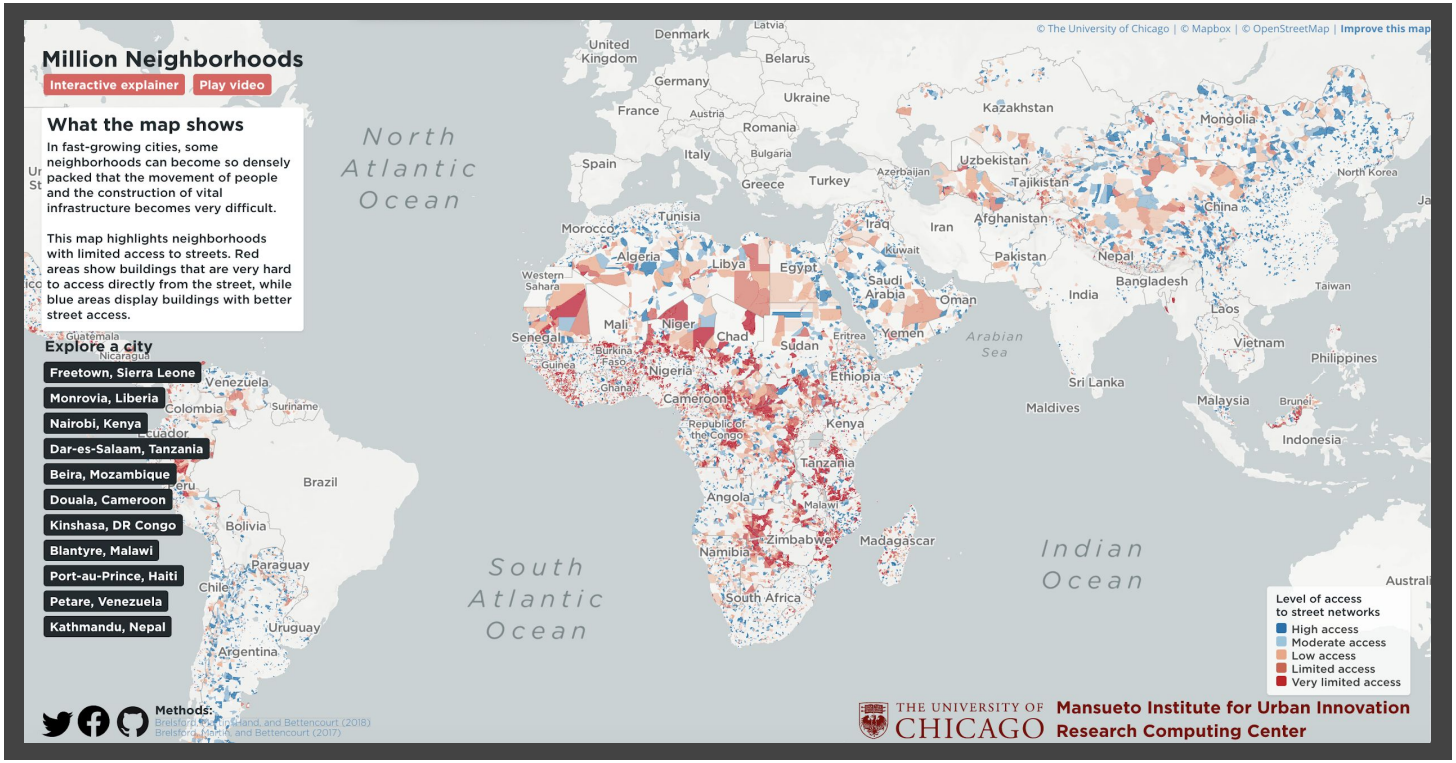
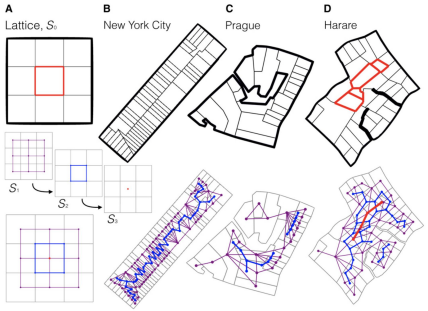
Million Neighborhoods Initiative | Mansueto Institute for Urban Innovation

The world is urbanizing quickly with nearly 4 billion people presently living in urban areas, about 1 billion of them in slums. Achieving sustainable development from rapid urbanization relies critically on creating cities without slums. In this project we diagnose systematically the central physical problem of slums—the lack of spatial accesses and related services—using a topological analysis of neighborhood maps and resolved by finding solutions to a minimum spanning tree problem. To implement these methods, the research team deployed large scale geospatial processing methods to analyze over 1TB of OpenStreetMap data and use computational geometry techniques for to create topological indices, geometric cadastral maps of building footprints, and spanning-tree algorithms.

The results are available here at **millionneighborhoods.org**





Topology of places and city block complexity.

(**A**) Schematic city block (top) with one internal place (red outline) and its characterization in terms of a hierarchy of weak dual graphs, *S*1, *S*2, and *S*3 (bottom). (**B**) New York City. (**C**) Prague. (**D**) Construction of nested dual graphs for a block in the Epworth neighborhood in Harare (Zimbabwe), with block complexity *k*max = 3. In this case, internal parcels are only one layer deep relative to existing accesses.