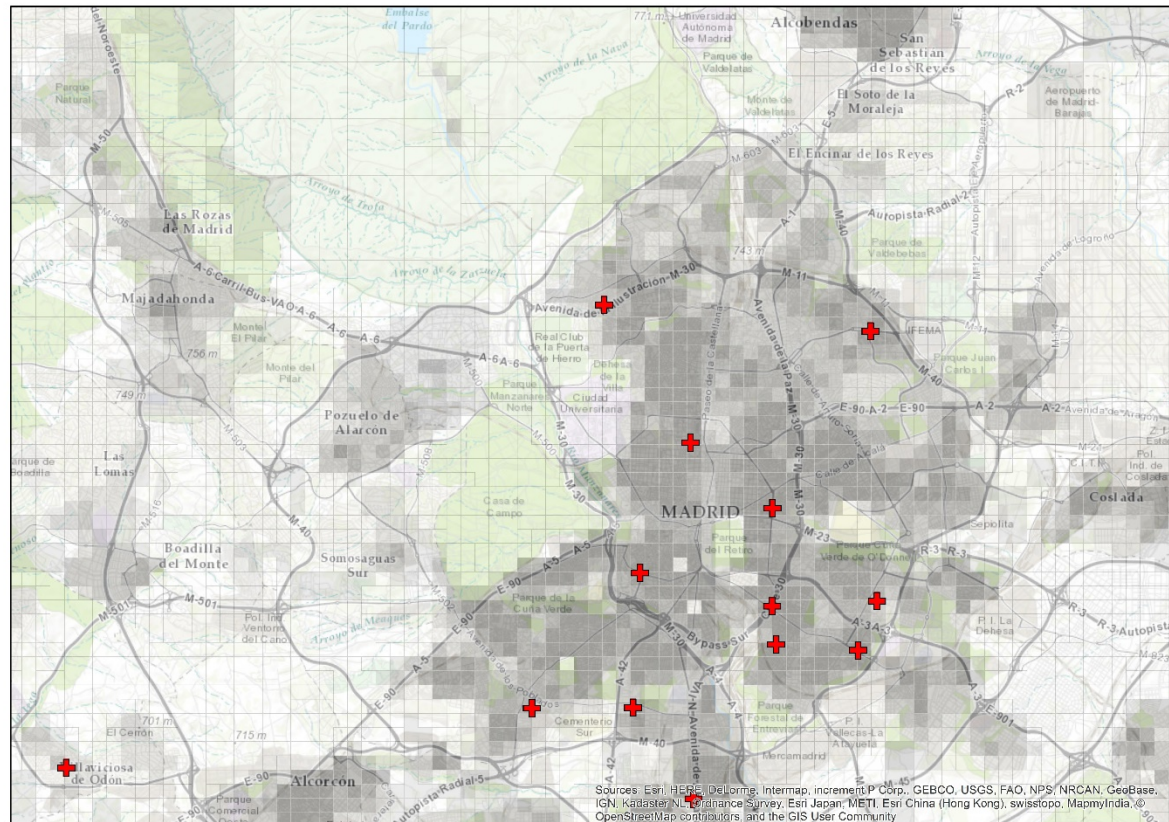


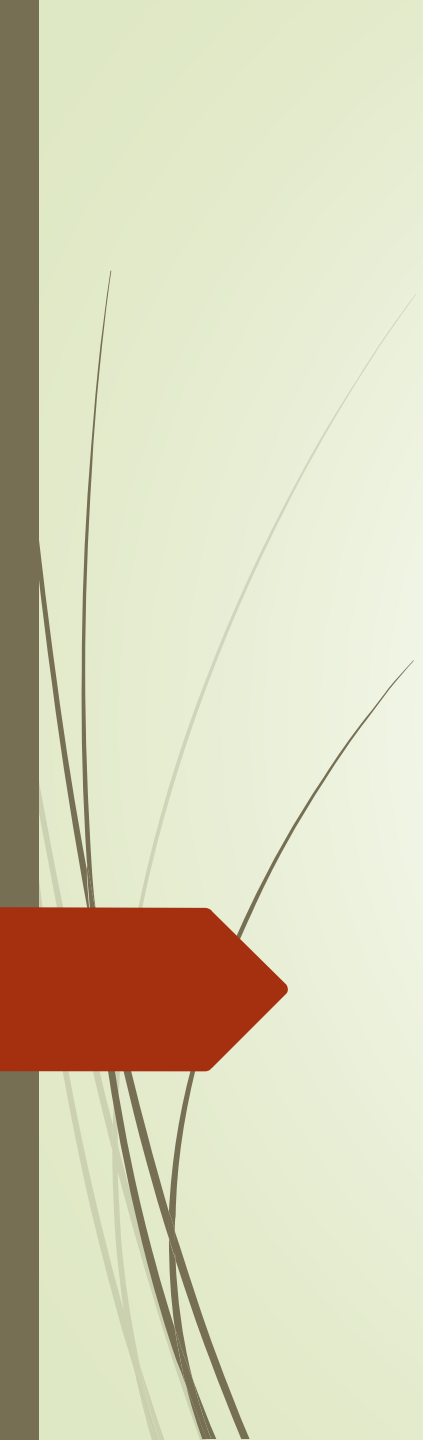
Shortcomings of current accessibility analysis



Shortcomings of current analysis

- Provide **static picture** of accessibility to HCS
- Neglect **daily fluctuations**
 - Health care facilities (service supply)
 - Population location (service demand)
 - Transport performance





Accessibility is dynamic!

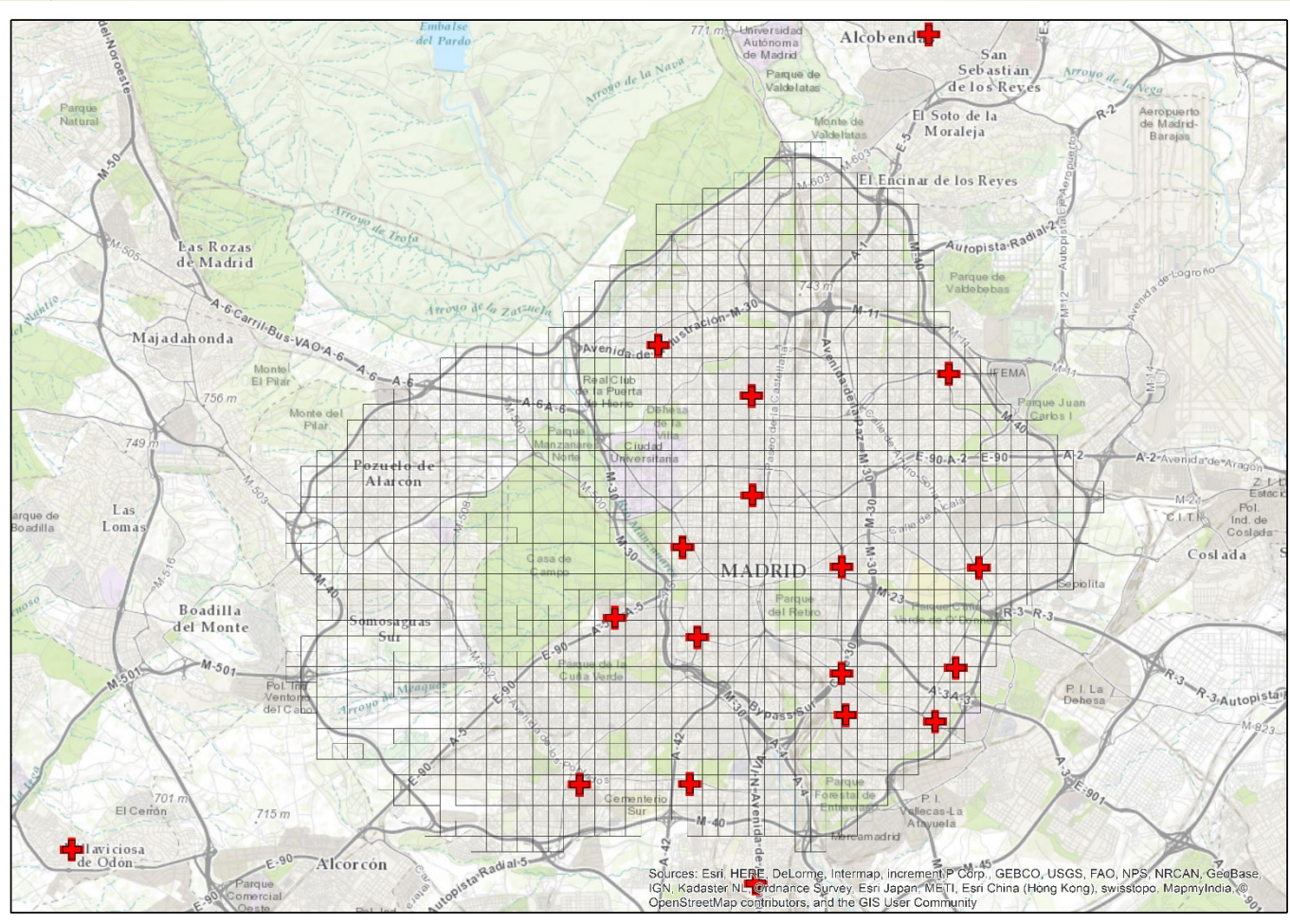
Data

Data		
HEALTH CARE FACILITIES	Health care (addresses, activity hours, and duration)	Portal de Salud de la Comunidad de Madrid (PSCAM)
POPULATION	Demographic & Cadastral data	Instituto Nacional de Estadística (INE) & Electronic Office of Cadastre
	Geolocated tweets	Twitter API
TRANSPORT	Transit stops, routes, and schedules (GTFS)	Consortio Regional de Transporte de Madrid (CRTM)
	Pedestrian networks	OpenTransportMap (OSM)

Health care facilities opening hours

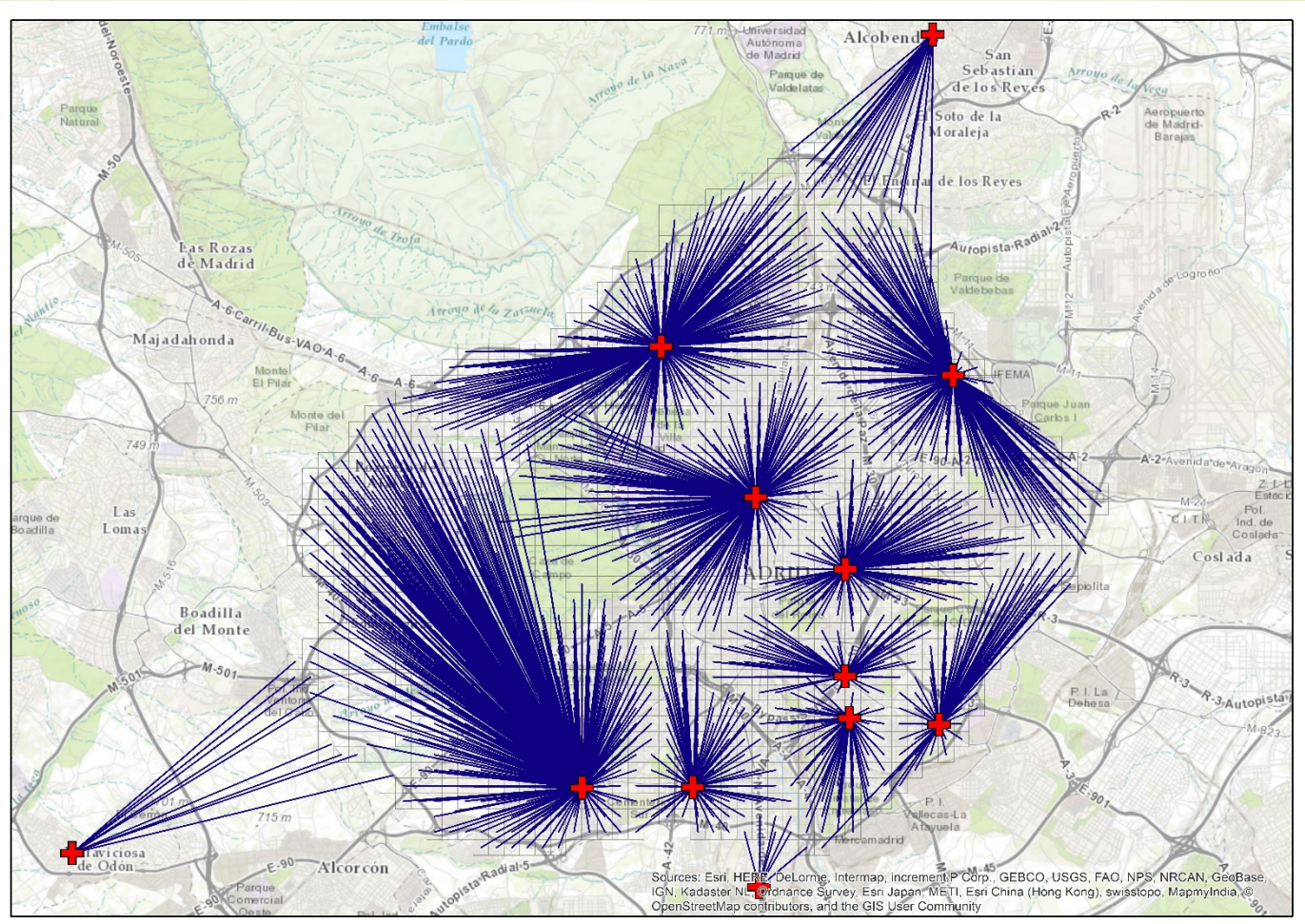


Health care facilities



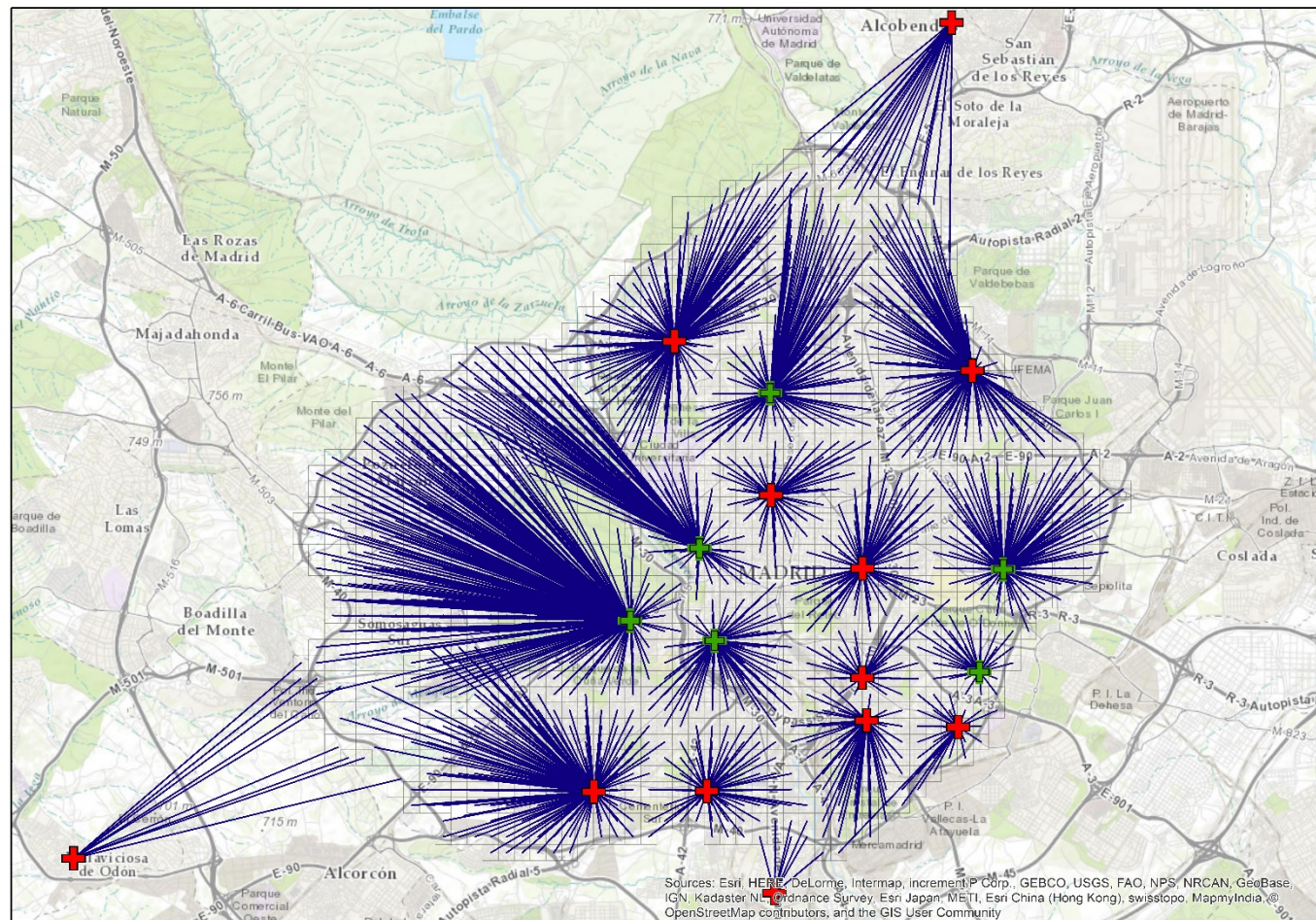
Health care facility locations and study area

Health care facilities



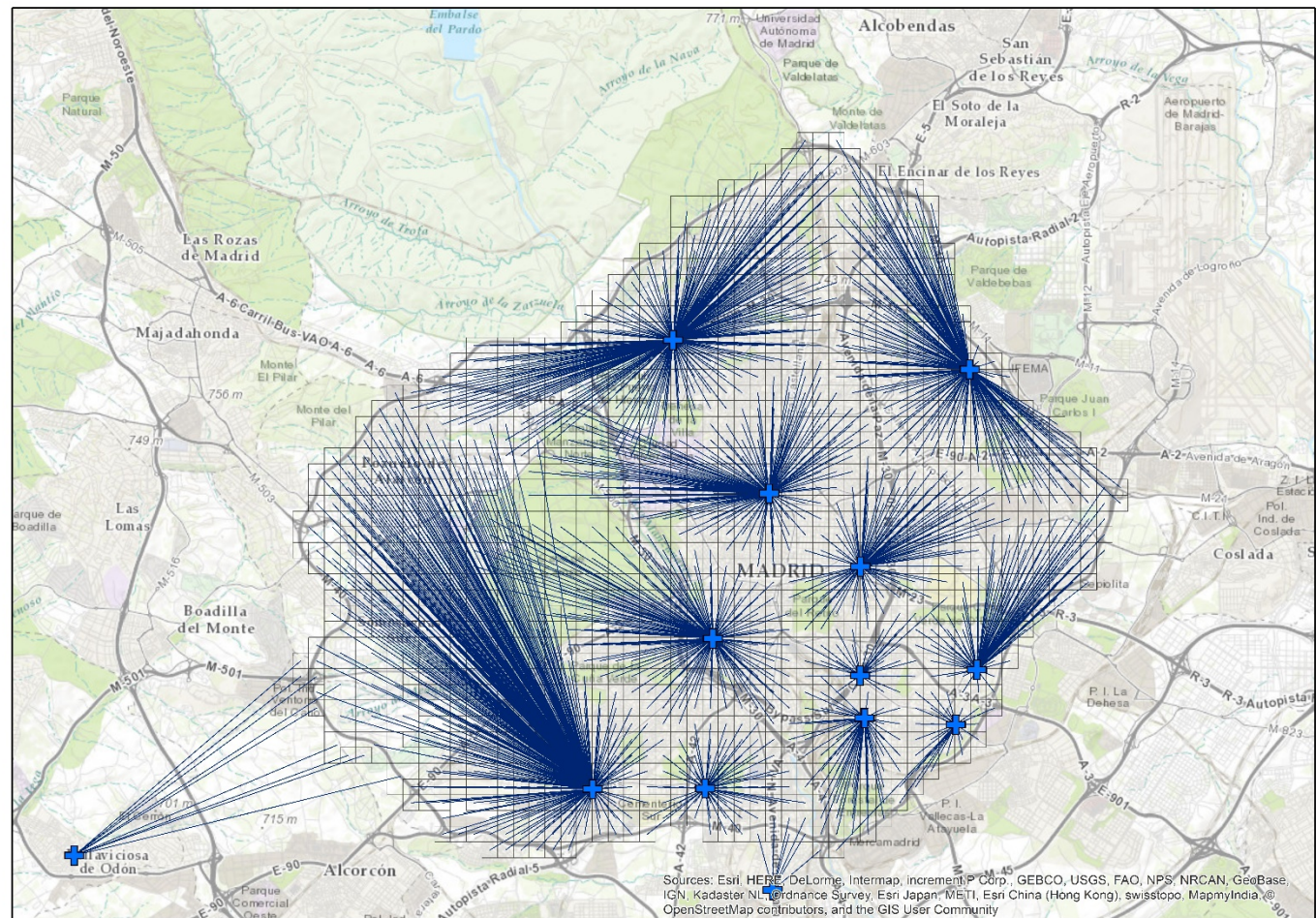
08:00 – 09:00

Health care facilities



12:00 – 13:00

Health care facilities

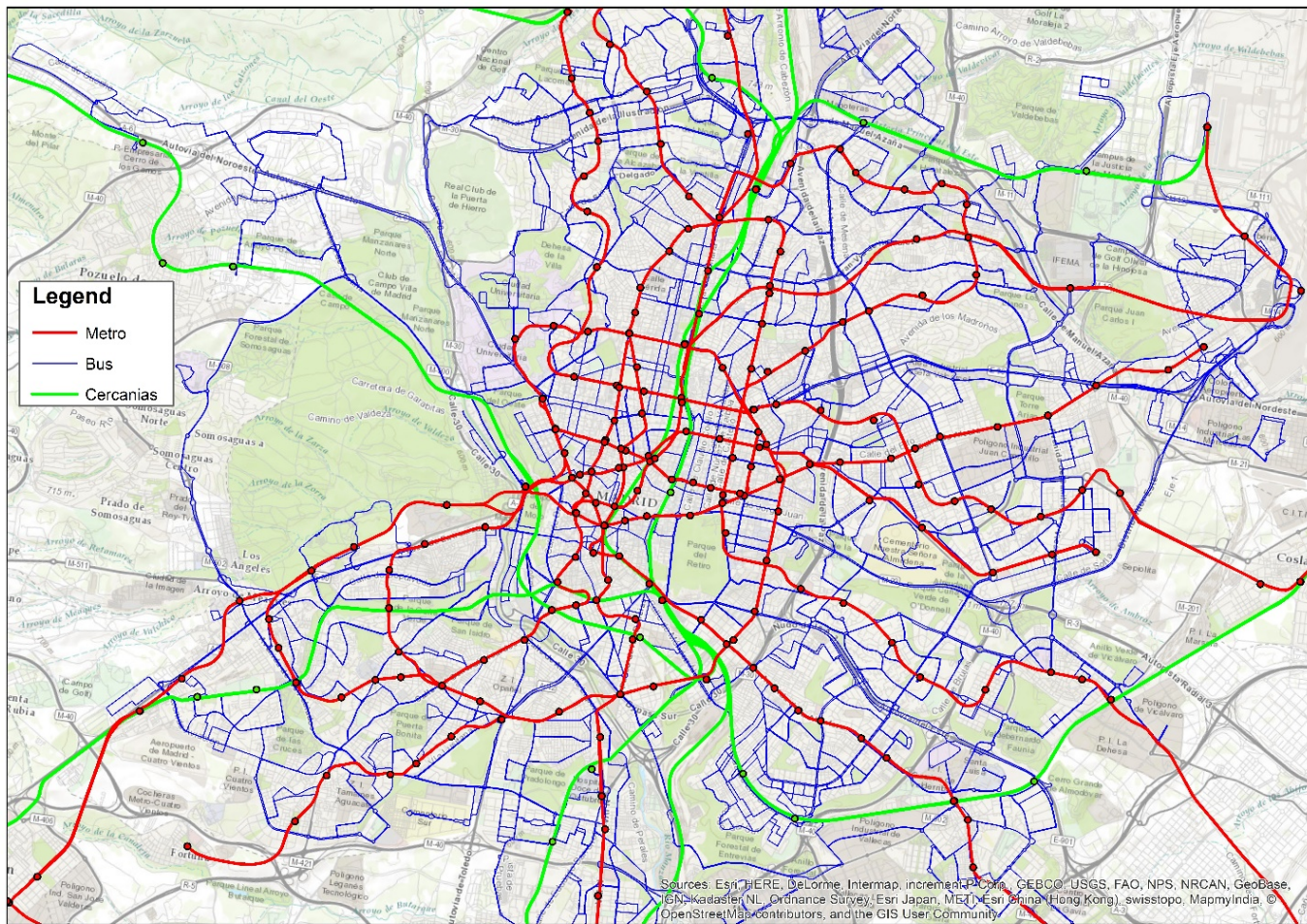


18:00 – 19:00

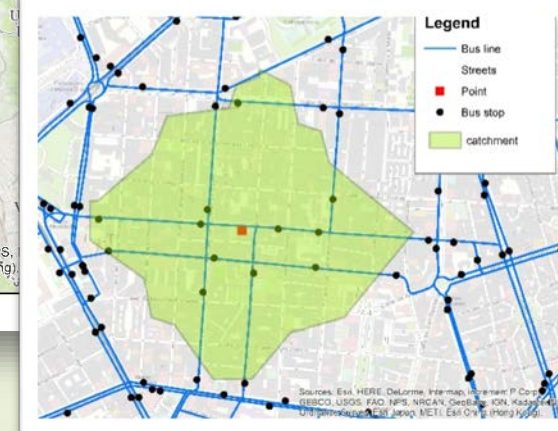
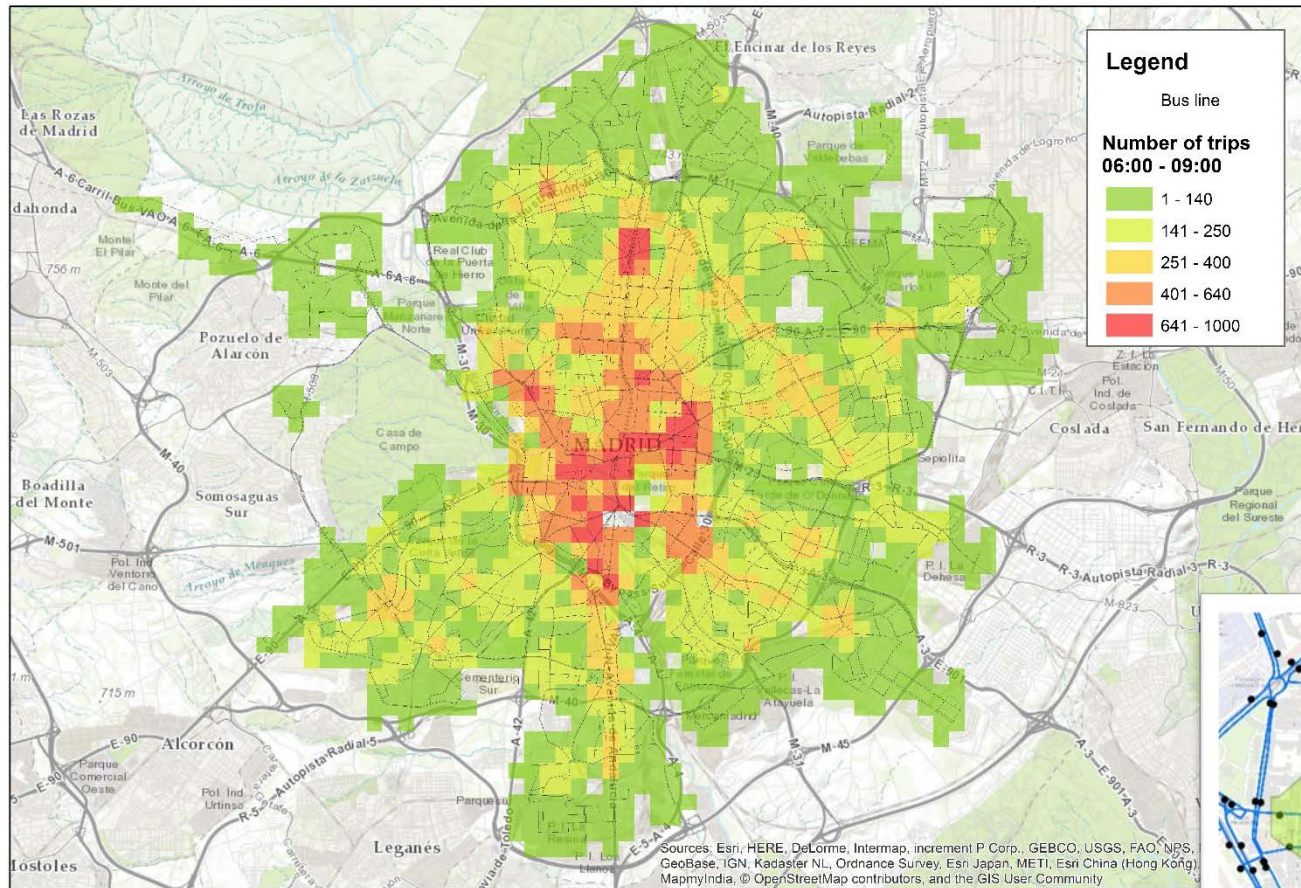
Variation in transit performance



From Google data to dynamic transport network



Number of bus trips between 06:00AM and 09:00 AM

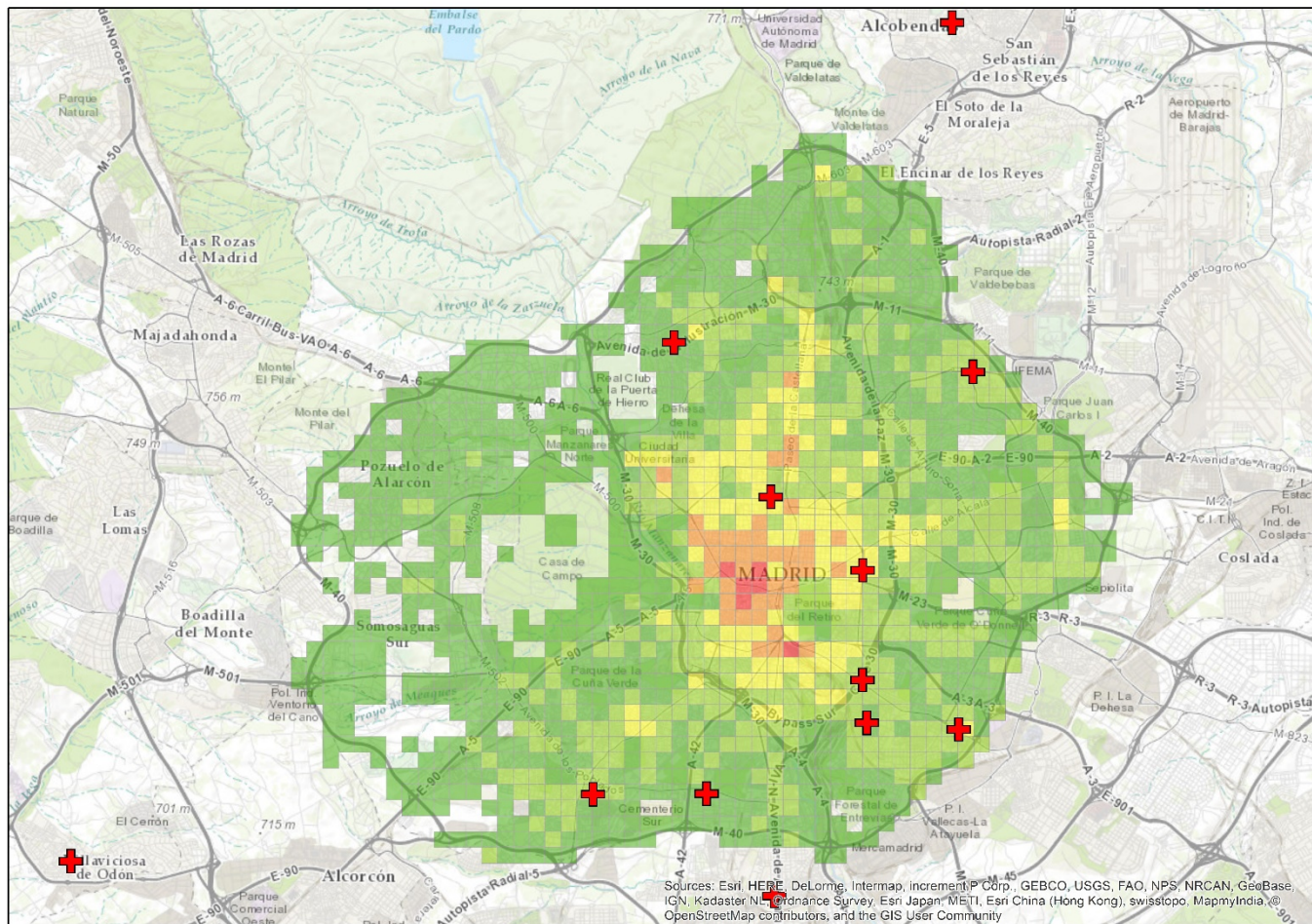


$$Connectivity_i(t_0 - t_1) = \sum_{s \in I} \sum_{t_0 < t < t_1} trip_{s,t}$$

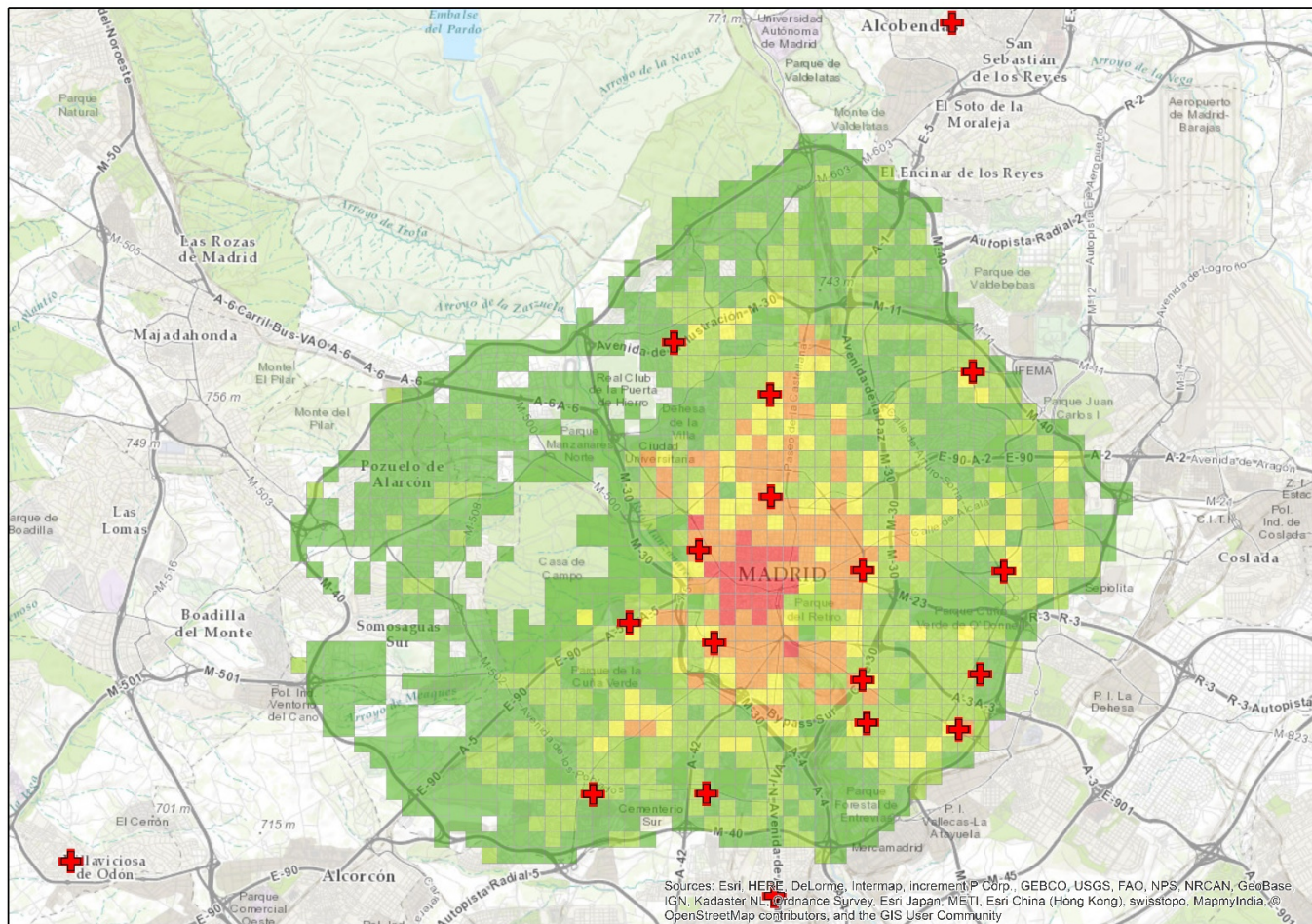
Variation in population location



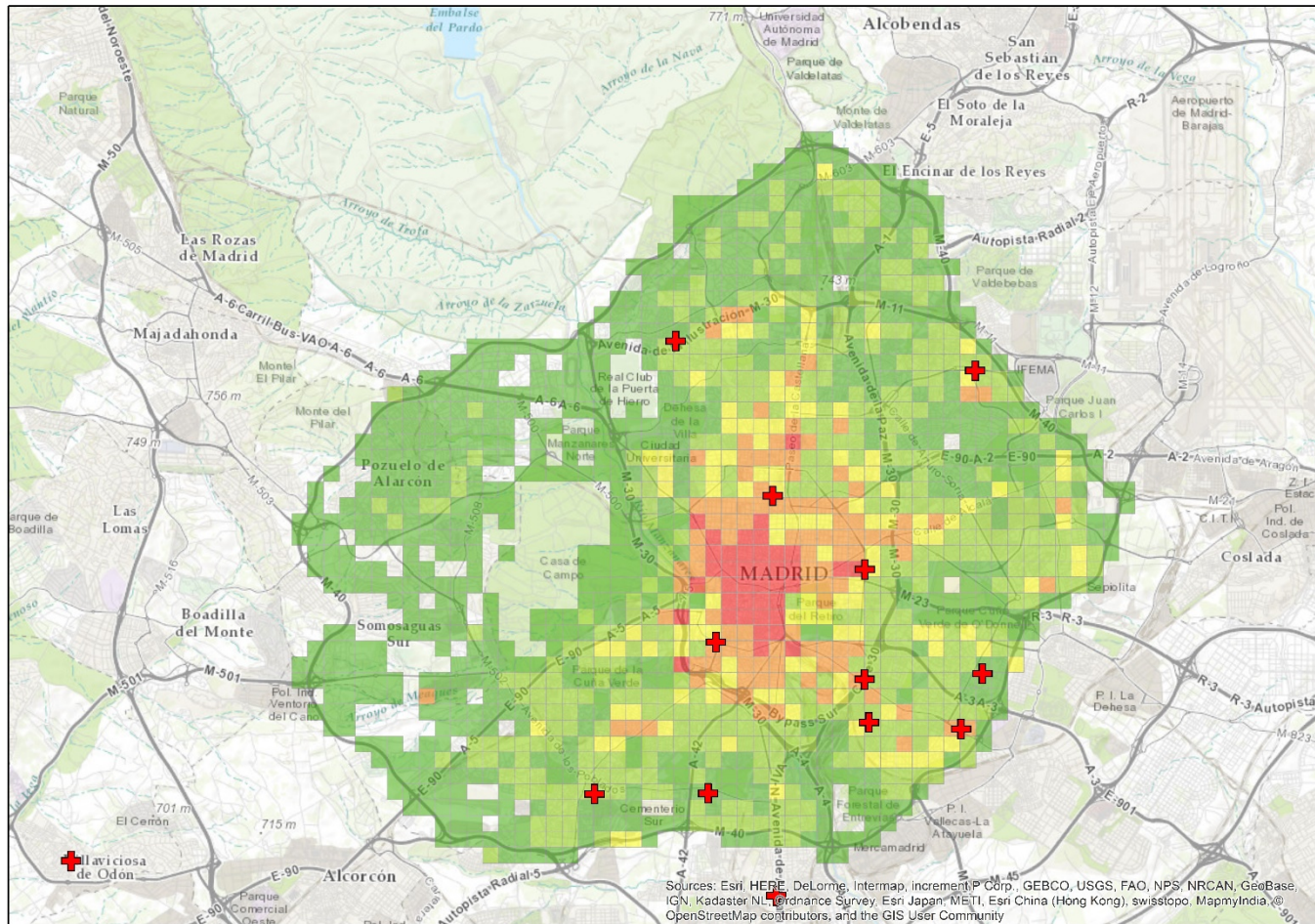
From Twitter and cadastral data to dynamic population location



From Twitter and cadastral data to dynamic population location



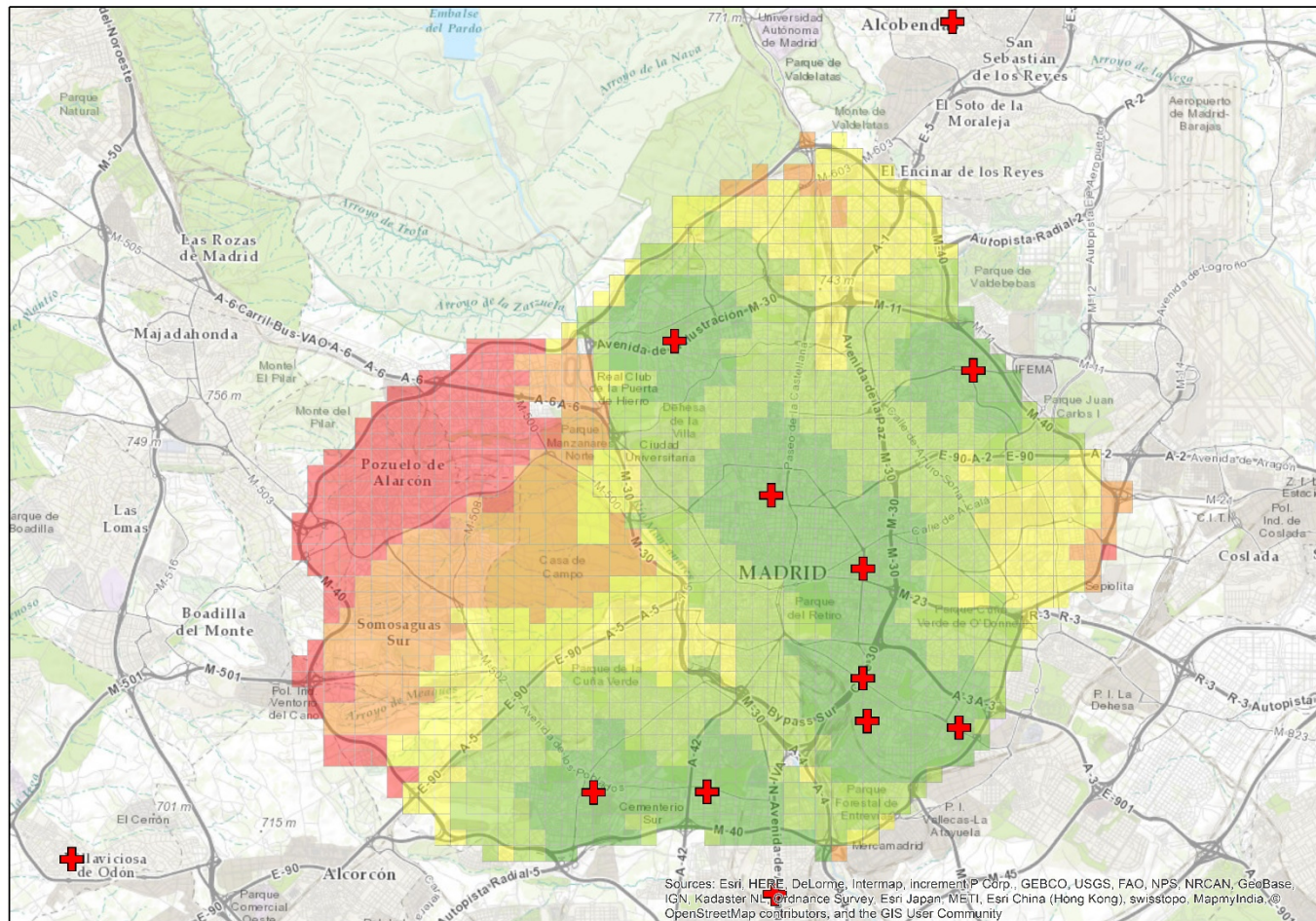
From Twitter and cadastral data to dynamic population location



Combined effects



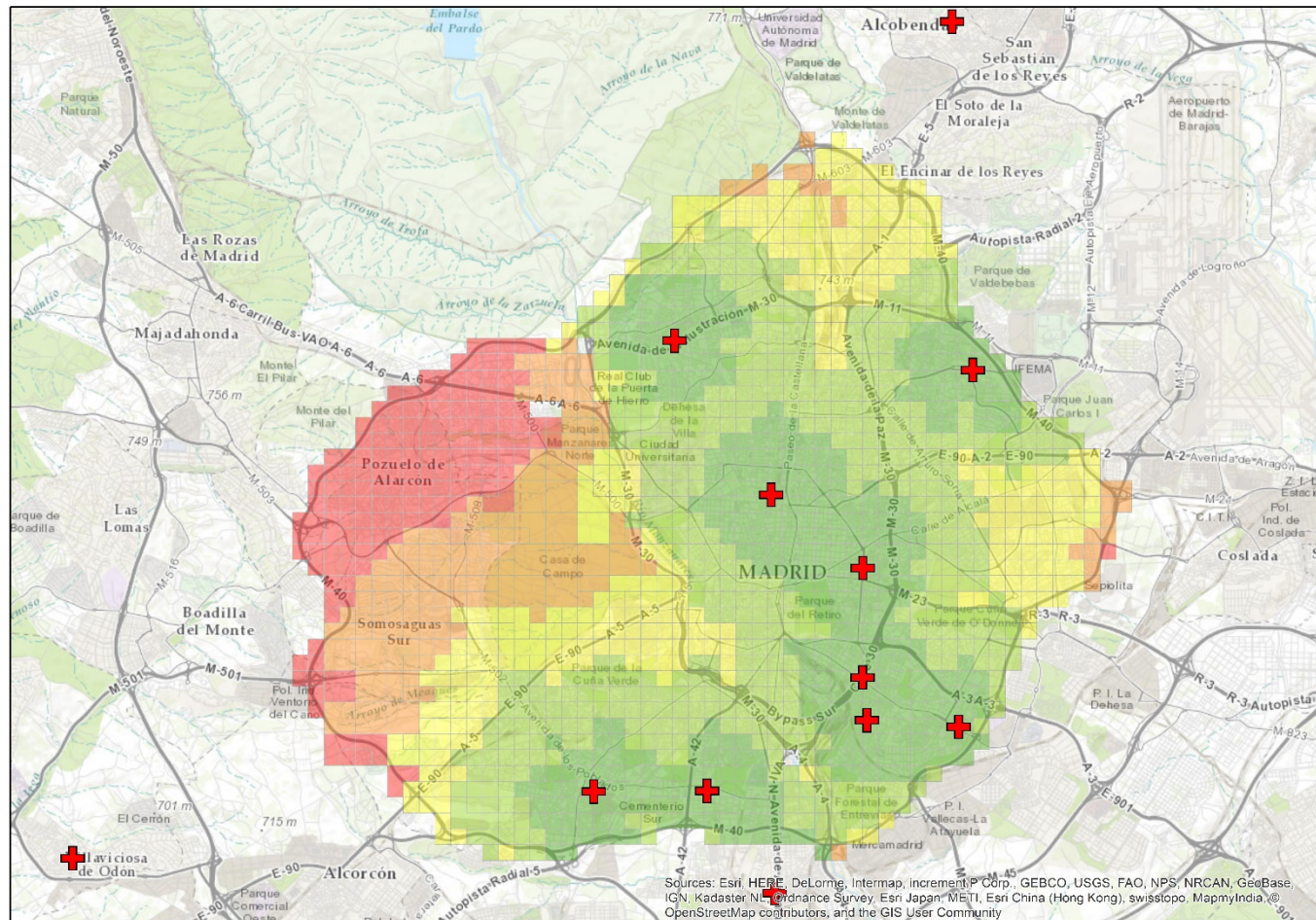
Combined effects



Toward smarter solutions



Smarter solutions





12:00 – 13:00

Discussion and conclusion





Discussion and conclusion

- Current accessibility analysis are static
- **Big data and GIS** can support health care practitioners in delivering **smarter** and more sustainable health care strategies
- From hard to **soft planning measures** (e.g. adapting opening hours to fit user needs or adapting transit frequencies)
- Bridging the **implementation gap**: connect academia with business and administration



Thanks for your attention

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