WHEN THE DRIVER IS GONE: PUBLIC GIS AND OPERATIONAL TRUST IN AN AUTONOMOUS FUTURE

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Public GIS information, such as address points, parcel registries, and geocoding services, is increasingly used to drive operational decisions. A delivery route, an emergency dispatch, or a home health visit all assume that a published location can be trusted for action. We ask whether that assumption holds. Public GIS describes where a place is. Operations need to know whether the place can actually be reached and served today. We call this property operational trust. A location can be correct in public records and still fail it. Today, drivers and field workers quietly fill that gap. As autonomous systems replace them, the question becomes urgent.

Hurricane María (2017) made this gap visible in Puerto Rico. In our operational work, roughly 1,000 registered institutional spaces lost their operational reliability while their coordinates stayed exactly the same.

We study the gap using about 24,500 operationally validated coordinates from a COVID-era, USDA-supported food assistance deployment in Bayamón. Each record marks where a delivery actually succeeded, not only where an address geocoded. We compare these validated points with the output of conventional geocoding services built on public address data. The comparison shows that a valid civic address is necessary but not sufficient for operational action. Puerto Rico's gaps in rural civic addressing are well known, but this result means that closing them would not be enough on its own. From these cases we derive an eight-mode taxonomy of location failures. Many of the failures are silent: the system returns a confident coordinate that is wrong for the task.

We then propose Reliable Places, a framework that treats place as a typed, uncertain, and history-bearing record rather than a static point. A place carries its type, its uncertainty, its last-meters access information, and a history of confirmed and failed visits. We also present the design of TrustGeoScore, a Bayesian trust score with temporal decay that lowers confidence in a place as its evidence ages. TrustGeoScore is designed but not yet deployed.

The gap is hidden today because a human is in the loop. Drivers, field workers, and responders correct bad locations with local knowledge: the right gate, the unmarked road, the neighbor who knows the family. That knowledge is rarely recorded. As services move toward autonomy, with autonomous vehicles, delivery drones, and robots, the human leaves the loop and the correction disappears. Public GIS information was never designed to carry it.

Our answer is that public GIS information is a necessary foundation but is not enough on its own. Operational trust needs an added layer of field evidence that public datasets do not record today. Such a layer would benefit current parcel delivery in rural areas; Medicare and Medicaid home services such as home health visits and non-emergency medical transportation; emergency and 911 addressing; and disaster recovery in Puerto Rico. It would complement, not replace, property and address registries such as CRIM.