WEB-MAPS
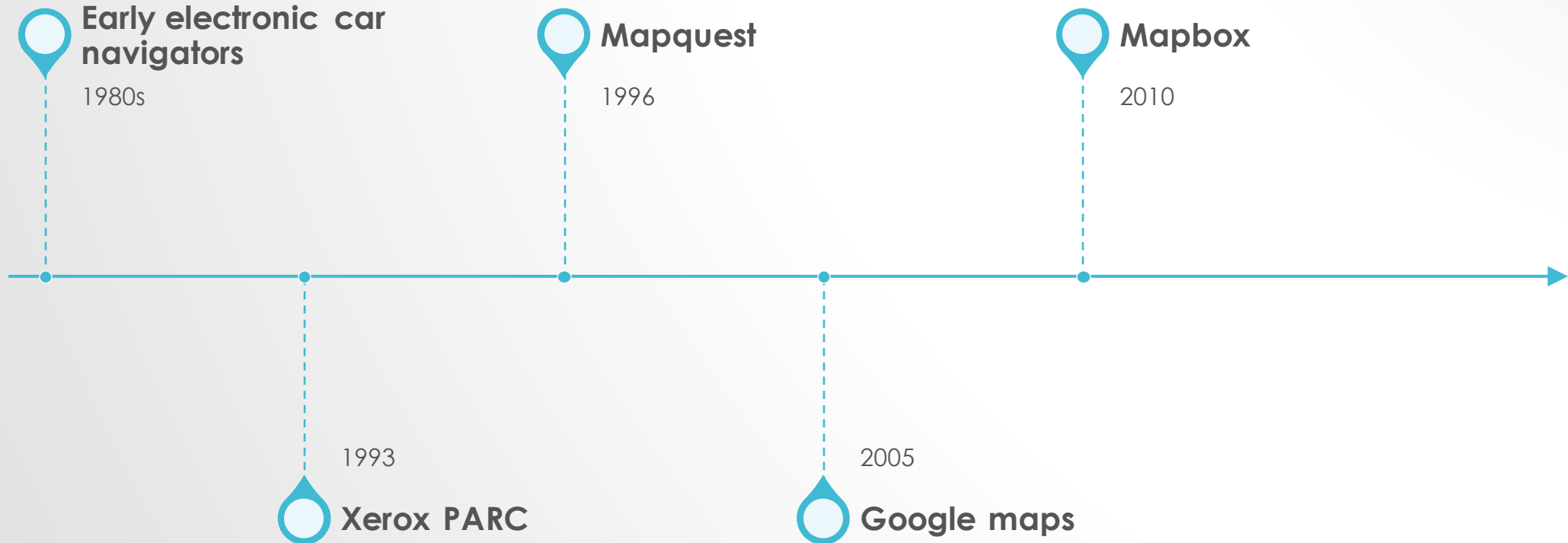
Brief history, technology, tools etc

By Grigorii Silidis

HISTORY LESSON
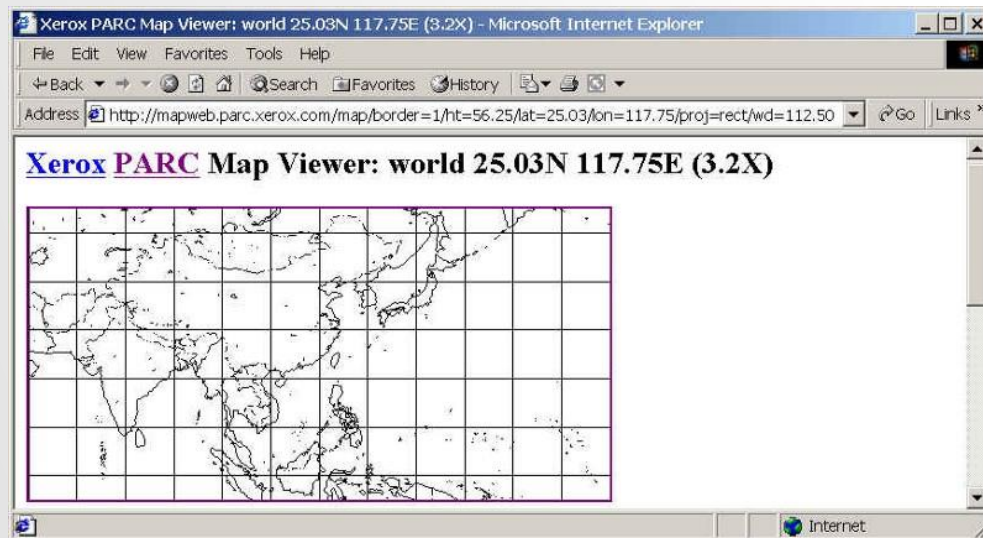
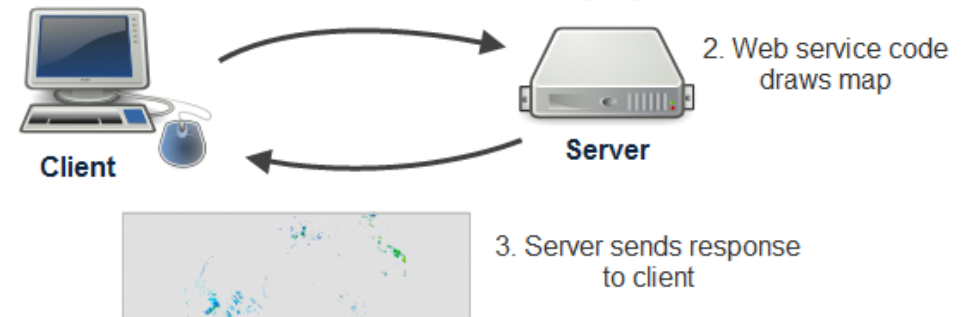**Early electronic car navigators**

1980s

Mapquest

1996

Mapbox

2010

1993

2005

Xerox PARC

Google maps

EARLY CAR NAVIGATORS

1980s

XEROX PARC
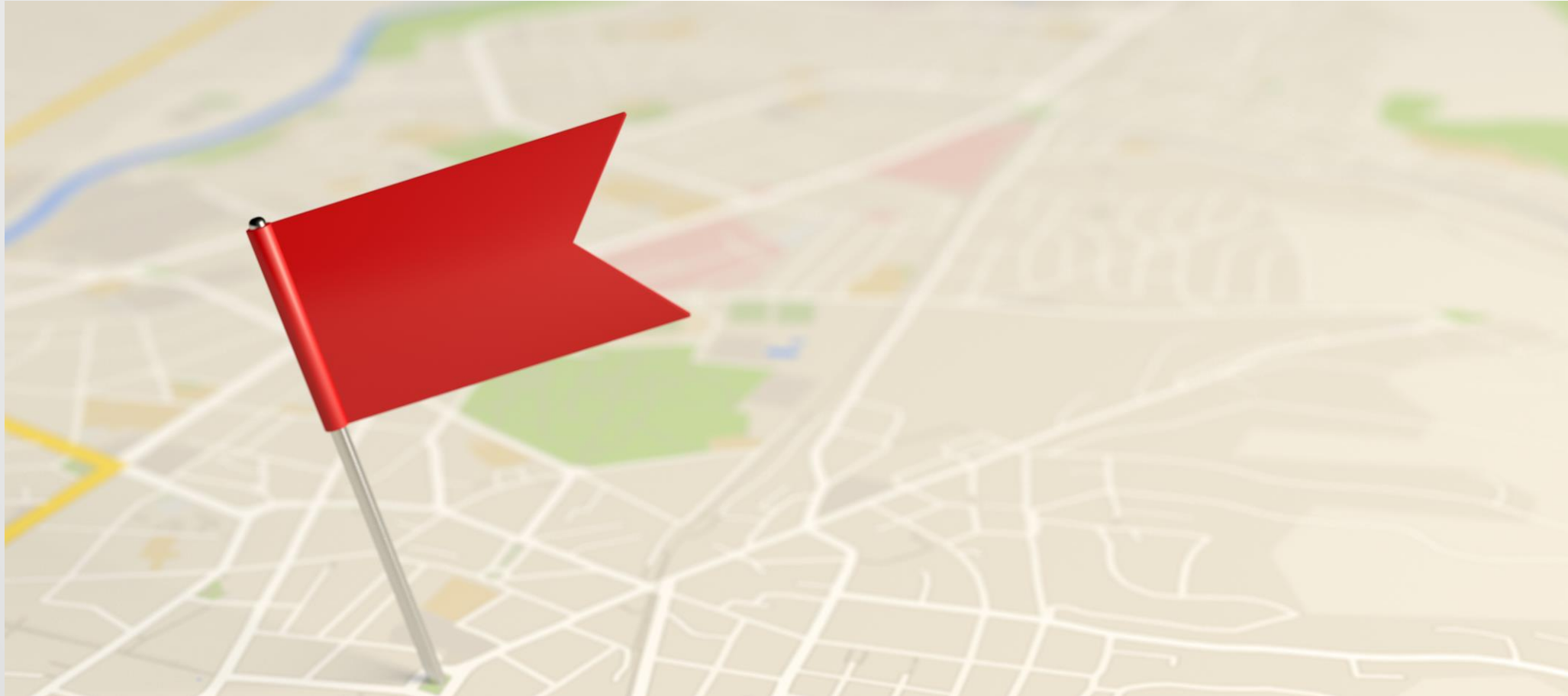

1993

MAPQUEST

1996

GOOGLE MAPS

2005
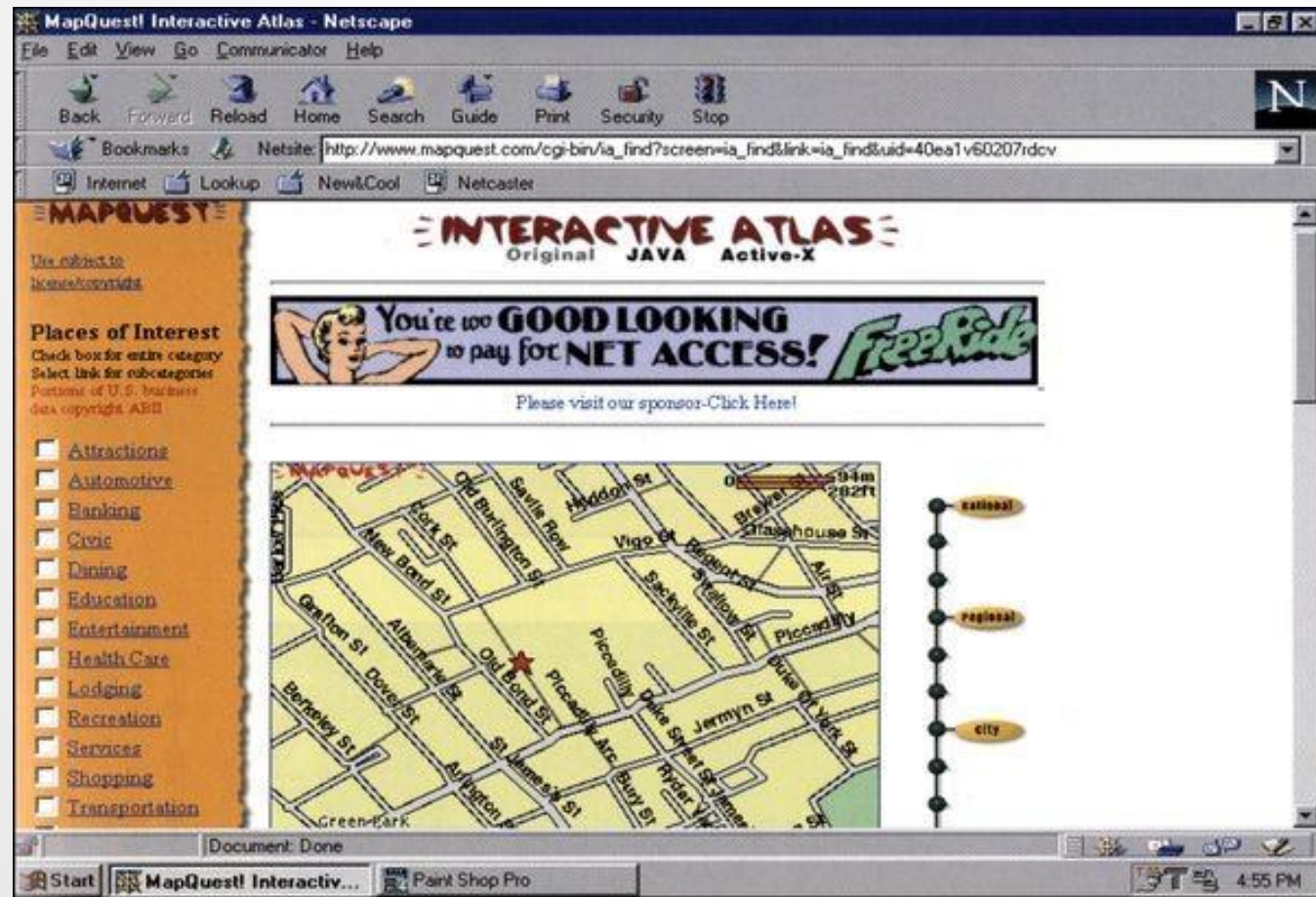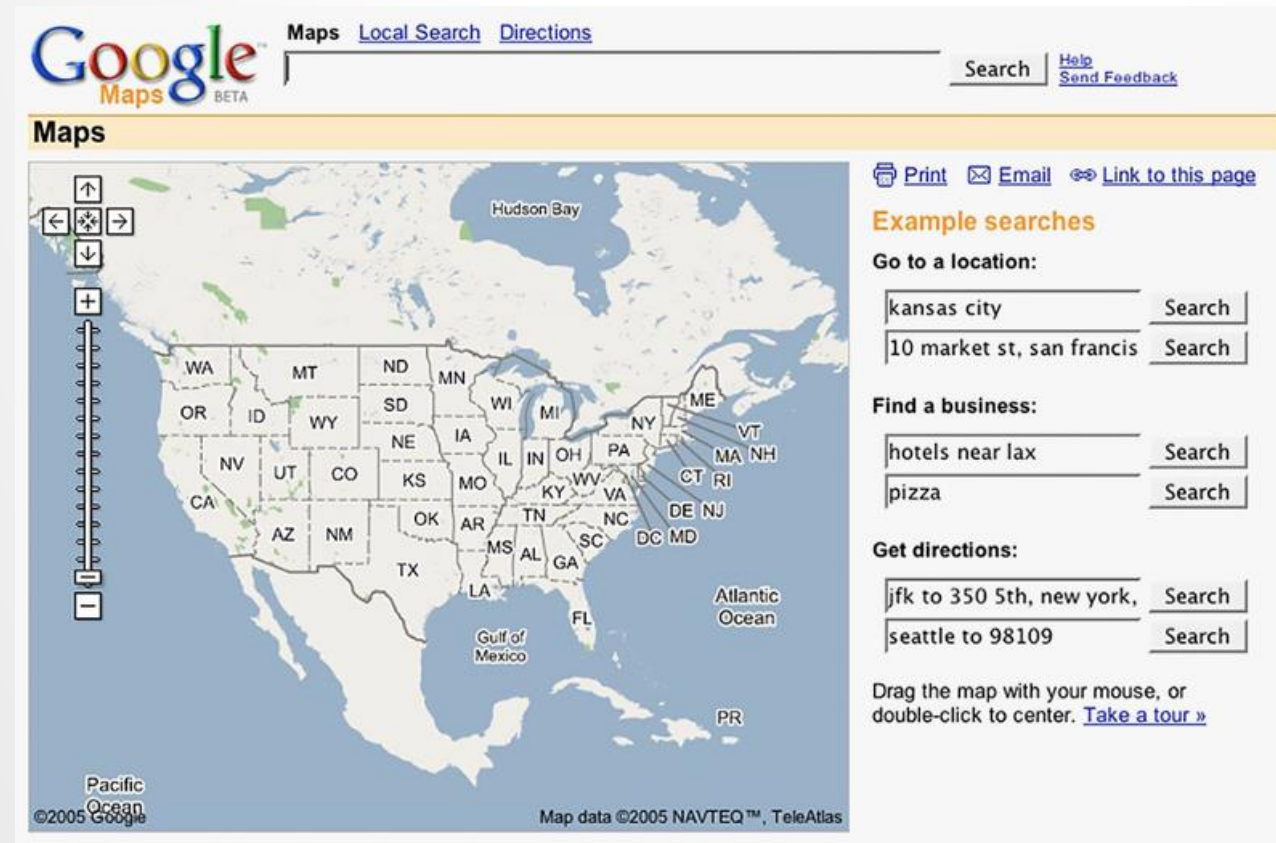
MAPBOX
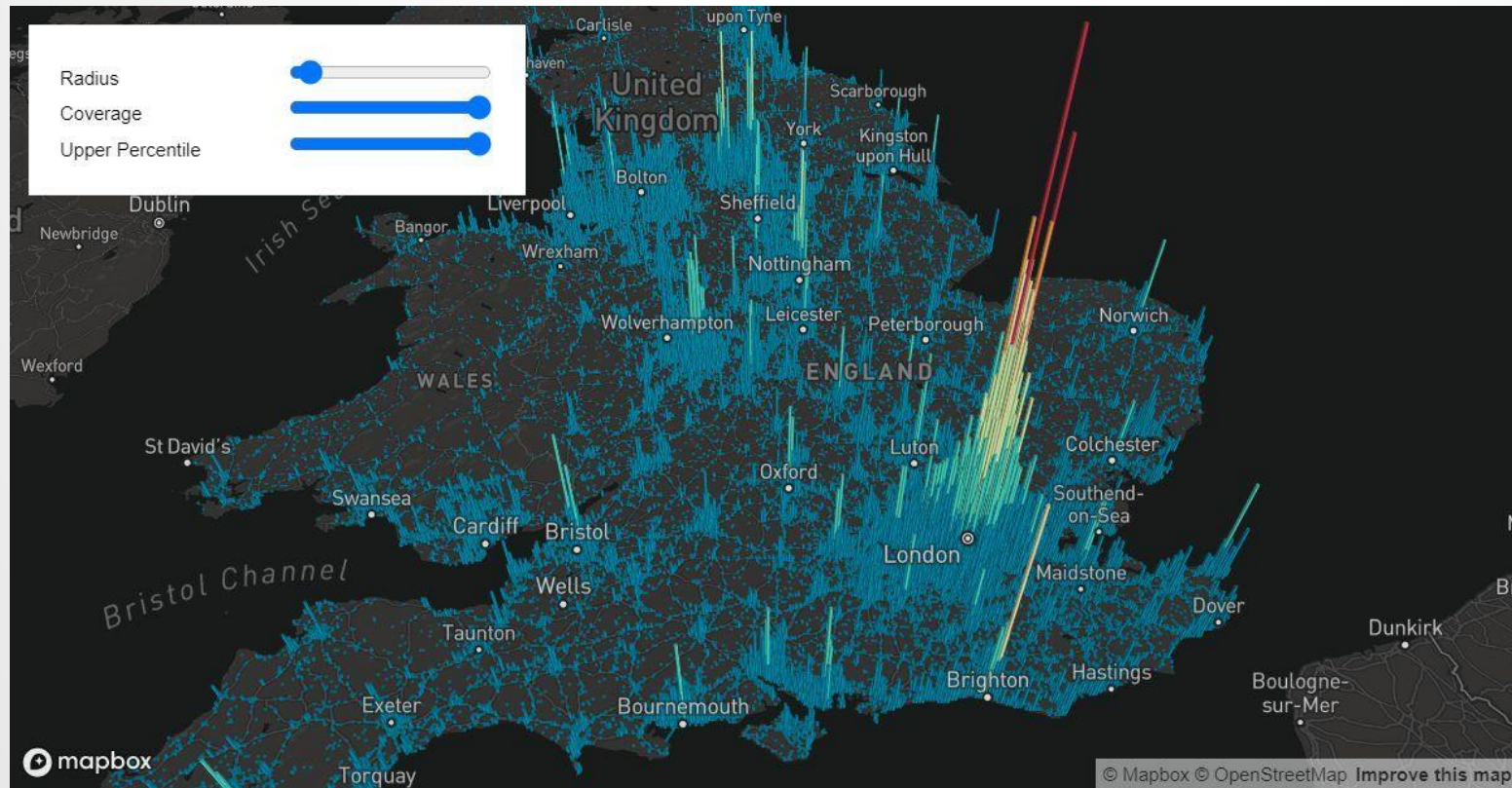
HOW WEB MAPS WORK

TYPES OF GEO-OBJECTS

POINTS
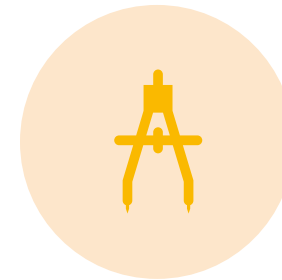
LINES

RELATIONS

WHAT ARE TILES?

How clients receive maps

INFRASTRUCTURE

GIS → Prepared GEO-data → Render server → Web server → Internet → Clients
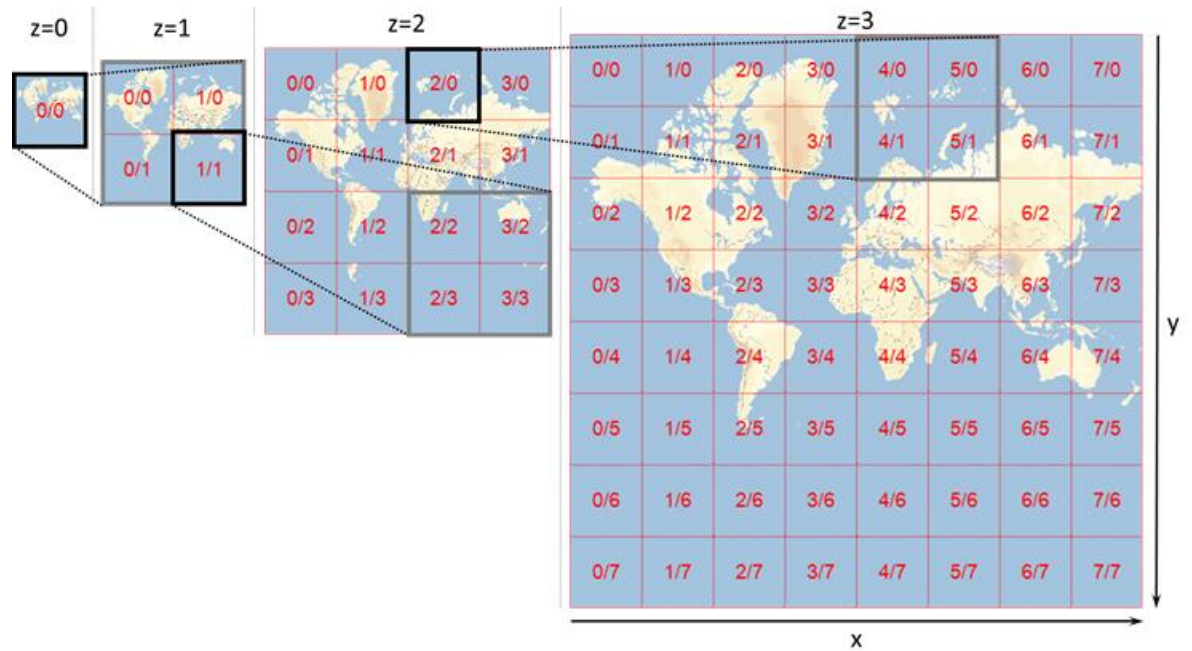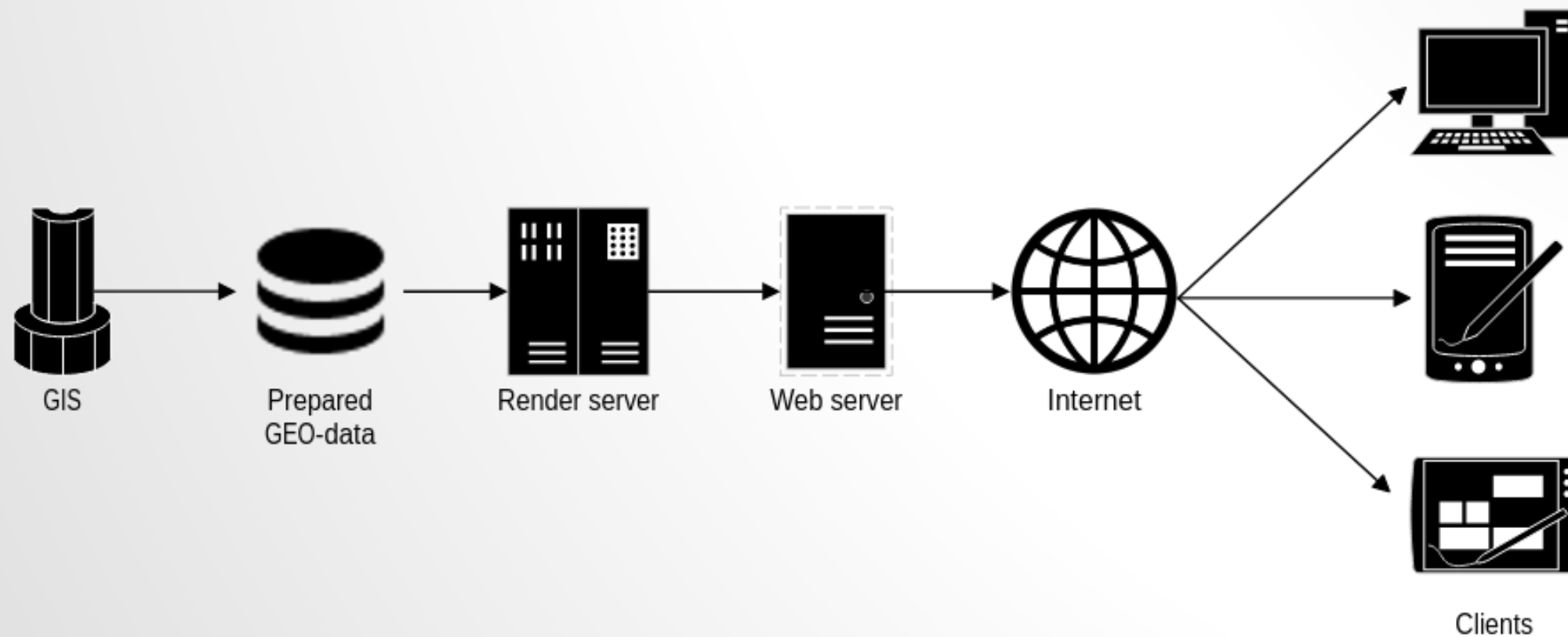
RASTER VS VECTOR

	Raster	Vector
Data type	Colored pixels	Geodata
Typical tile size	18KB(@1x)/50KB(@2x)	1-100KB (depending on data size)
Scaling	Nearest-neighbour	Not needed
Technical requirements	Ability to display images	Ability to render vector graphics (Usually OpenGL)
3D	No	Yes
Interaction	Interaction with coordinates	Interaction with corrdinates and objects

TWO TYPES OF MAP APIS

GIS-specialist oriented:

- Create layer

- Setup layer styling

- Add data

General user oriented:

- Add point to map

Example: OpenLayers

Example: Google Maps API

PROPRIETARY MAPS APIS

	Google	Yandex	Here	Bing
Free plans	Yes, but credit card is required	Yes	Yes, but credit card is required	Yes
Editable data	Add or edit business. Other information only through tech-support	All map data is editable in Yandex Map Editor	Add or edit POI. Other information only through tech-support	Add or edit business
Additional layers	Traffic, Satellite, Terrain	Traffic, Sattelite*	Traffic, Satellite, Terrain	Traffic, Satellite, Terrain
Data visualization	Heatmap, Clustering	Heatmap, Clustering	Heatmap, Clustering	Heatmap, Clustering
Static maps	Yes	Yes	Deprecated	Yes
Countries borders	Yes (adjusted by IP)	No	Yes (adjusted by param)	Yes (adjusted by param)

OPEN STREET MAP

OSM BASED APIS

	OpenLayers	Leaflet	Mapbox GL	Maplibre
Release	2006	2011	2014	2020
Pricing	Free	Free	Paid (Since 2.0)	Free
Vector or raster	Raster	Raster	Vector	Vector
License	BSD	BSD	Proprietary (Since 1.0)	BSD
Vector tile layers	Limited	No	Yes	Yes
OpenGL required	No	No	Yes	Yes
3D	No	No	Yes	Yes

MAPBOX VECTOR TILES

Style

Source

PBF

MBTiles
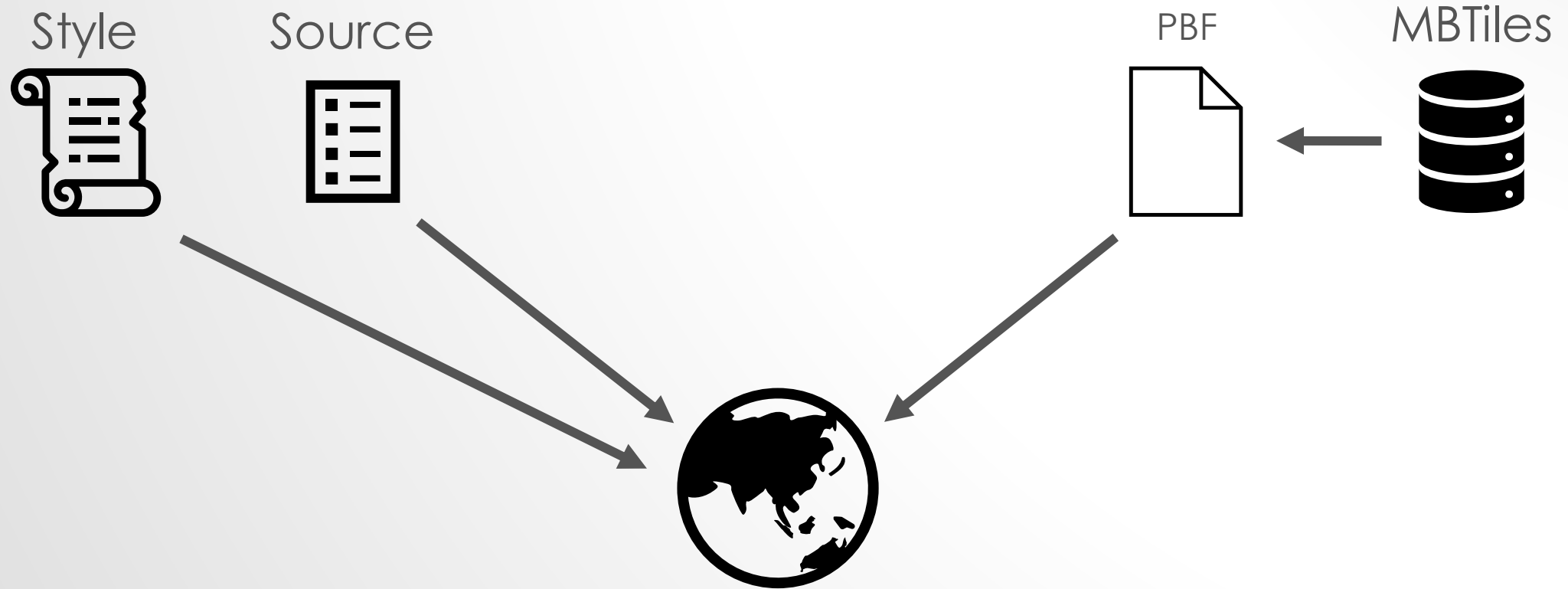
STYLING TOOLS
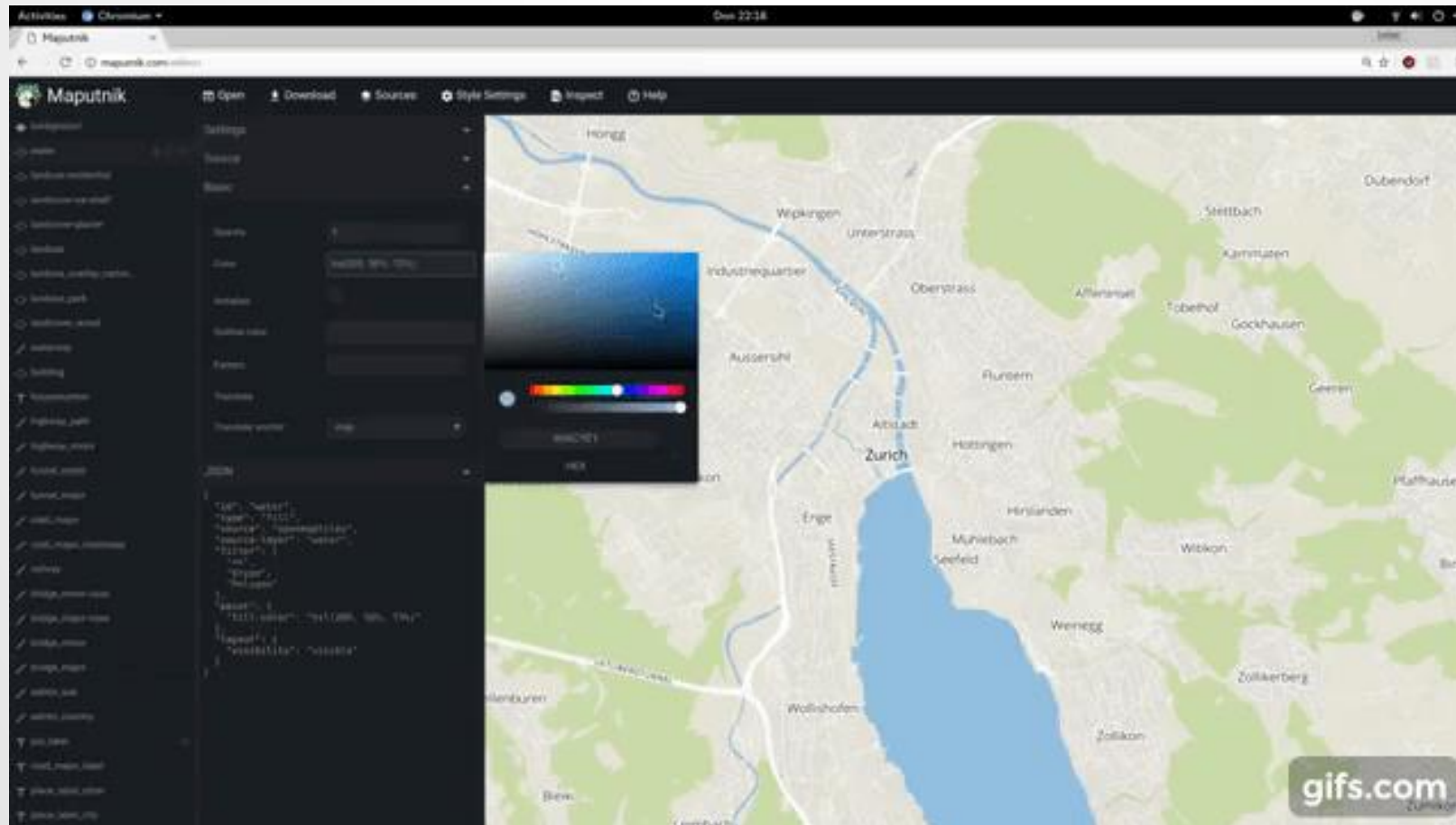
LINKS

- Car navigation demo:
  - Toyota Crown 8th gen: https://youtu.be/HzJH4O4OSqo?t=2170s
  - ETAK: https://youtu.be/CHCCjlSWbHE?t=163s

- History:
  - https://forrest.nyc/a-brief-history-of-web-maps/
  - https://ndrive.com/brief-history-gps-car-navigation/

- MVT:
  - https://cdn.jsdelivr.net/gh/osm2vectortiles/bachelor-thesis@882a46977f7b984fc59be188335127d62921c44c/thesis.pdf

- https://carto.com/blog/raster-vs-vector-whats-the-difference-which-is-best/

LINKS

Some examples:

- https://www.openrailwaymap.org/;

- https://demo.f4map.com/;

- https://opentopomap.org/;

- https://maplibre.org/maplibre-gl-js-docs/example/;

- https://geodienst.github.io/lighthousemap/;

- https://tree-map.nycgovparks.org/tree-map.