

# Publicación de cartografía para la web

Juan Carlos Méndez  
[juan@gkudos.com](mailto:juan@gkudos.com)

Especialización en Geomática  
Universidad Militar Nueva Granada



# 5. Servidores de Mapas

# Introducción



Kelsey Hightower

@kelseyhightower

Seguir



You haven't mastered a tool until you understand when it should not be used.

Traducir del inglés

9:02 - 13 feb. 2018

1.851 Retweets 5.012 Me gusta



78

1,9K

5,0K



## Historia

---

- ✗ A Brief History of Web Mapping
- ✗ Maps, Lies and Storytelling | P02| Selective History of Maps

C A R T E  
des  
INDES ORIENTALES  
Par P. Dv VAL Geographe  
Ordinaire du Roy.

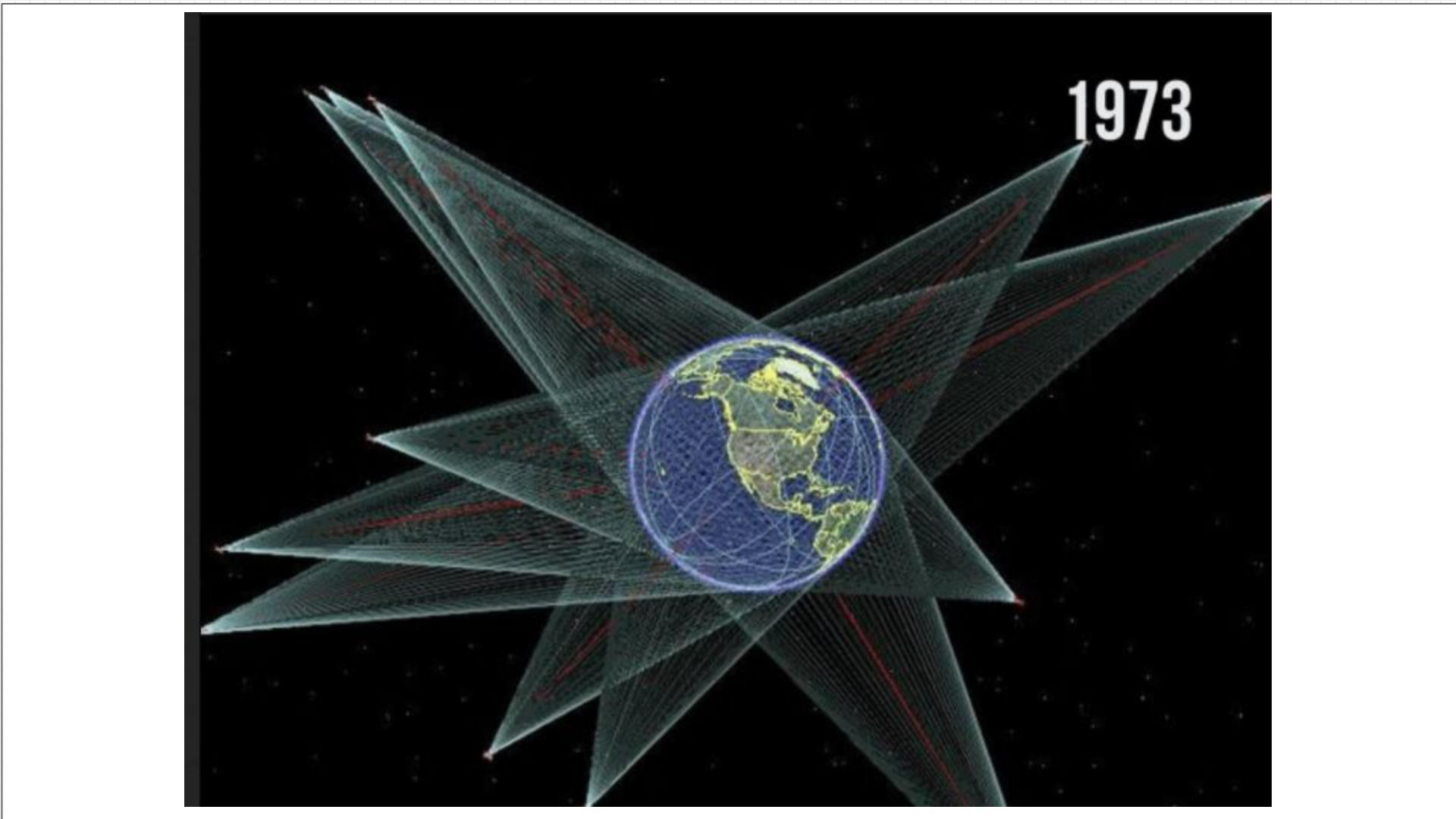
par P. Dv VAL Geographe  
Ordinaire du Roy.



1855







1973



# 1991 – The Internet



# 1993

Xerox PARC Map Viewer: usa 39.56N 109.65W (8.0X) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History Links

Address: http://mapweb.parc.xerox.com/map/color=1&db=usa/features=1&zoom=8.0

## Xerox PARC Map Viewer: usa 39.56N 109.65W (8.0X)

Select a point on the map to zoom in (by 2), or select an option below. Please read [About the Map Viewer](#), [FAQ](#) and [Details](#). To find a U.S. location by name, see the [Geographic Name Server](#).

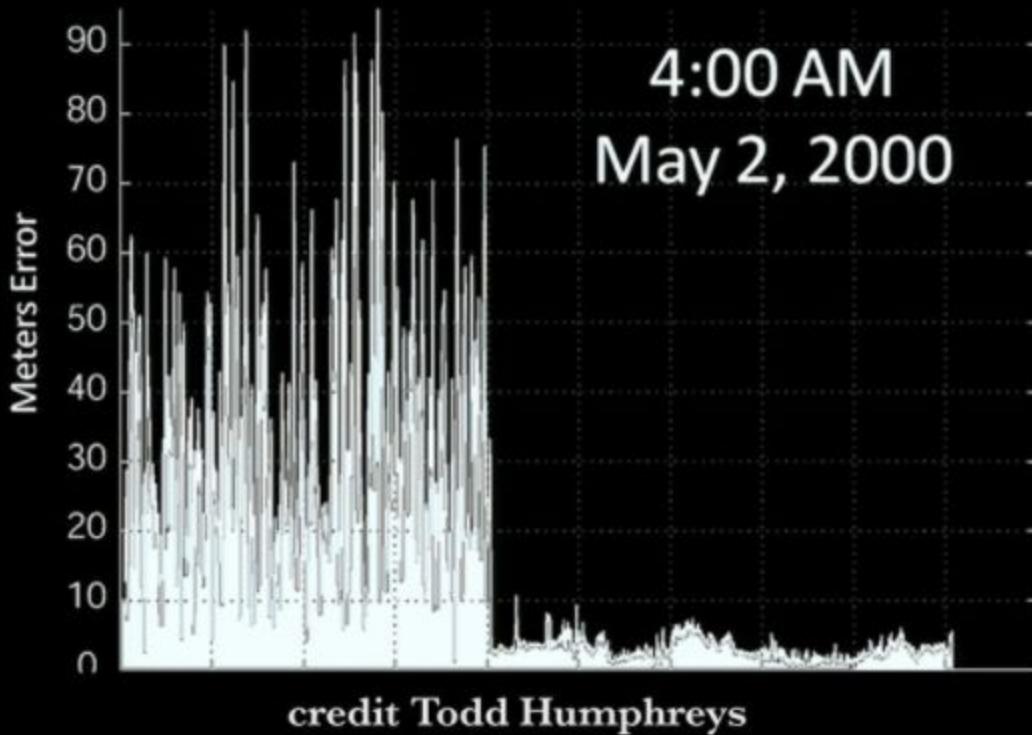
**Options:**

- Zoom In (2), (5), (10), (25); Zoom Out (1/2), (1/5), (1/10), (1/25)
- Features: Default, All, +[rivers](#), +[roads](#), +[railroads](#), +[federal lands](#)
- [View Color Legend for usa map](#)
- Display: [monochrome](#), Projection: [elliptical](#), [rectangular](#), [sinusoidal](#), [Narrow](#), [Square](#)
- Change Database to World (less detail)
- Hide Map Image, Retrieve Map Image Only, No Zoom on Select, Apply Selection
- Place mark at (39.56N 109.65W), Reset All Options

Requested region is 45.00 deg. wide by 22.50 deg. (1552.50 miles) high.

LATER

4:00 AM  
May 2, 2000





# 2000 – ArcIMS

GO

SITE INDEX

SEARCH OUR SITE

MAPS & GEOGRAPHY

## MapMachine

NATIONAL GEOGRAPHIC.COM ESRI

DYNAMIC MAPS

FLAGS AND FACTS

ATLAS MAPS

Find a Place  GO

IN THE NEWS

eye in the sky

Golan Heights:  
The Long Goodbye?

[What is Eye in the Sky?](#)

ATLAS UPDATES



Get the latest  
updates and  
keep your *Atlas  
of the World*  
current.

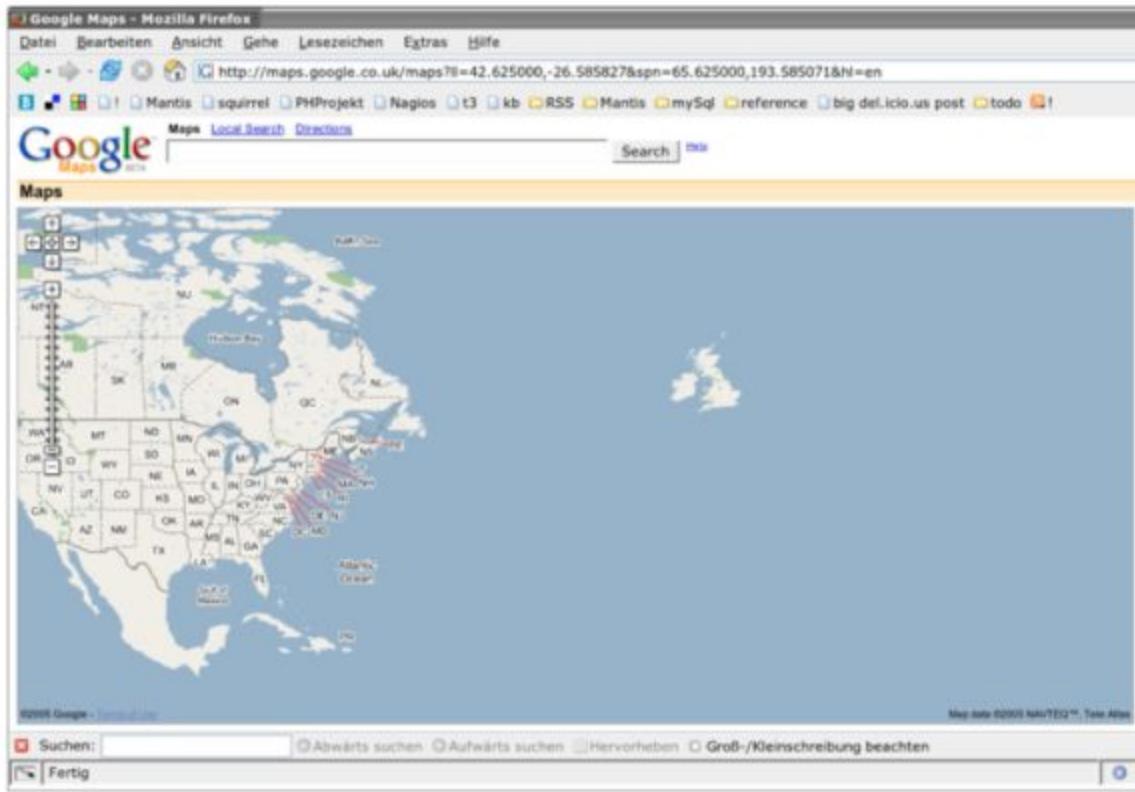
FEATURES



ArcIMS

knowwhere

# 2005



# STREET VIEW

2007





## Geotrigger Service Now Available

Geoloqi joined Esri in 2012 and the Geotrigger Service has been relaunched on

<http://developers.arcgis.com/features/geotrigger-service>

[Documentation](#) | [Overview](#) | [Geotrigger Service Pricing](#)

2013



waze

OUTSMARTING TRAFFIC, TOGETHER

# AN OPEN SOURCE STARTUP DIES AS MAPPING GETS HOTTER THAN EVER

Don't, however, expect Mapzen to be the cartographic canary. Mapping continues to be very hot space. Observe: a coalition of German carmakers' 2015 acquisition of the Nokia mapping company HERE for a reported \$2.7 billion. And Uber's reported \$500 million investment in technology that could free it from Google's services. And the \$164 million Softbank-led funding round for fellow open source mapping company Mapbox, which closed in October. The Bureau of Labor Statistics predicts the number of cartography jobs in the US will balloon by nearly 20 percent between 2016 and 2026.

Y cómo publico un  
mapa en la web?



# Aplicaciones Web



## Proceso Consulta Página Web

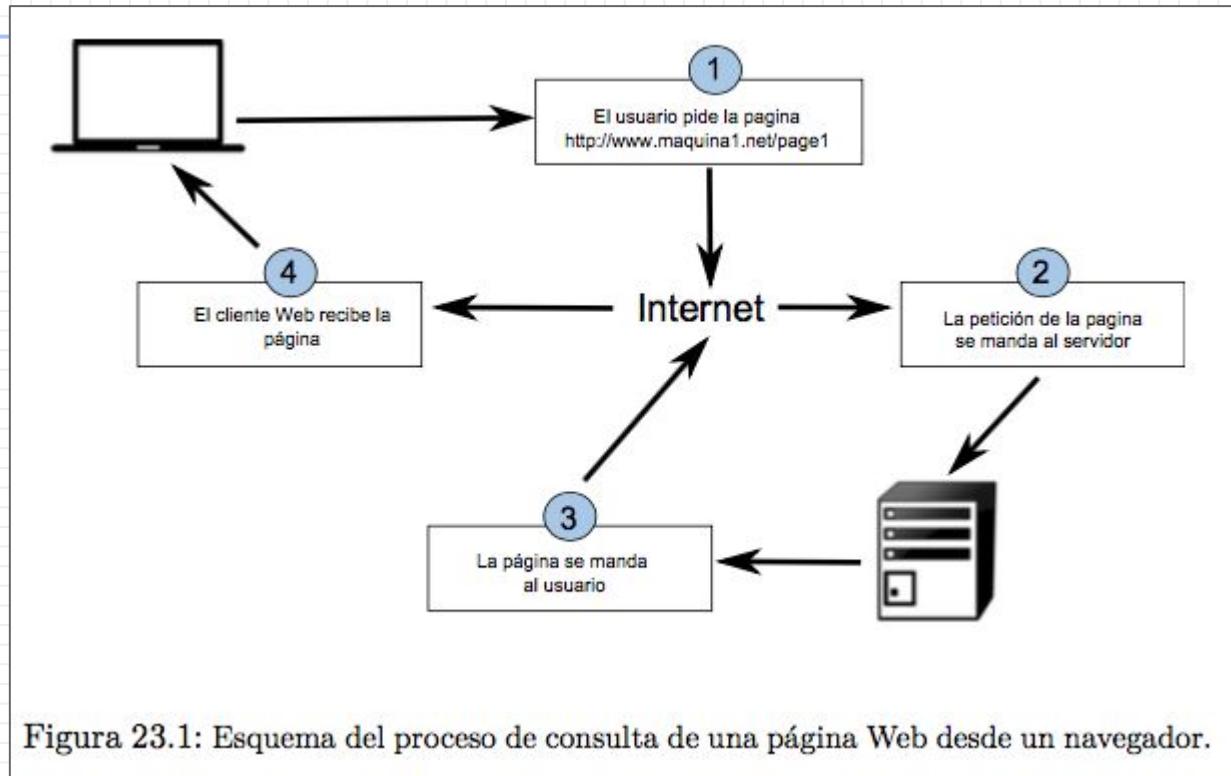


Figura 23.1: Esquema del proceso de consulta de una página Web desde un navegador.

## ARQUITECTURA TÍPICA DE UN SIG EN LA WEB

---



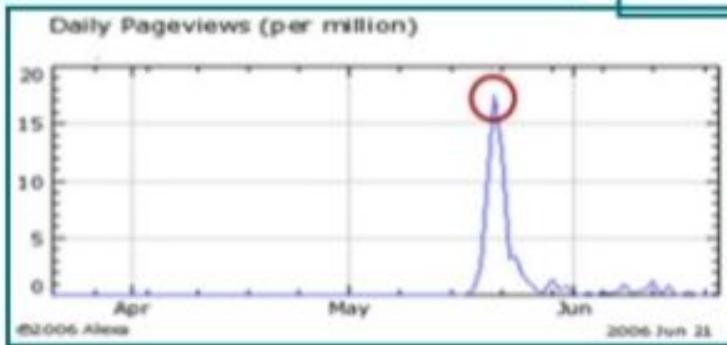
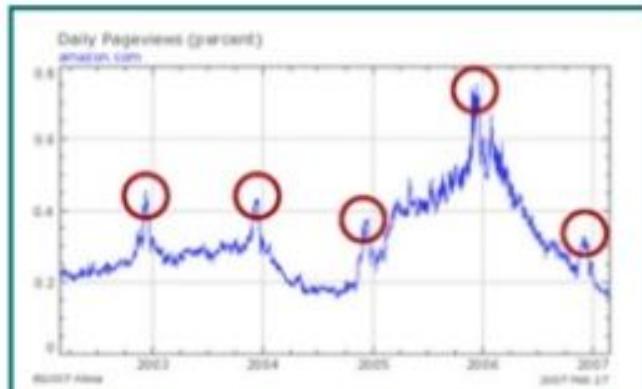
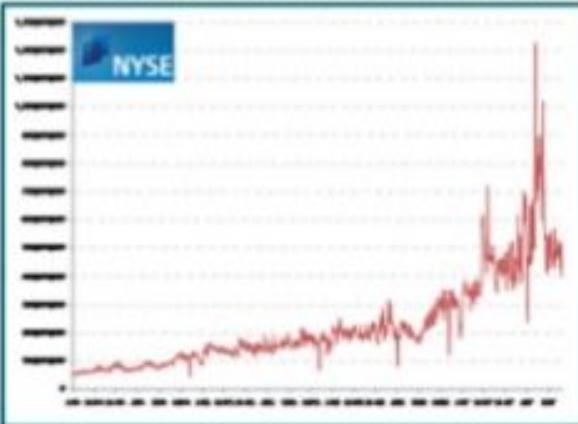
## Retos

---

- ✗ Seguridad
- ✗ Mantenibilidad
- ✗ Escalabilidad
- ✗ Interoperabilidad
- ✗ Disponibilidad
- ✗ Desempeño
- ✗ Usabilidad...

Software Quality Attributes

## CUANDO LOS SERVICIOS NO SON ESCALABLES



### Online Services

- Slashdot, Digg, TechCrunch Effect
- Rapid, unexpected customer demand/growth

Momentos críticos

## Arquitectura Servidor SIG

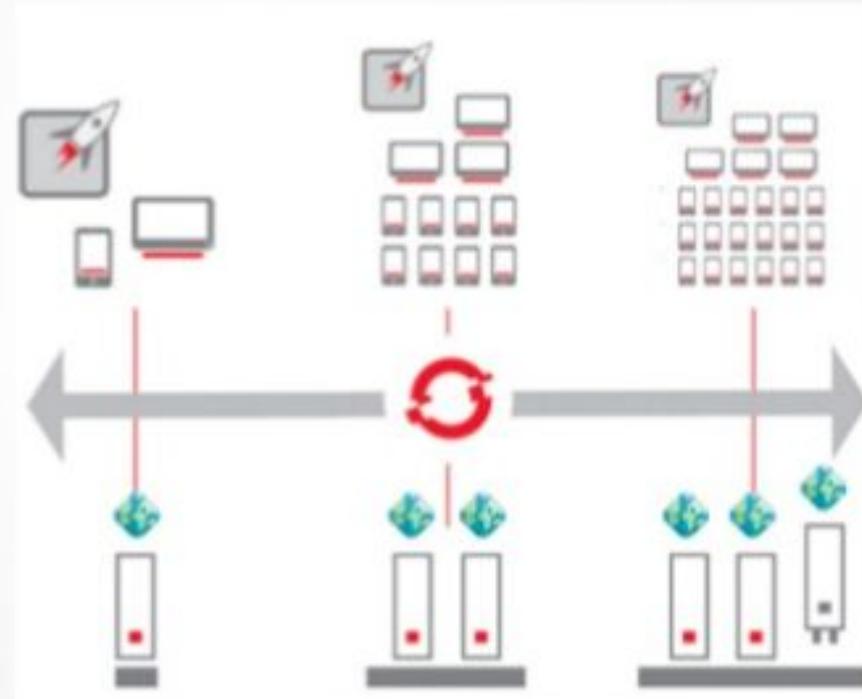
---

- ✗ Entrega datos (Ejm. Shp, geojson)
- ✗ Sirve consultas (Filtros)
- ✗ Entrega representaciones de los datos (Ejm: Imágenes)
- ✗ Sirve procesamiento. (Ejm. Generar polígono de influencia a x distancia de un objeto)

# GEOPROCESAMIENTO ESCALABLE

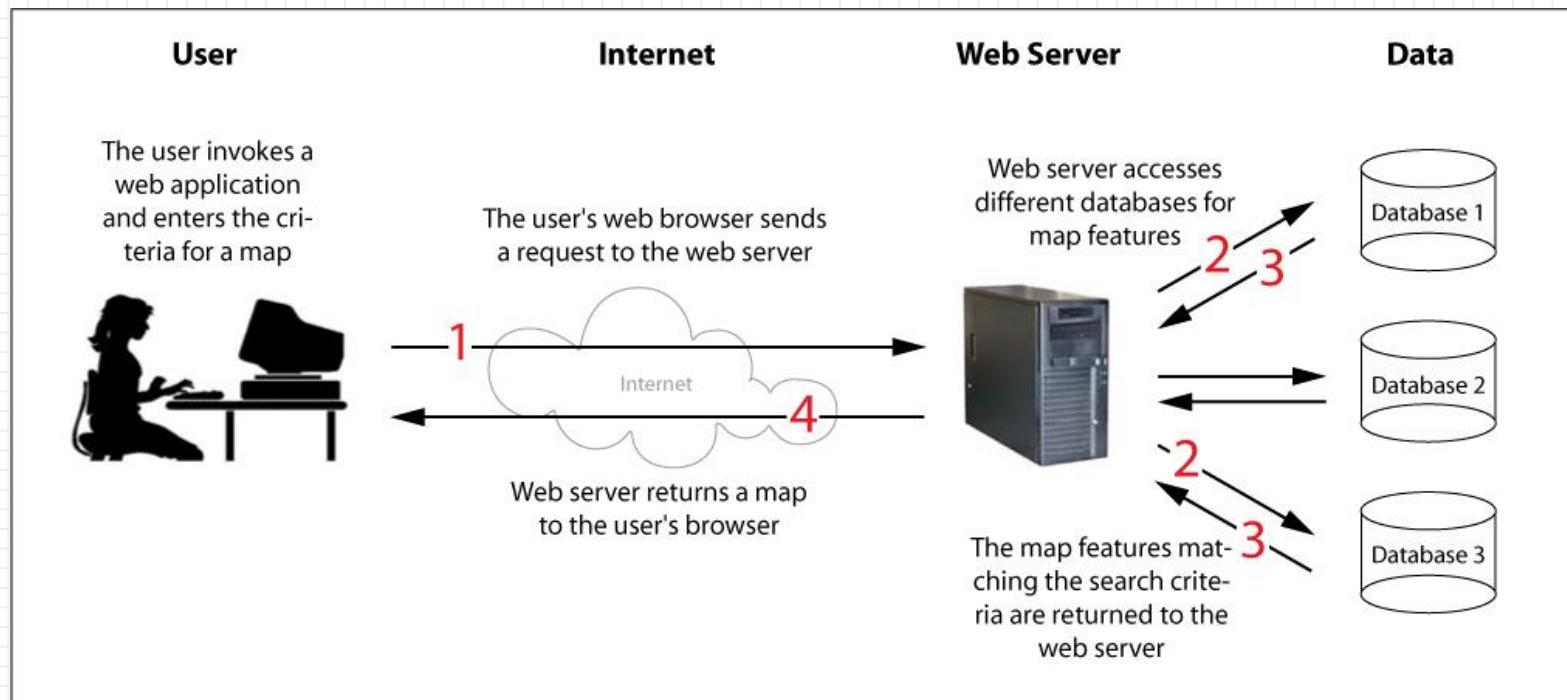
## Arquitectura

Servidor Geográfico  
(Geoserver) publicado en  
un servicio PAAS  
autoescalable.



## Y cómo publico un mapa en la web?

### Servidor de Mapas



# Alternativas para Publicación de Mapas en la Web

## Y cómo publico un mapa en la web?

---

### Tradicional

- ✗ Instalar y configurar servidor de mapas en máquina local

### Actual

- ✗ Instalar y configurar servidor de mapas en máquina local / cloud
- ✗ Software como servicio

## Y cómo publico un mapa en la web?

OGC

### X Implementaciones certificadas

The screenshot shows the OGC website's "Certified and Implementing Products" section. At the top, there is a navigation bar with links for About, Standards, Innovation, News & Events, Membership, and Resources. Below the navigation is a search bar with dropdown menus for Standard and Product Provider, and buttons for Clear and Search. There are three radio buttons: one selected (green) labeled "Compliant Products Only", one gray labeled "Reference Implementations Only", and one gray labeled "All Implementations". A message box below the search bar states: "Found 60 organizations with 272 products with 883 standard implementations, 883 of which are currently compliant, and 60 are reference implementations". Below this, a table lists certified products for "Actian Corporation". The table has two columns: "Product" and "Certified". The first row shows "Ingres Database 11.0" with "Certified: 2017-03-14" and "Implementation Specification for Geographic information - Simple feature access - Part 2: SQL option 1.1" with "Certified: 2017-03-30". The second row shows "Simple Features - SQL - Types and Functions 1.1" with "Certified: 2017-03-30". A "Top" button is located at the bottom right of the table.

Product	Certified
Ingres Database 11.0	Certified: 2017-03-14
Implementation Specification for Geographic information - Simple feature access - Part 2: SQL option 1.1	Certified: 2017-03-30
Simple Features - SQL - Types and Functions 1.1	Certified: 2017-03-30

# Software Proprietario



## Software Proprietario

---

- ✗ Arcgis Server
- ✗ Luciadfusion
- ✗ XTRASERVER
- ✗ Bluespatial

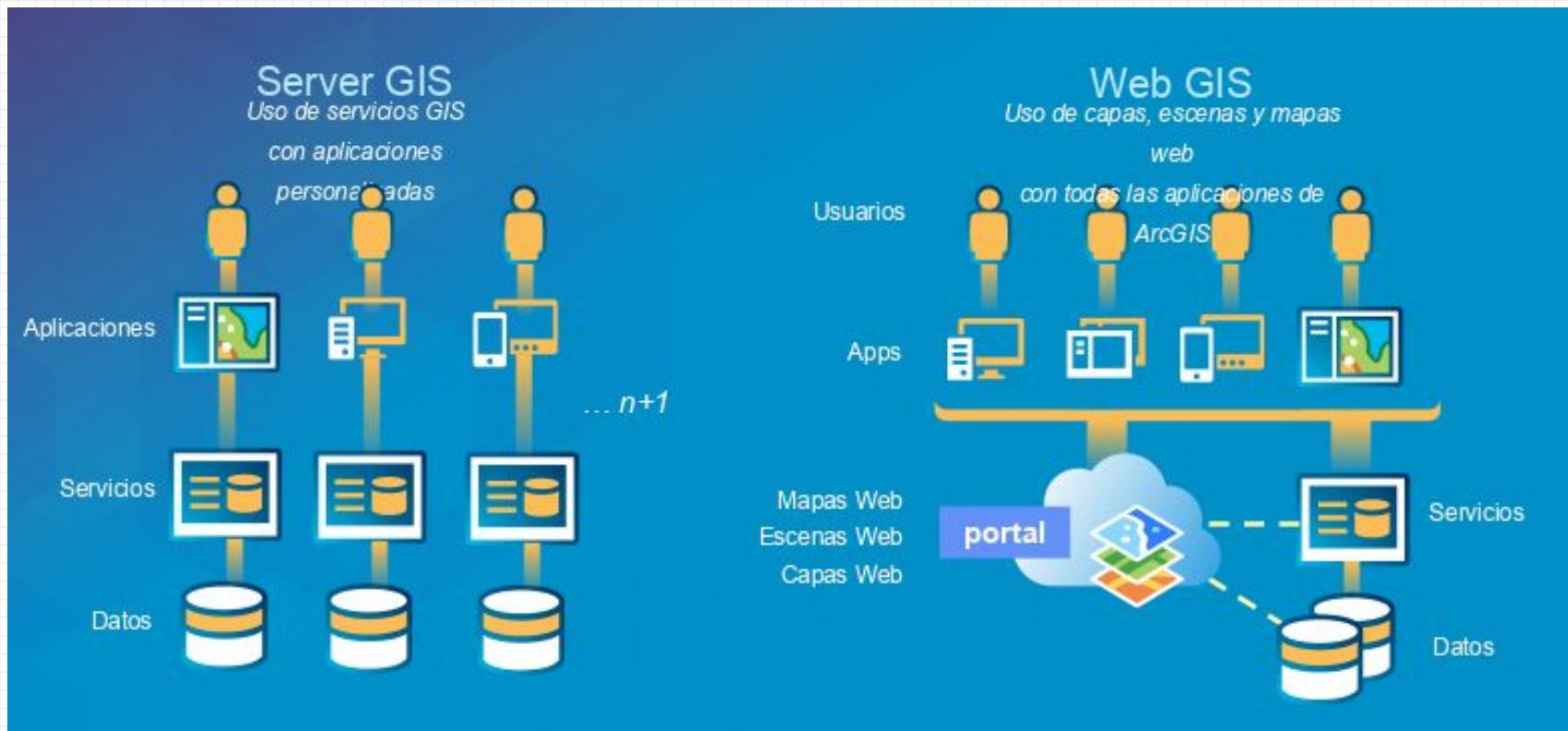
## Arcgis Server

---

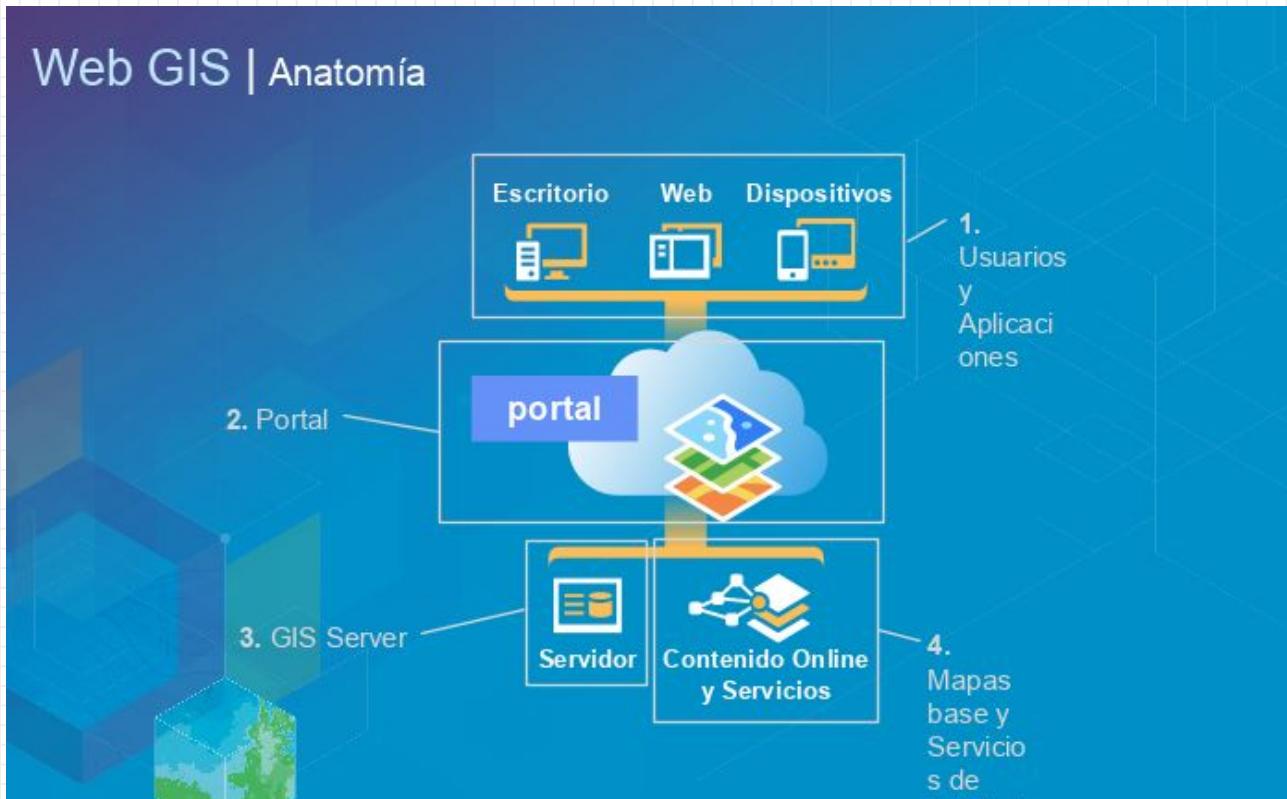
- ✗ Esri (Arcgis Enterprise)
- ✗ Versión Actual: 10.6
- ✗ Versión “Estable”: 10.5.1
- ✗ ¿Qué tipos de servicios se pueden publicar?

Version	Release Date	General Availability	Extended Support	Mature Support	Retired	Release Notes
10.6	January 17, 2018	Jan 2018 - Dec 2019	Jan 2020 - Dec 2021	Jan 2022 - Dec 2023	January 01, 2024	<a href="#">View</a>
10.5.1	June 29, 2017	Jun 2017 - Nov 2018	Dec 2018 - Nov 2020	Dec 2020 - Nov 2022	December 01, 2022	<a href="#">View</a>

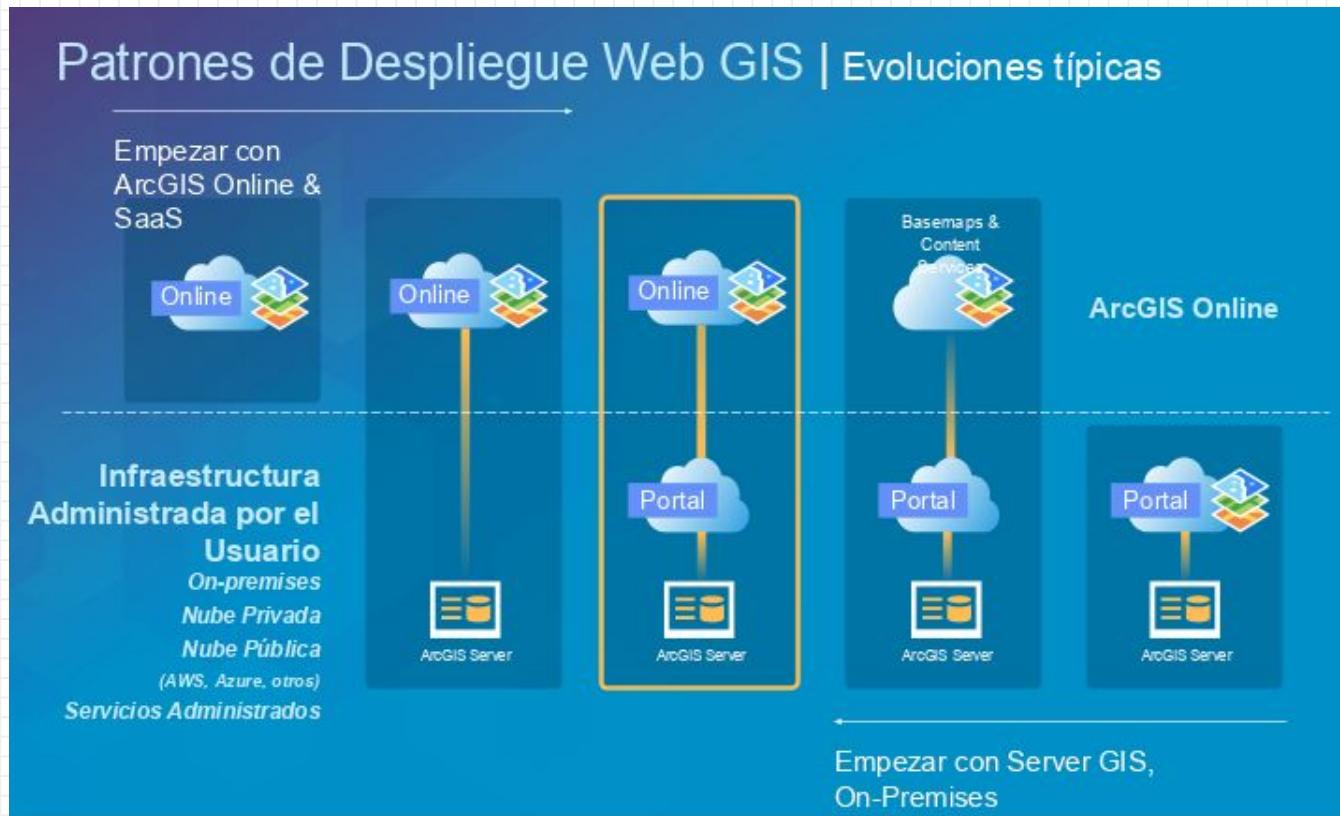
# Arcgis Server



# Arcgis Server



# Arcgis Server



# Arcgis Server

## GeoAnalytics Server | Extends ArcGIS Analysis Capabilities

### Geoprocessing



Powerful analytics

### GeoAnalytics



Distributed analytics  
and distributed storage

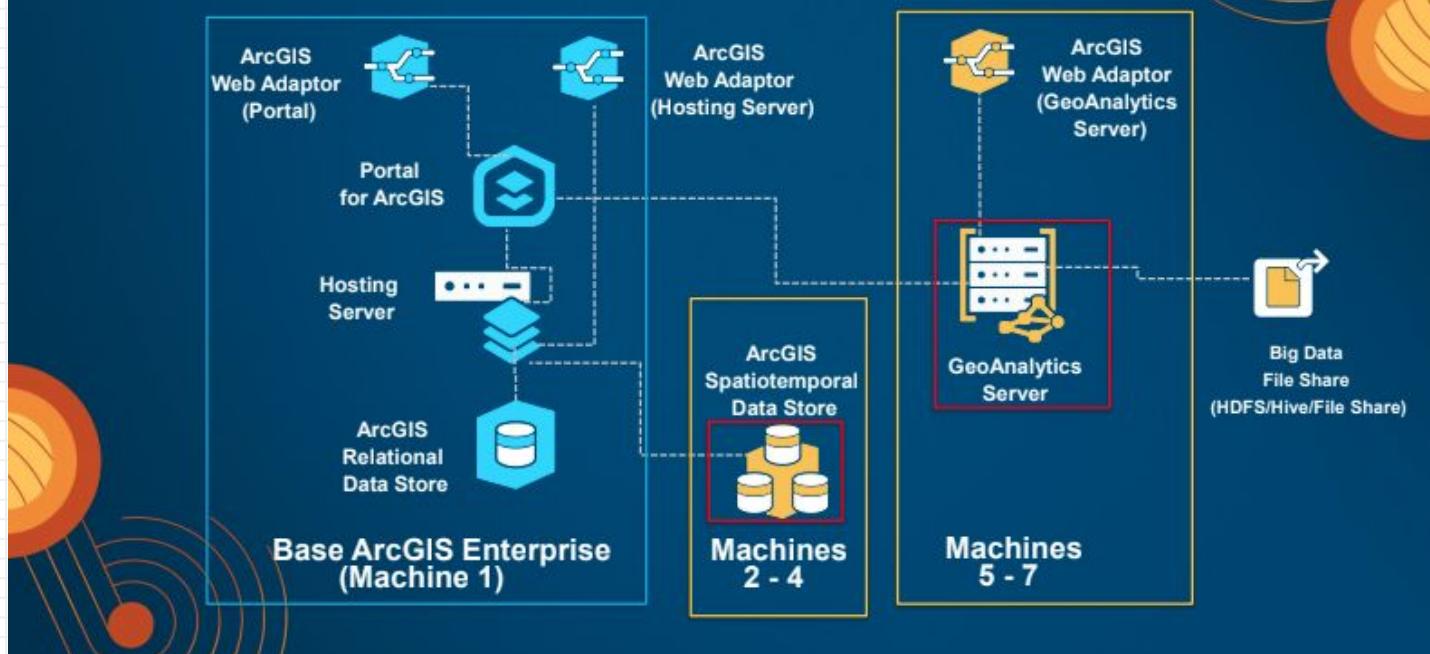
### Web GIS Layers



Rich geoinformation model

# Arcgis Server

## Deployment Patterns - Multi-Machine Deployment



# Arcgis Server

ArcGIS Enterprise 10.5 	 satish sankaran	Registered: 2016-10-27
 KML 2.2.0		Certified: 2016-11-17
 WCS 2.0 Interface Standard- Core: Corrigendum 2.0.1		Certified: 2016-12-02
 Web Coverage Service (WCS) Implementation Specification (Corrigendum) 1.0.0		Certified: 2016-11-17
 Web Coverage Service (WCS) Implementation Specification Corrigendum 1 1.1.1		Certified: 2016-11-17
 Web Feature Service 2.0 Interface Standard (also ISO 19142) 2.0		Certified: 2016-11-17
 Web Map Service (WMS) Implementation Specification 1.3.0		Certified: 2016-11-17
 Web Map Service Client (WMS) Implementation Specification 1.3.0		Certified: 2016-11-17
 Web Feature Service 1.0.0		Certified: 2016-11-17
 Web Map Service 1.1.1		Certified: 2016-11-17

## Arcgis Server

---

- ✗ OGC support in ArcGIS Server
- ✗ WFS Services: Read Only

	WCS	WFS	WMS	WMPS	WPS
Map services	X	X	X	X	
Geodata services	X	X			
Image services	X		X	X	
Geoprocessing services					X

Arcgis Server

---

**x** Extensiones

## LuciadFusion

---

- ✗ [http://www.luciad.com/solutions/  
luciadfusio](http://www.luciad.com/solutions/luciadfusio)
- ✗ Promesa de valor:
  - ✗ Desempeño
  - ✗ Grandes volúmenes de datos
  - ✗ OGC
  - ✗ Múltiples fuentes de datos
  - ✗ Tiempo real

# LuciadFusion

---

## BUILT FOR USERS

- ➔ Publish data in one click to any service
  - ➔ Quickly upload, find and publish data through LuciadFusion Studio's intuitive web interface
  - ➔ Fastest and most user friendly OGC service platform to install, create services and serve data
  - ➔ Serve maps faster with the quickest tiling engine for elevation, (multispectral) imagery, weather data and more
- 

## CONNECT TO 200+ DATA FORMATS

- ➔ Connect to any database
- ➔ Work with domain-specific formats and standards
  - Weather
  - Aviation
  - Defense
  - Maritime
- ➔ Directly serve earth observation multi-spectral imagery
- ➔ Handle dynamic 4D data such as weather data
- ➔ Include military symbology APP6 and MS2525
- ➔ Combine vector and raster in one single product
- ➔ Connect natively to 200+ data formats and add custom formats through LuciadFusion's API

## LuciadFusion

- Serve any data over open standards
- Rely on full support for OGC standards including OGC SE (SLD), OGC WMS, OGC WFS(-T), OGC WMTS, OGC WCS, OGC GeoPackage, OGC NetCDF-CF & OGC CSW
- Plug & play WMS, WFS, WMTS or WCS by dragging and dropping to serve in less than one minute – no coding required!

## PRACTICAL INFORMATION

Connecting to LuciadFusion services can be done from:

- OGC-compliant browser applications, built on LuciadRIA or other platforms
- Desktop applications, built on LuciadLightspeed/Desktop or other platforms
- Mobile applications, built on LuciadMobile or other platforms



# LUCIADFUSION PLATFORM

LUCIADFUSION  
STUDIO  
EASY DATA MANAGEMENT  
VIA THE BROWSER

OGC  
SERVICES  
CSW, WMS, WFS, WCS,  
WMPS & WPS

SYMOLOGY  
SERVICES  
NATO, MARITIME  
& MORE

CUSTOM  
SERVICES  
ANALYTICS,  
EXPORT & MORE

CATALOG &  
CRAWL

VISUALIZE

ANALYZE

TILE

PUBLISH



METADATA  
CATALOG



ANY DATA SOURCE, IN ITS ORIGINAL FORMAT

## Xtraserver

---

- ✗ <http://www.interactive-instruments.de/en/xtraserver/>
- ✗ XtraServer is a suite for building up high-performance spatial web services complying with the specifications of the Open Geospatial Consortium (OGC®). Currently XtraServer supports Web Map Services (WMS) and Web Feature Services (WFS).

## Bluespatial

---

✗ <https://www.bluespatial.com/>



Scalable ArcGIS / OGC Compatible GIS Server

- ✓ Supports Esri REST, WMS, KML, OData and GeoJSON
- ✓ Compatible with ArcGIS Desktop
- ✓ Compatible with Esri developer SDKs
- ✓ Implements Esri's **Open REST API**

# Software Libre



## Software Libre

---

- ✗ Geoserver
- ✗ Mapserver
- ✗ Qgis Server
- ✗ Degree

## Geoserver

---

- ✗ <http://geoserver.org/>
- ✗ Versión Actual Estable: 2.12.1
- ✗ GPL

**Built on Open Standards**



The logo consists of a blue rectangular badge with the words "CERTIFIED OGC® COMPLIANT" in white. To the right of the text are three blue hexagons arranged in a triangular pattern.



WCS 1.0



WMS 1.1.1



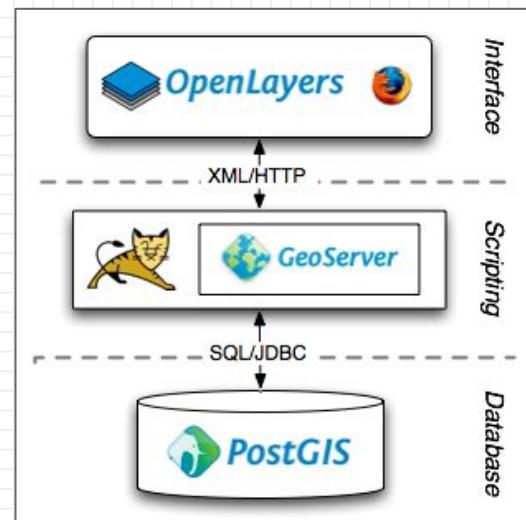
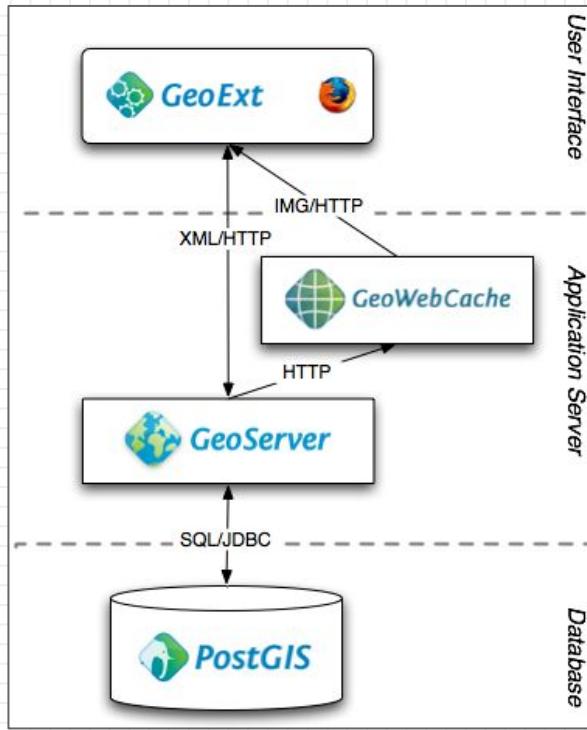
WFS 1.0

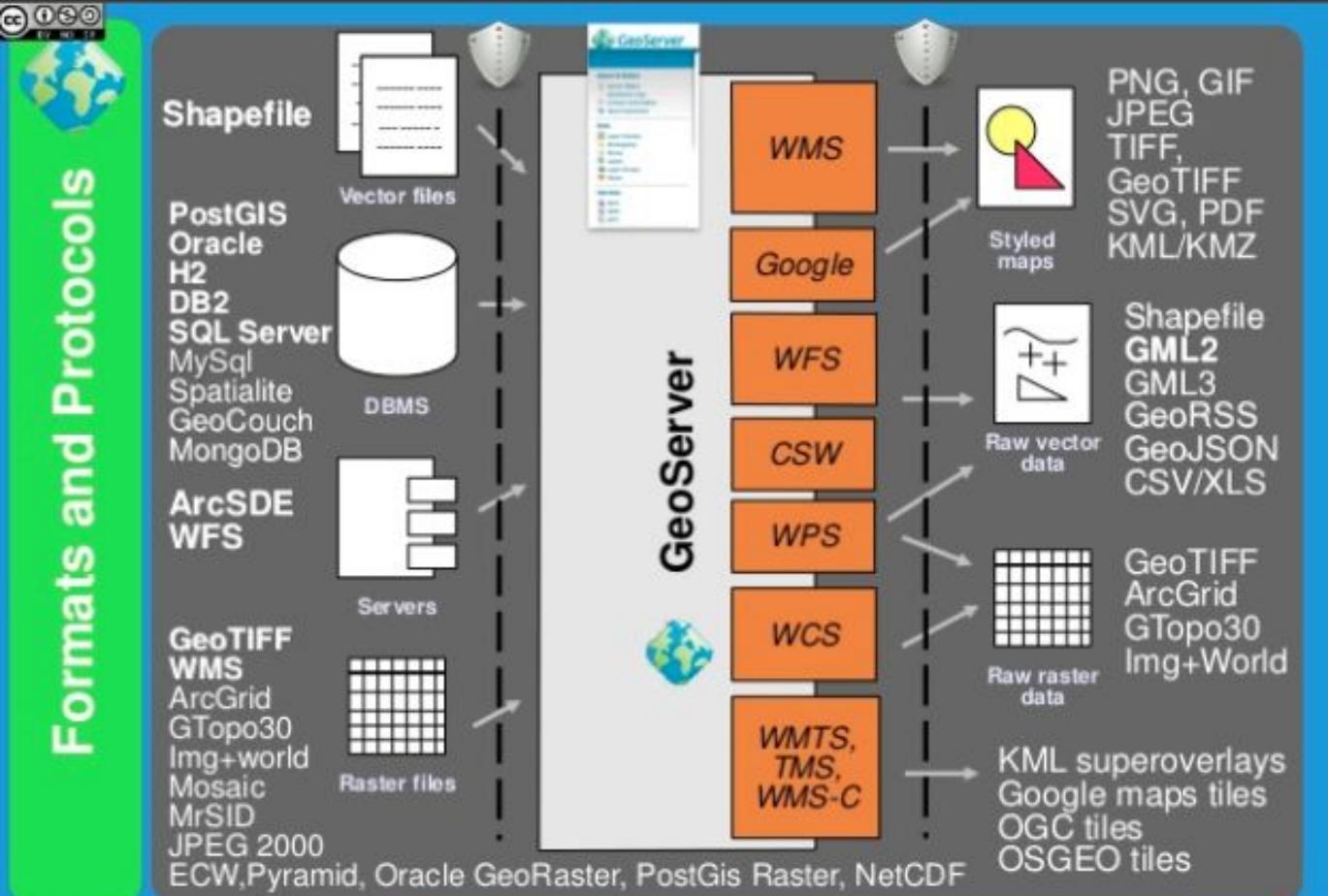
GeoServer is a OGC compliant implementation of a number of open standards such as Web Feature Service (WFS), Web Map Service (WMS), and Web Coverage Service (WCS).

Additional formats and publication options are available including Web Map Tile Service (WMTS) and extensions for Catalogue Service (CSW) and Web Processing Service (WPS).

# Geoserver

- ✗ Requerimientos: Java 8





## Geoserver

---

### Fuentes de datos

- ✗ Vector, Raster, Bases de datos Relacionales
- ✗ No relacionales: MongoDB,  
Elasticsearch
- ✗ Big Data: Geomesa

### Formatos de Salida

- ✗ Png, tiff, kml, vector tiles, etc

Geoserver

---

## Estilos / Simbología

- ✗ SLD
- ✗ CSS
- ✗ YSLD
- ✗ MBStyle

## Geoserver

---

### Extensiones

- ✗ Oficiales
  - ✗ Ejemplos: Vector tiles, OGR
- ✗ Comunidad
  - ✗ Ejemplos: JDBCStore, S3 Support for GeoTiff

## Geoserver

---

### OGC? Yes, from the ground up

- WMS (1.1.1, 1.3.0)
  - WFS (1.0, 1.1, 2.0)
  - WCS (1.0, 1.1, 2.0)
  - WPS (1.0)
  - CSW (2.0.1)
  - SLD (1.0, 1.1)
  - GML (2.x, 3.1, 3.2)
- WMTS (1.0)
  - GeoPackage
  - KML
  - WMS and WCS Earth Observation profiles

# Geoserver

-----



## WFS-Transactional

- Modify your data from your remote client (desktop, web or mobile)



The diagram illustrates the WFS-T workflow. It starts with a screenshot of a desktop client interface showing a map and a sidebar menu. A red box highlights the "Update geometry" option in the menu. An arrow points from this interface to a central node labeled "WFS-T", represented by a globe icon. Another arrow points from "WFS-T" to a second screenshot of a desktop client interface, which shows a map with a red box around a specific feature. This second interface has a status bar at the bottom.

Edit with desktop client  
and commit changes

WFS-T

WMS

All protocols will  
Immediately see  
the updates

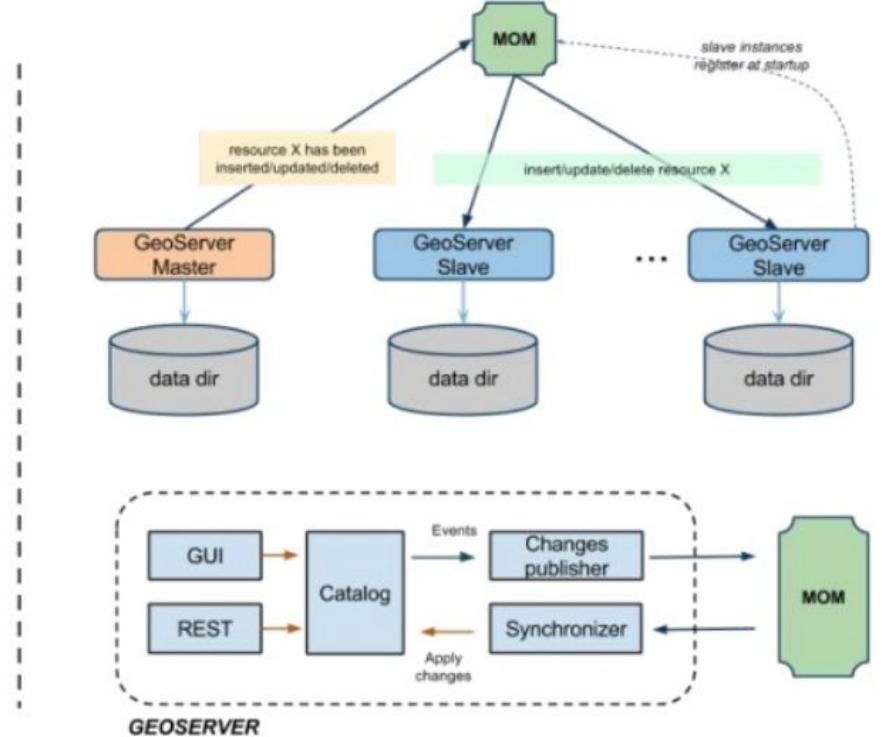
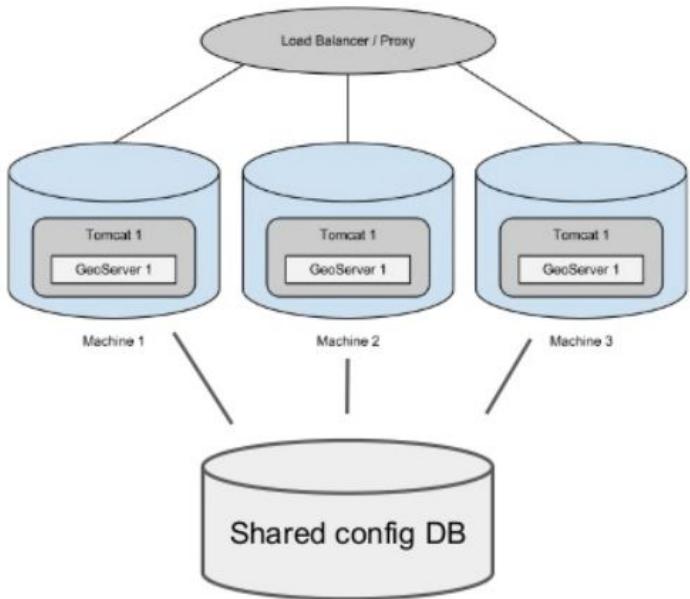
 **GeoSolutions**

FOSS4G-Europe 2014, Bremen  
14<sup>th</sup>-17<sup>th</sup> July 2014



## Geoserver - Escalabilidad

### Clustering solutions



## Geoserver - Tutoriales

---

- ✗ Using the web administration interface
- ✗ Publishing a postgis table
- ✗ Publishing a shapefile
- ✗ Otros

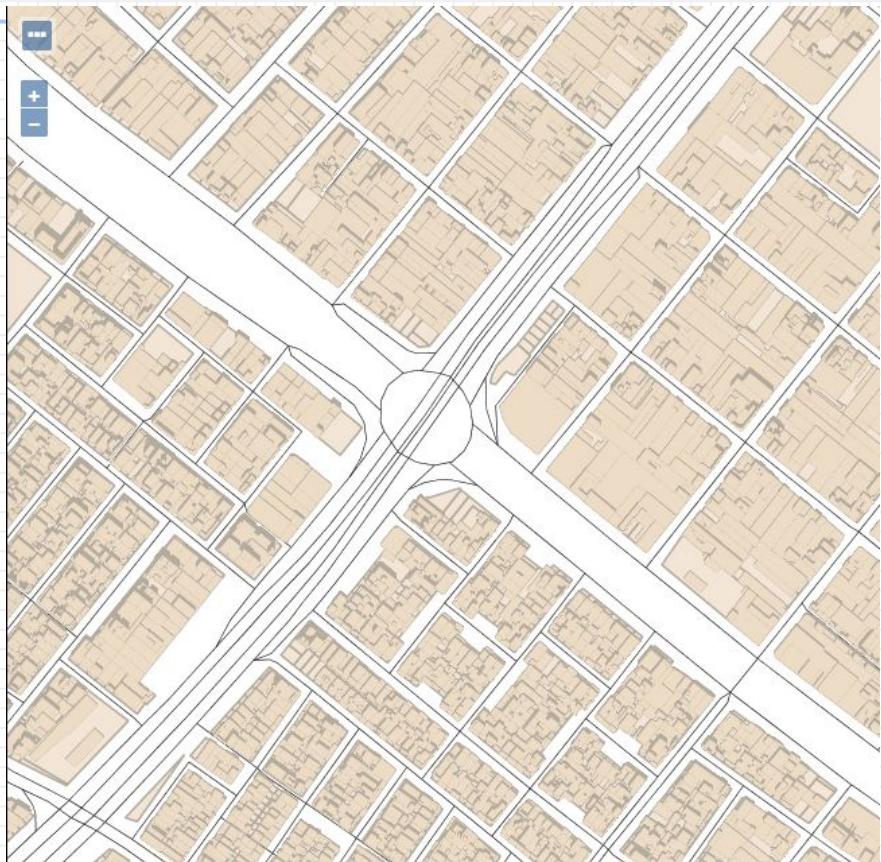
## Geoserver - Más Información

---

- ✗ [GeoServer, an introduction for beginners](#)
- ✗ [Advanced Security With GeoServer](#)
- ✗ [GeoServer Feature FRENZY](#)
- ✗ [Running in a production environment](#)

## Geoserver - Ejemplo

Fuente de datos: IDECA  
Mapa de Referencia



## Geoserver - Ejemplo

Base de datos:  
Postgresql 9.6, postgis 2.2

### Almacenes de datos

Gestionar los almacenes que proveen datos a GeoServer

Agregar nuevo almacén

Eliminar los almacenes seleccionados

<input type="checkbox"/>	Tipo de datos	Espacio de trabajo	Nombre del almacén	Tipo	¿Habilitad
<input type="checkbox"/>		gkudos	elasticsearch	Elasticsearch	
<input type="checkbox"/>		gkudos	es_world_borders	Elasticsearch	
<input type="checkbox"/>		gkudos	ideca_0317	PostGIS	
<input type="checkbox"/>		gkudos	ideca_shps	Directory of spatial files (shapefiles)	

## Geoserver - Ejemplo

Base de datos:  
Postgresql 9.6, postgis 2.2

### Editar un origen de datos vectoriales

Editar un origen de datos vectorial existente

PostGIS

PostGIS Database

#### Información básica del almacén

Espacio de trabajo \*

gkudos

Nombre del origen de datos \*

ideca\_0317

Descripción

ideca\_0317

Habilitado

#### Parámetros de conexión

dtype \*

postgis

host \*

localhost

port \*

6432

database

ideca\_0317

schema

area\_catastral

user \*

aplicacion

## Geoserver - Ejemplo

---

<input type="checkbox"/>		Sector Catastral	gkudos:scat	ideca_0317	✓	EPSG:4686
<input type="checkbox"/>		Construcciones	gkudos:cons	ideca_0317	✓	EPSG:4686
<input type="checkbox"/>		Manzana	gkudos:manzanas	ideca_0317	✓	EPSG:4686
<input type="checkbox"/>		Lotes	gkudos:lotes	ideca_0317	✓	EPSG:4686

## Geoserver - Ejemplo

### Estilos: YSLD

#### Style Editor



```
1 name: Default Styler
2 title: A yellow polygon style
3 feature-styles:
4 - name: name
5   rules:
6     - title: yellow polygon
7       zoom: [14,max]
8       symbolizers:
9         - polygon:
10           stroke-color: '#000000'
11           stroke-width: 0.1
12           stroke-opacity: 0.2
13           fill-color: '#c7eae5'
14           fill-opacity: 0
15
```

## Geoserver - Ejemplo

### Grupos de Capas

Capas				
Orden de dibujo	Capa	Estilo por defecto	Estilo	Eliminar
1	gkudos:ideca_departamentos	<input checked="" type="checkbox"/>	ysld_ideca_dept	
2	gkudos:ideca_municipios	<input checked="" type="checkbox"/>	ysld_ideca_muni	
3	gkudos:scat	<input checked="" type="checkbox"/>	ysld_ideca_sector	
4	gkudos:manzanas	<input checked="" type="checkbox"/>	ysld_ideca_manzana	
5	gkudos:mvi	<input checked="" type="checkbox"/>	ysld_ideca_mvi	
6	gkudos:lotes	<input checked="" type="checkbox"/>	ysld_ideca_lote	
7	gkudos:cons	<input checked="" type="checkbox"/>	ysld_ideca_cons	
  1  	Resultados 1 a 7 (de un total de 7 ítems)			

# Geoserver - Soporte Comercial

<http://geoserver.org/support/>

## Core Contributors

The organizations listed here are recognized as being closest to the core development of GeoServer, and as such are usually the best to go to for support. They are close enough to the codebase to know what is possible, and to ensure that any improvement to be made to GeoServer gets done in the right way. This can minimize your risk greatly.



Boundless (US) works to ensure that the geospatial community reaps the benefits of open source. Formerly the geospatial division of OpenPlans, Boundless started GeoServer in 2001, and continues to be leader in the community. Boundless employs experts from the open source geospatial community and the broader geospatial field who recognize the power and momentum of open source on the future of the industry. For more information [contact Boundless](#) or visit the website for information about GeoServer and Boundless Suite support.



GeoSolutions (Italy) is a company with a strong commitment to providing innovative, robust, cost-effective geospatial solutions employing cutting edge technologies. GeoSolutions associates are members of the project steering committee, as well as GeoTools and GeoNetwork ones. GeoSolutions area of expertise lies in raster management, coordinate transformations and referencing, advanced map rendering, web processing services, spatial database access, vector data access, and OGC and ebRIM catalog management. For more information please get in touch with Simone Giannecchini or Andrea Aime in the [GeoSolutions contact page](#).



Transient Software Limited is a New Zealand based provider of software development and support services with expertise in scientific, environmental, and geospatial applications. Transient contributes to GeoServer and GeoTools development and is well positioned to implement features to meet your business needs. For more information please [contact Transient](#).



Astun Technology is the UK market leader for Enterprise solutions built on OSGeo foundations. Astun provides enterprise-ready, high-quality services such as training, support and consultancy in GeoServer, GeoNetwork, PostGIS, QGIS, MapServer, OpenLayers & GDAL/OGR. Over 60 organisations rely on Astun to support their endeavours including Government Agencies, Local Authorities, National Parks, Blue Light Services, Social Housing, Utility companies and other commercial organisations.

Astun is actively involved in the OSGeo community employing well known members including Antony Scott, Jo Cook, Ian Turton, Matt Walker and Mike Saunt. Our team of OSGeo experts and enthusiasts have over 250 years cumulative experience in the geospatial industry and Astun encourages and supports staff in volunteering and contributing within the Open Source, Open Data and humanitarian mapping communities.

## Mapserver

---

- ✗ Versión actual 7.0.7
- ✗ <http://mapserver.org/>
- ✗ Inició a mediados de los 90's
- ✗ Configuración: Archivo [Mapfile](#)
- ✗ Instalación: A veces requiere compilación de código ("fácil" en linux)
- ✗ Mapcache: Administrador de caché
- ✗ Mapscript: Api programable (Ejm Generación dinámica de Mapfiles) con interfaces para [PHP](#) y [python](#)
- ✗ TinyOWS: WFS-T

# Mapserver

## MapServer OGC Specification support

- Web Map Service (OGC:WMS)
  - Server: 1.0.0, 1.0.7, 1.1.0, 1.1.1, 1.3.0
  - Client: 1.0.0, 1.0.7, 1.1.0, 1.1.1
- Web Feature Service (OGC:WFS) 1.0.0, 1.1.0, 2.0
- Web Coverage Service (OGC:WCS) 1.0.0, 1.1.0, 2.0.0, 2.0.1
- Geography Markup Language (OGC:GML) 2.1.2, 3.1.0 Level 0 Profile, 3.2.1
- GML Application Schema - Coverages (OGC:GMLCOV) 1.0.0, 1.0.1
- Web Map Context Documents (OGC:WMC) 1.0.0, 1.1.0
- Styled Layer Descriptor (OGC:SLD) 1.0.0
- Filter Encoding Specification (OGC:FES) 1.0.0
- Sensor Observation Service (OGC:SOS) 1.0.0
- Observations and Measurements (OGC:OM) 1.0.0
- SWE Common (OGC:SWE) 1.0.1
- OWS Common (OGC:OWS) 1.0.0, 1.1.0, 2.0.0

## QGis Server

---

- ✗ QGIS Server uses QGIS as back end for the GIS logic and for map rendering.
- ✗ [https://docs.qgis.org/2.18/en/docs/user\\_manual/working\\_with\\_ogc/server/index.html](https://docs.qgis.org/2.18/en/docs/user_manual/working_with_ogc/server/index.html)
- ✗ WMS 1.3, WFS 1.0.0 and WCS 11.1.1
- ✗ implements advanced cartographic features for thematic mapping
- ✗ [QGIS server: the good, the not-so-good and the ugly](#)

# Comparación

## What's good and not so?

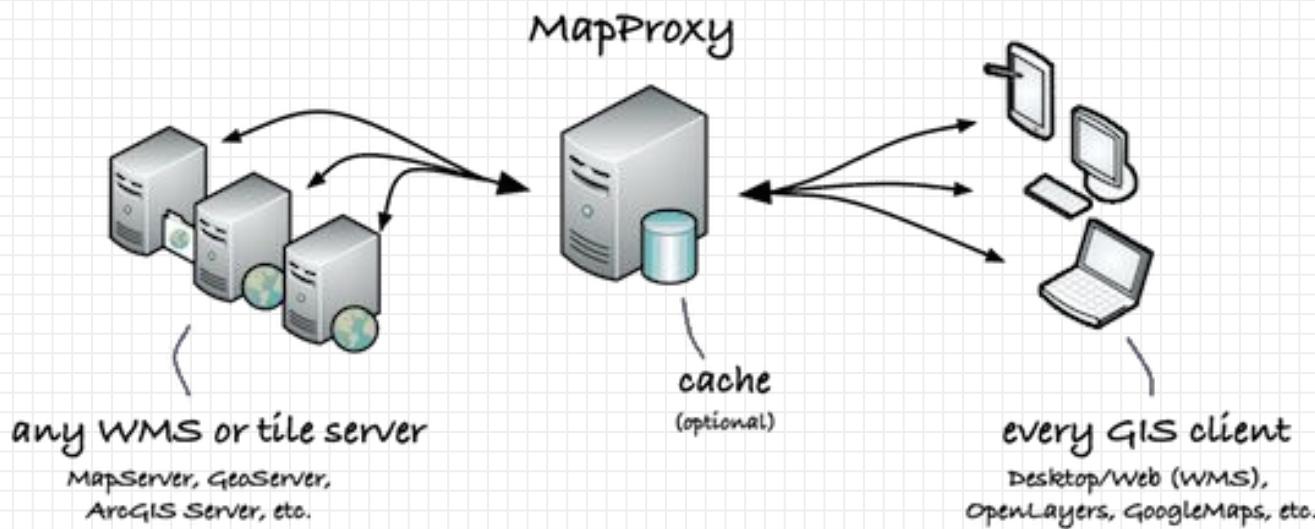
Clip slide

	 MapServer open source web mapping	 GeoServer	
<b>Good</b>	All the config is in the mapfile Styling is sophisticated Adding layers is easy PostGIS and QGIS (with plugin) integration Low footprint and dependencies Large range of data sources Stable and well-supported	All the config is GUI-driven Styling is OGC SLD Multiple output formats Includes security model PostGIS and QGIS (with plugin) integration Stable and well-supported	Publish directly from QGIS Stable and well-supported Large range of data sources
<b>Not so</b>	Mapfile is specific to MS Manual config of mapfile	Adding layers requires several steps (though easy from QGIS) SLD hard to edit Limited range of data sources	QGIS-dependant Less-used WMS/WFS output only
<b>Use for</b>	Integration High-end styling Multi-format environment	Non-coding map creators Layer catalogue PostGIS/QGIS environment Publishing workflow	QGIS users Rapid map publishing

## Otros

---

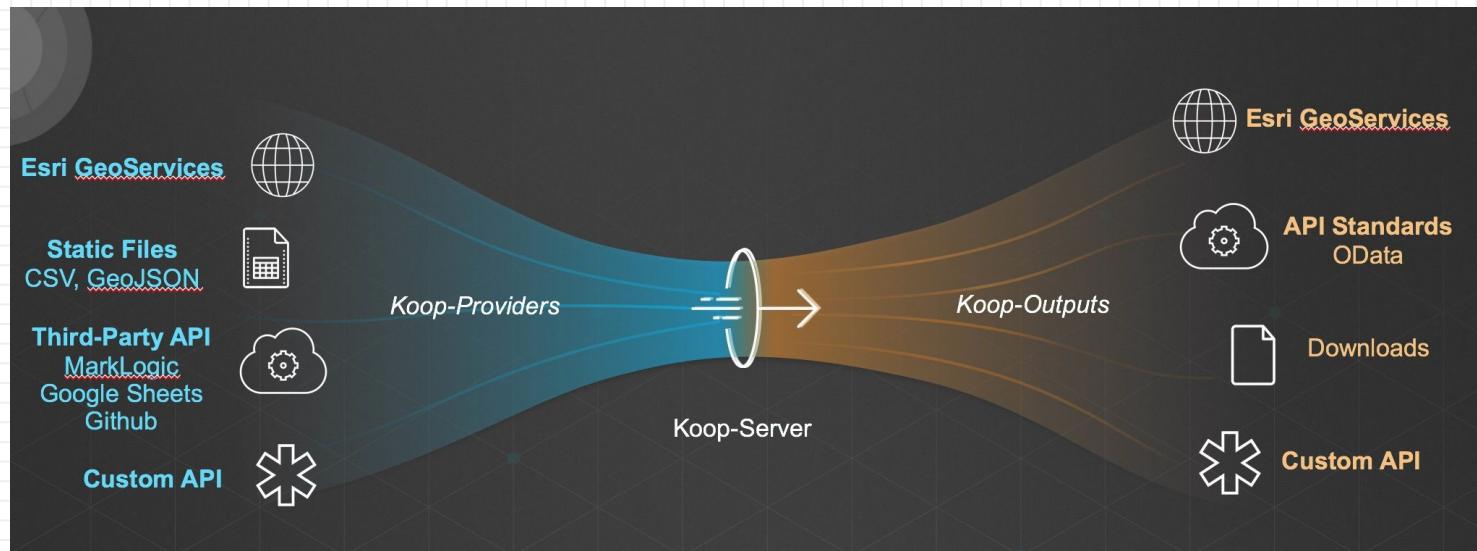
- ✗ MapProxy <https://mapproxy.org/>
- ✗ TileCache
- ✗ WMS



## Otros

---

- ✗ Koop <https://github.com/koopjs/koop>  
<http://koopjs.github.io/>
  - ✗ Transform, query, and download geospatial data on the web.



# Servicios en la Nube



## Arcgis Online

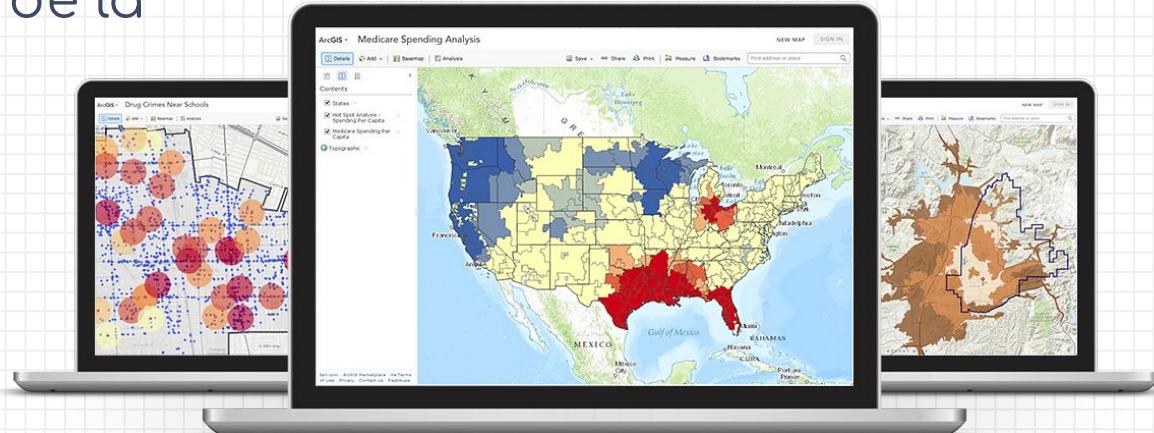
---

- ✗ ESRI
  - ✗ <https://www.arcgis.com/home/index.html>
  - ✗ <http://www.arcgis.com/features/features.html>
- ✗ Servicio en la nube para la publicación de datos geográficos en la web
- ✗ Aplicaciones “listas para usar”
- ✗ Mapas temáticos, [Smart Mapping](#)
- ✗ Conjuntos de datos de pequeño / mediano tamaño\*
- ✗ Suscripción por créditos

## Arcgis Online

---

- ✗ Seguridad por grupos
- ✗ Herramientas básicas de análisis
- ✗ Datos / mapas de la Comunidad



## Mapbox

---

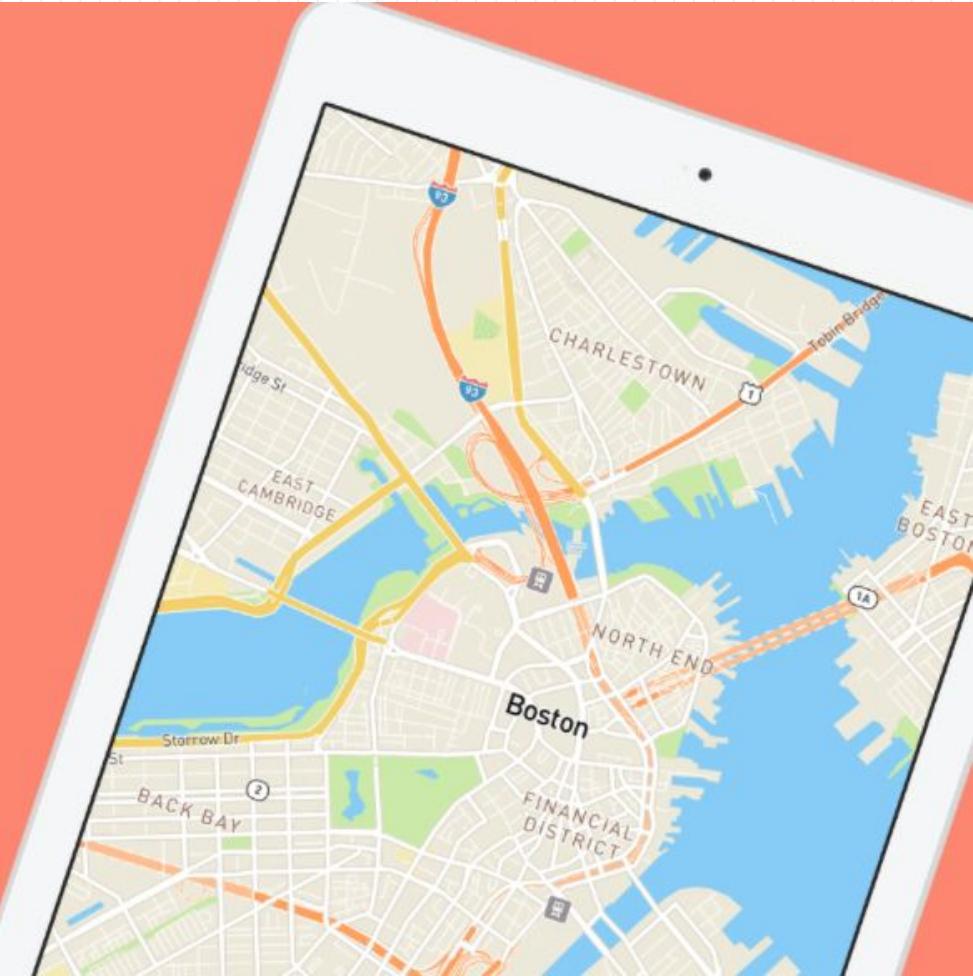
- ✗ Software como Servicio para publicación de mapas para aplicaciones web o móviles (Vector / Ráster)
- ✗ Servicios basados en localización: Geocoding, Navigation
- ✗ Vector tiles, MBTiles

DESIGN

# MAPS

Choose a map style or completely customize your own map and data.

[Learn more about maps →](#)



The screenshot shows the Mapzen Style Editor interface with a map of Washington D.C. The left sidebar lists layers such as Country labels, State labels, Marine labels, City labels, place-islands, place-town, place-village, place-hamlet, place-suburb, place-neighbourhood, place-islets-archipelago-abor..., airport-label, POI labels (scalerank 1), POI labels (scalerank 2), POI labels (scalerank 3), road-labels, waterway-label, Admin boundaries, Bridges, Roads, Tunnels, building, Aereways, barrier\_line-land-line, barrier\_line-land-polygon, water, water shadow, waterway-river-canal, and Hillshading. The 'place-suburb' layer is currently selected.

The main panel shows a map of Washington D.C. with various labels and features. A floating style editor window for the 'place-suburb' layer is open, showing settings for 'Text field' (name\_en), 'Color' (hsl(0, 0%, 62%)), 'Opacity' (1), 'Font' (DIN Offc Pro Regular, Arial Unicode MS Regular), 'Size' (16.23 px), 'Letter spacing' (0.15 em), 'Line height' (1.2 em), 'Max width' (7 em), and 'Transform' (Tt). The 'Halo' section includes 'Halo color' (hsl(0, 0%, 100%)), 'Halo width' (1 px), and 'Halo blur' (0 px).

On the right side of the interface, there are several controls: 'Publish your style', 'Search', 'Map position', 'Debug', 'History', 'Light' (which is active), and 'Help'. Below these are coordinates (14.0, -77.037, 38.8) and a zoom level selector. The bottom right corner shows a small preview of the map.

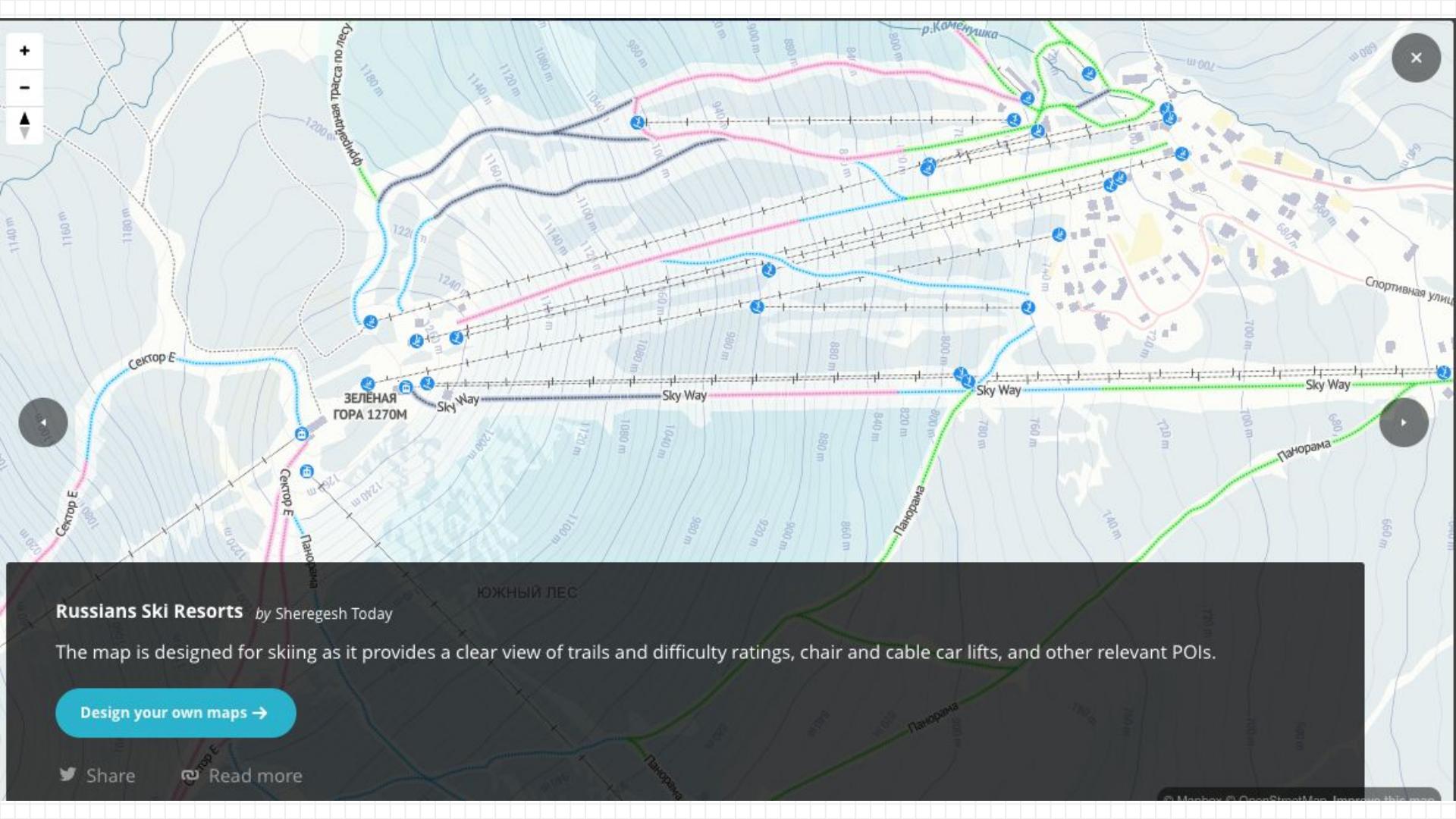
# La historia del B·O·G·O·T·A·Z·O

9 de abril de 1948



El 9 de abril de 1948 en el centro de Bogotá fue escenario de un caos de violencia a causa del asesinato del líder político Jorge Eliécer Gaitán. Los disturbios y revueltas destruyeron algunos espacios y edificios representativos y transformaron la memoria urbana de la ciudad para siempre.





# SEARCH

Turn your coordinates into addresses or your addresses into coordinates. Our geocoding API offers worldwide forward and reverse permanent geocoding. Run batch queries, store the results, and use them on a Mapbox map or anywhere you want.

Contact us



# NAVIGATION

Smart turn-by-turn routing based on real-time traffic

 Traffic-aware routing

 Turn-by-turn guidance

 Lane instructions

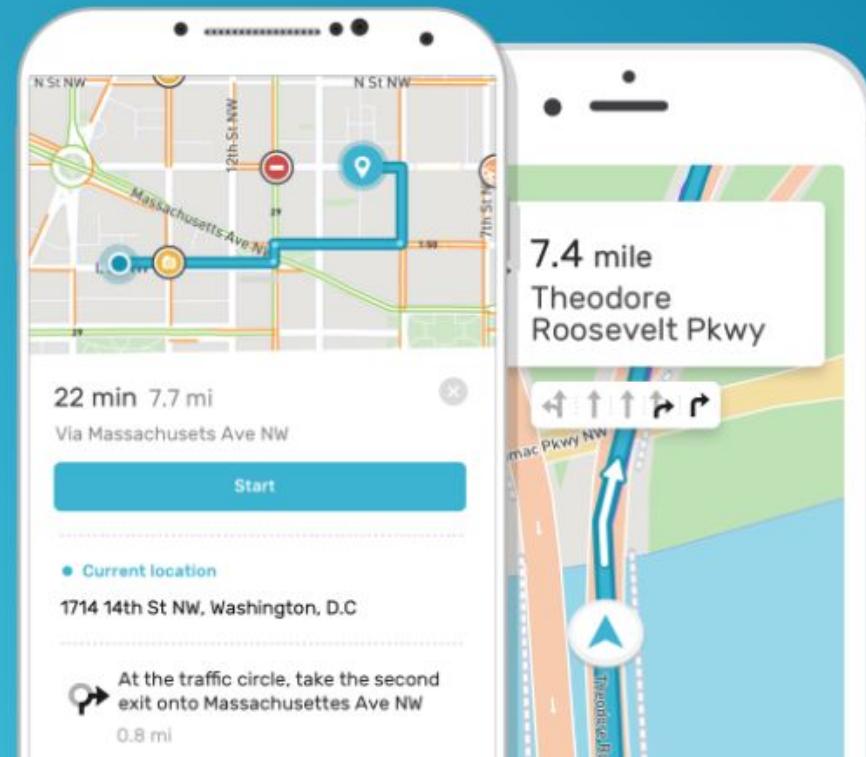
 Walk, bike, and driving

 Incidents

Contact sales

or view [documentation](#)

SUPPORTS JS    



# Mapbox

---

## Building blocks for navigation

Access Mapbox Directions and Search APIs for custom solutions.

### Type-ahead search

Search for addresses and get suggestions from our geocoding API.

[Geocoding API](#)

### Directions

Traffic-aware turn-by-turn instructions for driving, bicycling and walking.

[Directions API](#)

### Map matching

Snap routes to the road network for easy analysis.

[Map matching API](#)

### Optimization

Optimize the itinerary of complex multi-stop trips.

[Optimization API](#)

### Trip durations

Calculate fastest travel times for a set of origins and destinations.

[Matrix API](#)

## Mapbox

---

### Otros

- ✗ [WMTS](#)
- ✗ [SDK: iOS, Android, Unity, JS, QT](#)
- ✗ [Telemetry](#)
- ✗ [Automotive](#)
- ✗ [Analysis: Turf](#)

## Carto

---

- ✗ <https://carto.com/>
- ✗ Software como servicio
- ✗ Mapas rápidos, bonitos
- ✗ Analítica de localización Intuitiva: [Builder](#)
- ✗ CartoCSS, Vector Tiles
- ✗ SDK de programación
- ✗ [Data Observatory](#)
- ✗ [SDK Mobile](#)
- ✗ [Data Services](#)

# Carto

IRCA - Índice de riesgo de la cali...

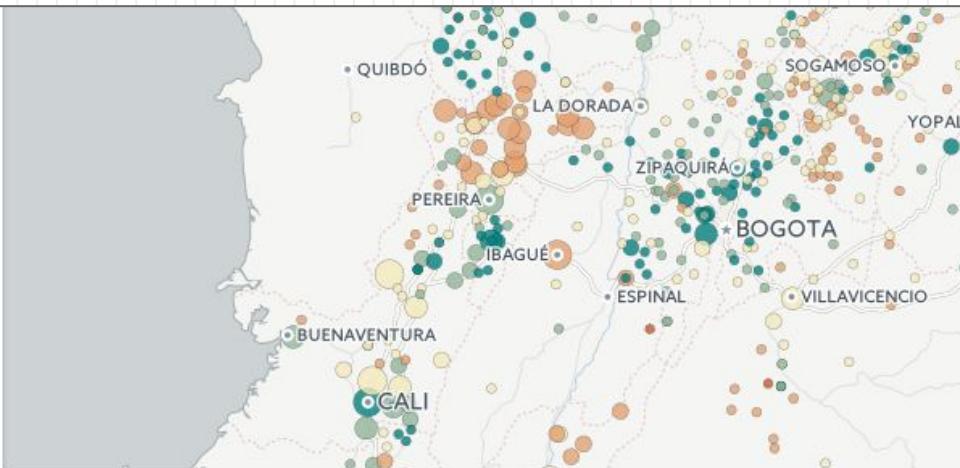
PROMEDIO IRCA

0% - 5%  
5.1% - 14%  
14.1% - 35%  
35.1% - 80%  
80.1% - 100%



NUMERO\_DE\_MUESTRAS

2.5k  
895  
219  
108  
56  
AVG: 43.6  
1



PROMEDIO IRCA

609 SELECTED



Promedio por Municipio

ALL SELECTED

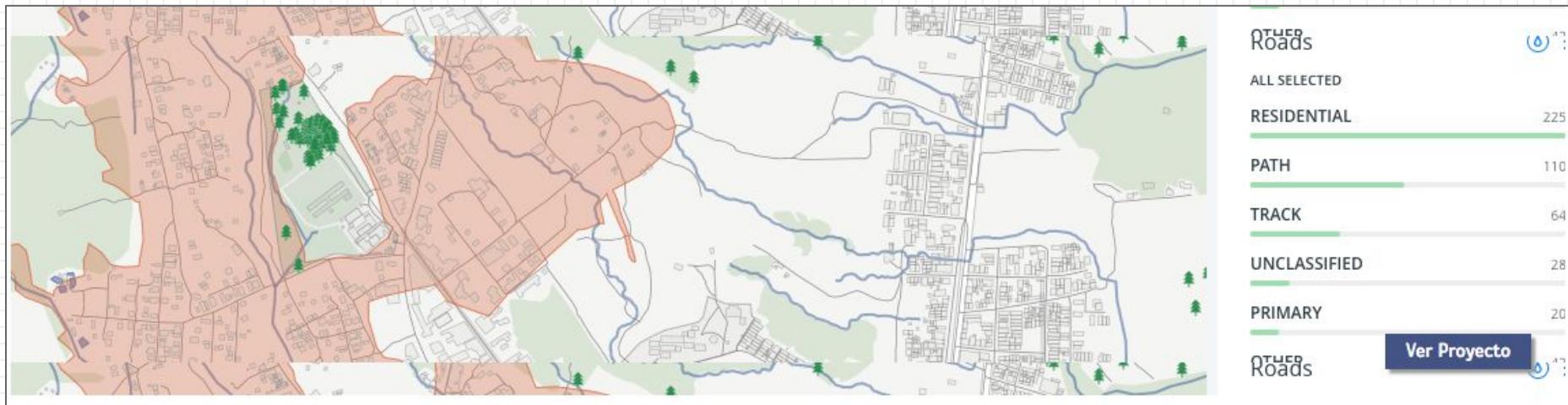
TIMBIQUÍ

96.1

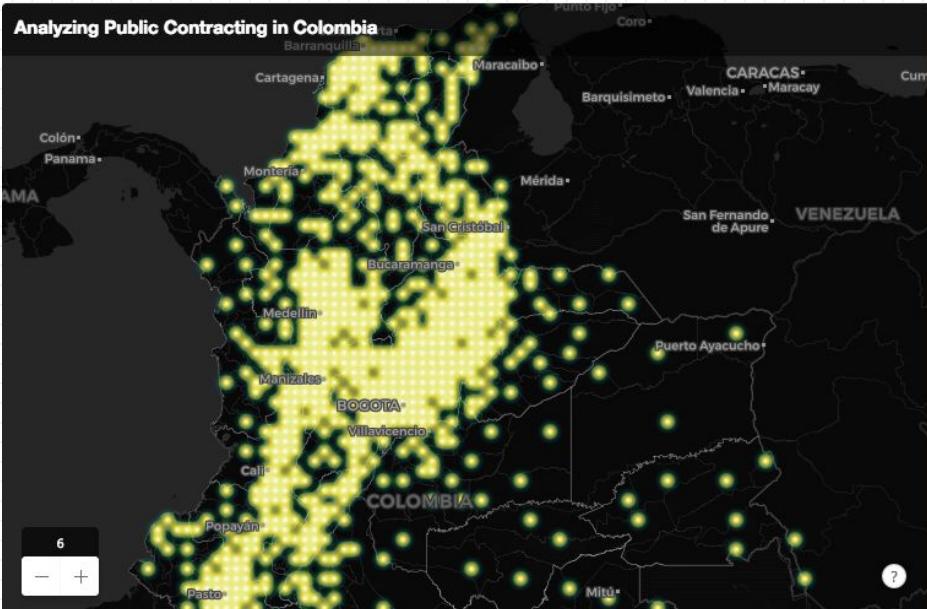
MORELIA

Ver Proyecto

# Carto



# Carto



Avg. Amount  
\$2,122.12 M (COP)

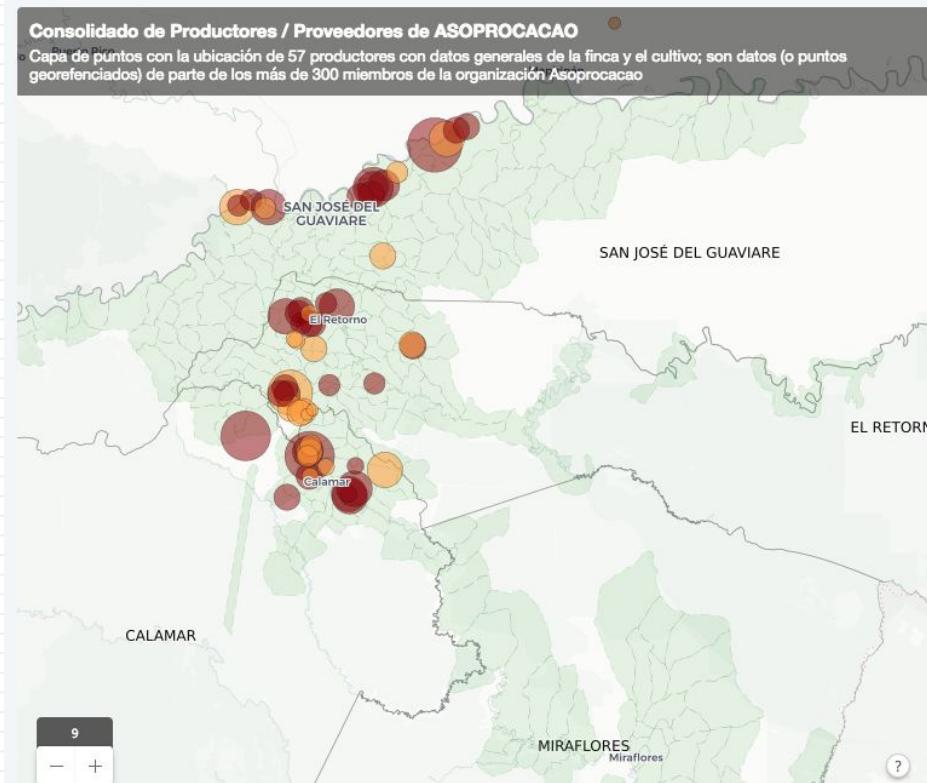
Number of Contracts  
892,166

Organization	⑥
ALL SELECTED	
ANTIOQUIA - GOBERNACIÓN	2
SENA - SERVICIO NACIONAL DE APRENDIZAJE	2
POLICÍA NACIONAL	2
ICBF - INSTITUTO COLOMBIANO DE BIENESTAR ...	1
INPEC - INSTITUTO NACIONAL PENITENCIARIO ...	1
OTHER	79

SEARCH IN 5878 CATEGORIES

Municipality	⑥
ALL SELECTED	
BOGOTÁ	11

# Carto



Total Vendidos 2015  
**23,208 kg**

Diferencia Año Anterior  
**147.48 %**

#### Municipio

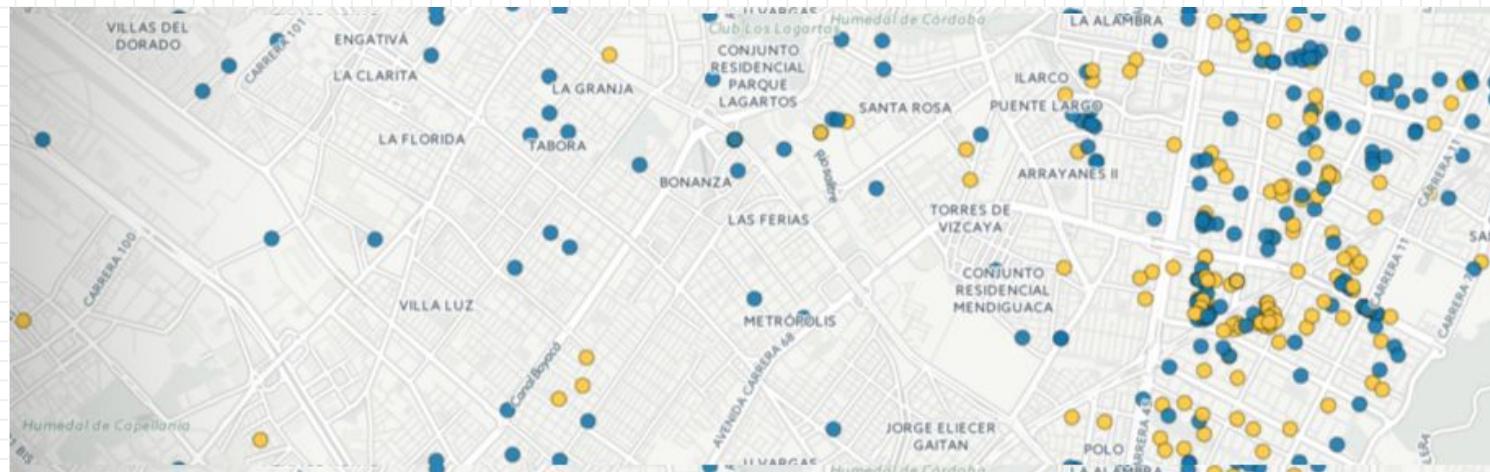
ALL SELECTED	26
RETORNO	26
SAN JOSÉ DEL GUAVIARE	17
CALAMAR	15

#### Área Cacaotera (Ha)



#### Precio Promedio por Kg

# Carto



Avg Cost  
\$261.91 M (COP)

#### Transaction Type

2 SELECTED **LOCK**

SALE

RENT

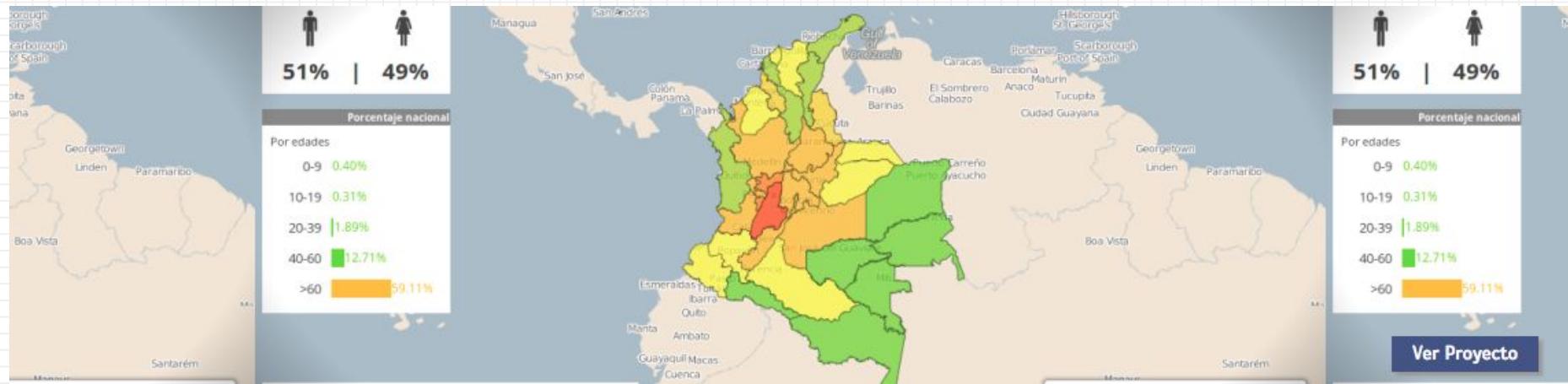
#### Property Type

ALL SELECTED

APARTMENT

**Ver Proyecto**

# Carto



# Carto

Puerto Rico  
**Guaviare.**  
Mapa de Turismo

Sitios Rupestres

Cuerpos de agua

Sitios Religiosos

Todos

Puerto Concordia

Resguardo Indígena Las Salin

El Boquerón

El Morro

Vda. San Francisco

Vda. La Fuguita

Vda. El Tigre

Vda. La Leona

Vda. Guacamayas

El Retorno

Mapiripán

Charras

Puerto Alvira

Mapiripán

Charras

Puerto Alvira

¡Bienvenido al Guaviare!

Guaviare Destino Natural

de Kudos SAS.

04:40

Abrir video aquí

Bienvenido al mapa turístico del guaviare, busca tu destino por nombre, tipo de destino o simplemente haz clic en el lugar que te interese

## Otros

---

- ✗ Mango Maps
- ✗ GIS Cloud

# Apis / Servicios Web



# Google Maps API

---

## API web

[Google Maps Embed API](#). Agrega un mapa de Google a tu sitio sin límites de código ni de cuota.

[Google Maps JavaScript API](#). Personaliza mapas con tus imágenes y tu contenido propios.

[Places Library in the Google Maps JavaScript API](#). Información actualizada sobre millones de ubicaciones.

[Google Static Maps API](#). Imagen de mapa simple e integrable con codificación mínima.

[Google Street View Image API](#). Imágenes y panoramas reales.

# Google Maps API

---

## API de servicios web

[Google Maps Directions API.](#) Indicaciones entre varias ubicaciones.

[Google Maps Distance Matrix API.](#) Tiempo de viaje y distancia para varios destinos.

[Google Maps Elevation API.](#) Datos de elevación para cualquier punto en el mundo.

[Google Maps Geocoding API.](#) Realiza conversiones de direcciones a coordenadas geográficas.

[Google Maps Geolocation API.](#) Datos de ubicación de torres celulares y nodos WiFi.

[Google Places API Web Service.](#) Información actualizada sobre millones de ubicaciones.

[Google Maps Roads API.](#) Funcionalidad snap-to-road para rastrear de forma precisa rutas de navegación de GPS.

[Google Maps Time Zone API.](#) Datos de zonas horarias para cualquier lugar del mundo.

# Mapillary

 Mapillary

Product ▾ Resources ▾ Blog Sign in Create account

## Street-level imagery for the future of maps

Images from anyone with a camera, combined to generate map data

Create account Explore places

242,831,714 images, 4,039,749,728 meters



Manhattan, New York  
EXPLORE THIS LOCATION ➔

Capture the story behind any location in images and maps

# Mapillary

## APIs

Set of powerful, cross-platform APIs which allow you to interact with various aspects of Mapillary data and build upon it.

### Mapillary API

Easy and powerful cross-platform API. Interact with images, sequences, changesets, map objects, image detections and users.

## Tiles

Mapillary data on the map. Visualize, query and interact with set of vector and raster tiles.

### Coverage - Vector Tiles

Mapillary coverage with additional properties in **.mvt** format

### Coverage - Raster Tiles

Mapillary coverage in raster tile format

### Data - Map Objects

Mapillary map objects data in **.mvt** format

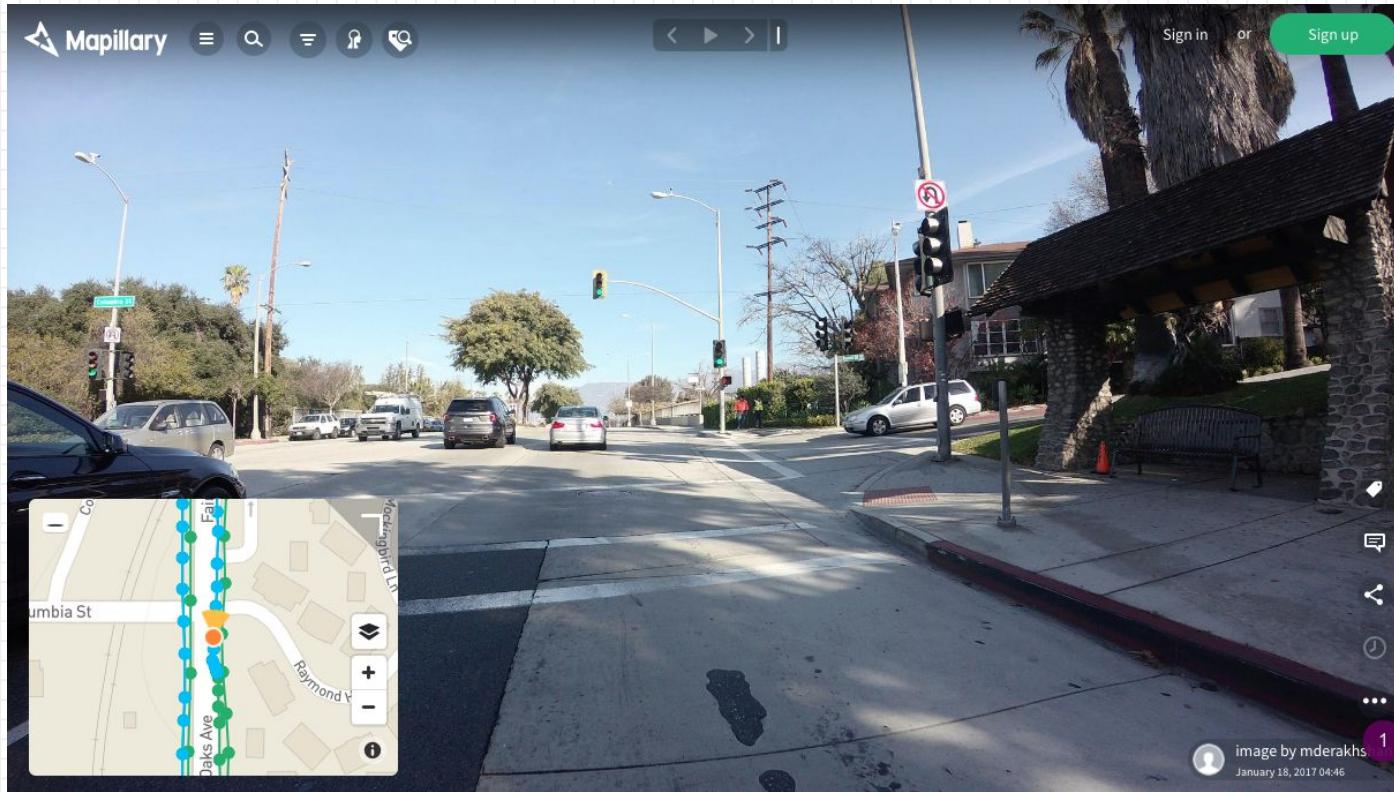
## Viewers

Viewers for street-level image from Mapillary

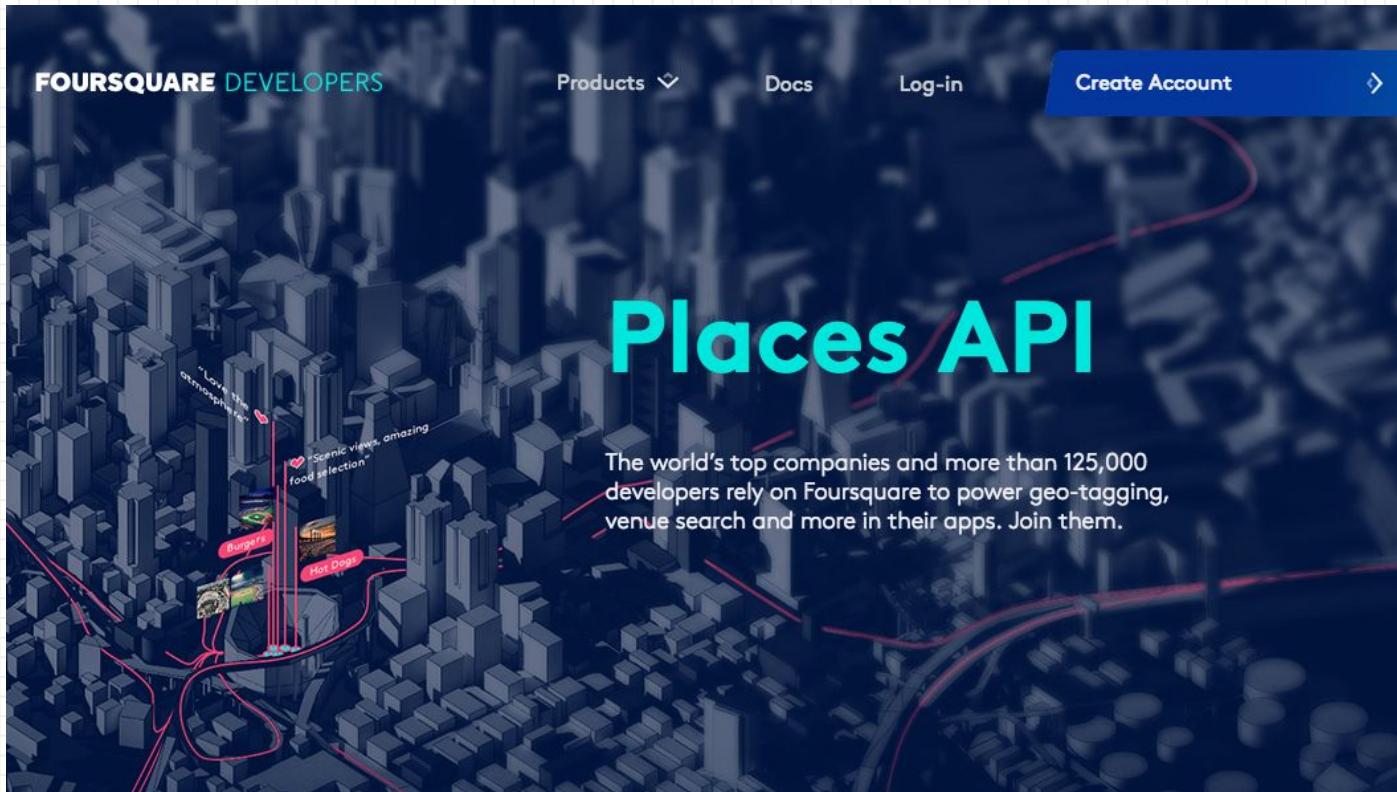
### Mapillary JS

JavaScript & WebGL library which renders street level images from Mapillary

# Mapillary



# Foursquare



The image shows the Foursquare Developers Places API landing page. The background features a dark, stylized 3D cityscape with glowing red lines representing streets and paths. In the foreground, there's a cluster of buildings with callout bubbles containing text and small icons. One bubble says "Burgers", another says "Hot Dogs", and a third says "Scenic views, amazing food selection". Above these bubbles, a pink heart icon with the text "Love the atmosphere!" is visible. The top navigation bar includes links for "FOURSQUARE DEVELOPERS", "Products", "Docs", "Log-in", "Create Account", and a user icon. The main title "Places API" is prominently displayed in large, light blue letters. Below the title, a descriptive paragraph reads: "The world's top companies and more than 125,000 developers rely on Foursquare to power geo-tagging, venue search and more in their apps. Join them."

FOURSQUARE DEVELOPERS

Products Docs Log-in Create Account

# Places API

The world's top companies and more than 125,000 developers rely on Foursquare to power geo-tagging, venue search and more in their apps. Join them.

# ESRI Location Services

## Location Services

Supercharge your applications with context, routing and location-based alerts. Add even more power to your apps with civic and demographic data.



### Geocoding >

Use the geocoding service to convert addresses to and from geographic coordinates. Search for places within a region and get places matching your search.



### Directions >

Serve up directions, optimal routes between multiple destinations, and drive time calculations around a point of interest.



### GeoEnrichment >

Given a point, area, or street address, find demographic and contextual data about the study area such as average income, household size and population density.

Consumo de información  
de distintos orígenes de  
datos geográficos

## Aplicaciones

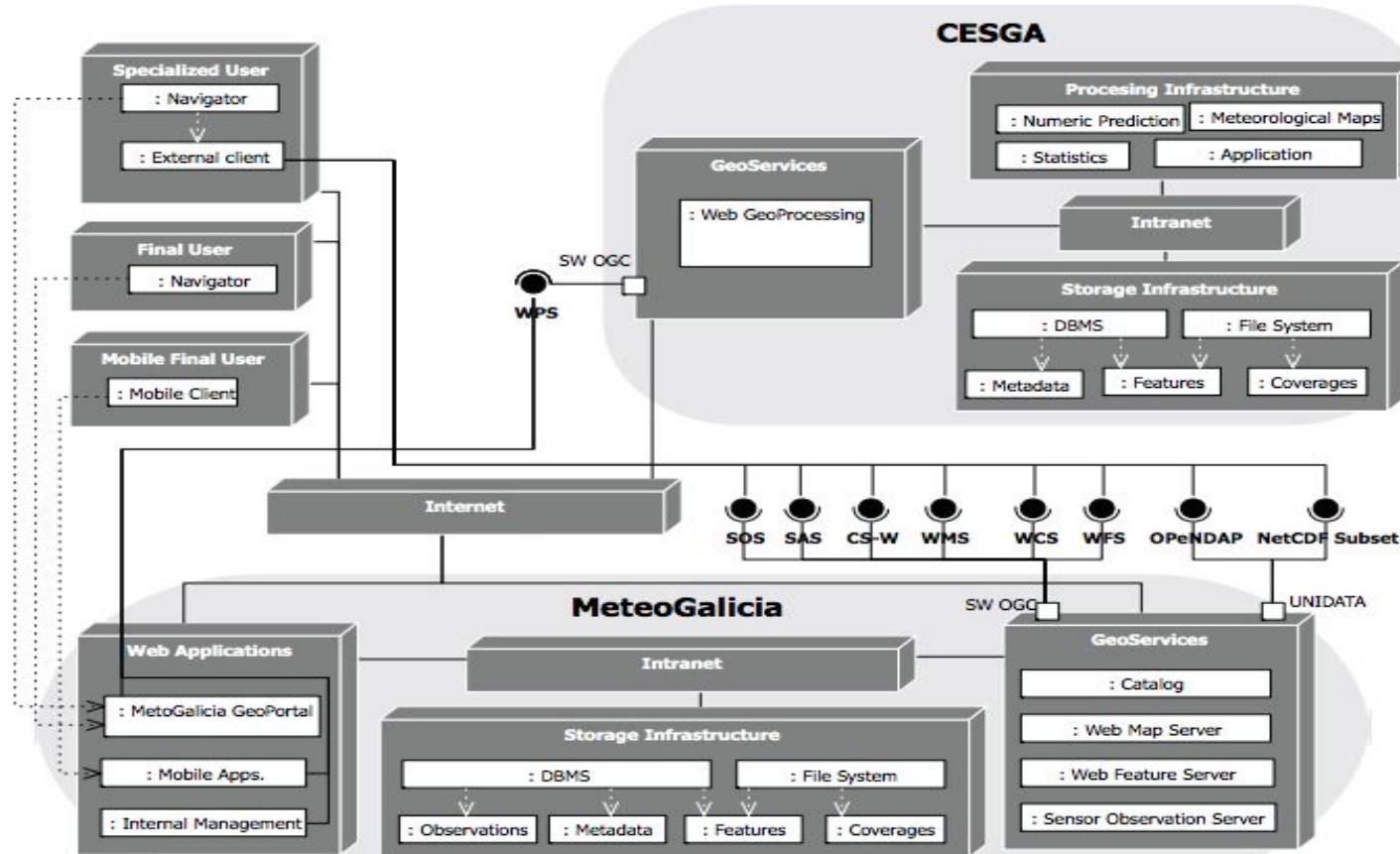
---

- ✗ Viqueira, José R. R., et al. "A Sensor Observation Service Based on OGC Specifications for a Meteorological SDI in Galicia." Lecture Notes in Computer Science Advances in Conceptual Modeling -□□ Applications and Challenges, 2010, pp. 43–52.. doi:10.1007/978-3-642-16385-2\_6.

## Aplicaciones

---

- ✗ The MeteoSIX project, founded by the Galician regional government, aims at the development of a Spatial Data Infrastructure (SDI) and a new SDI based Geo web site to enable an integrated access to meteorological data for a wide variety of users with different skills. Such data has to be available through the internet using OGC and OpenNDAP standards.

**Fig. 1.** Component Deployment for the MetoSIX Project

## Aplicación

---

Akıncı, H., & Erdoğan, S. (2013). Designing  
a flood forecasting and  
inundation-mapping system integrated  
with spatial data infrastructures for  
Turkey. Natural Hazards, 71(1), 895–911.  
<https://doi.org/10.1007/s11069-013-0939-9>

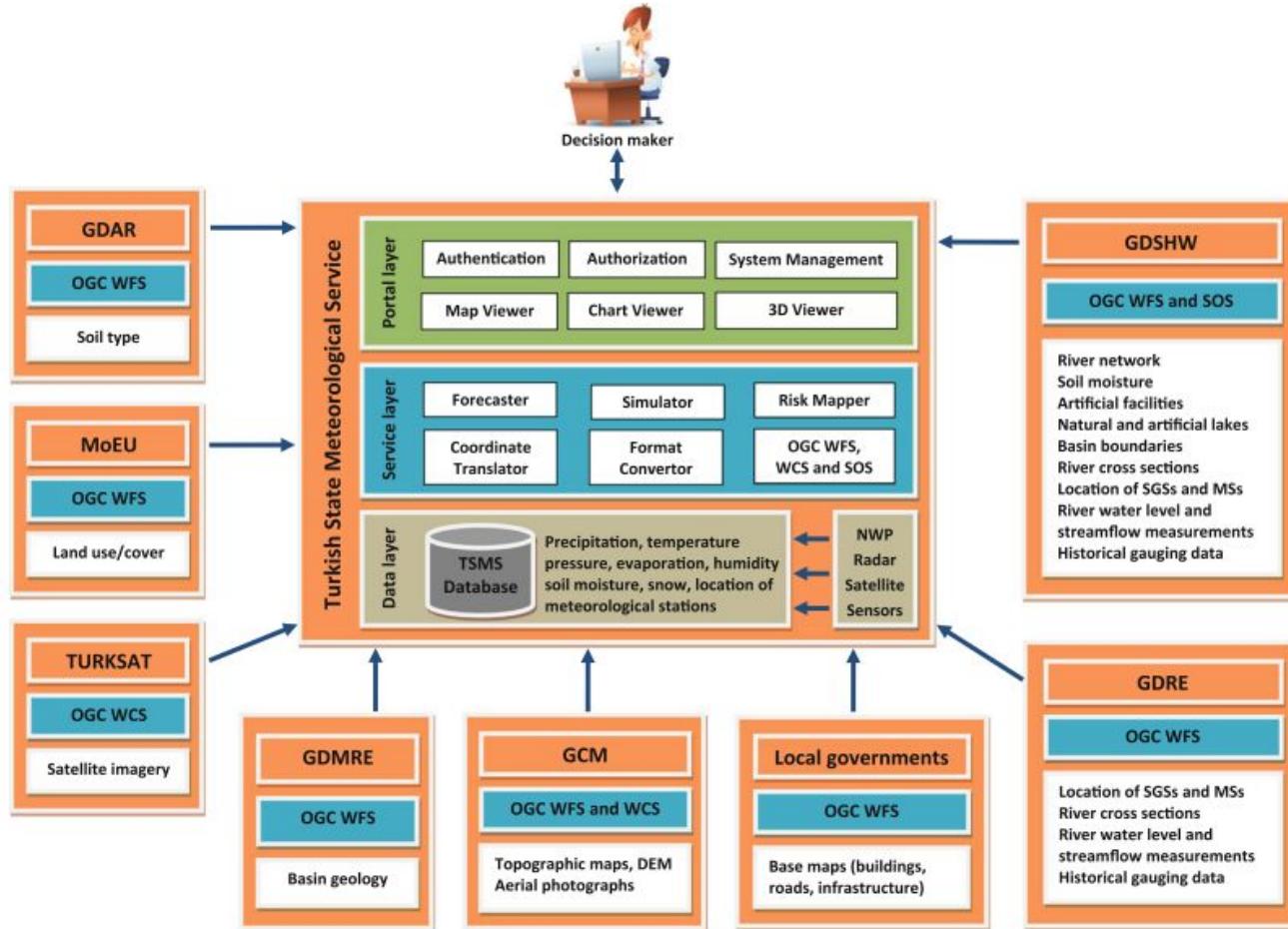
## Aplicación

---

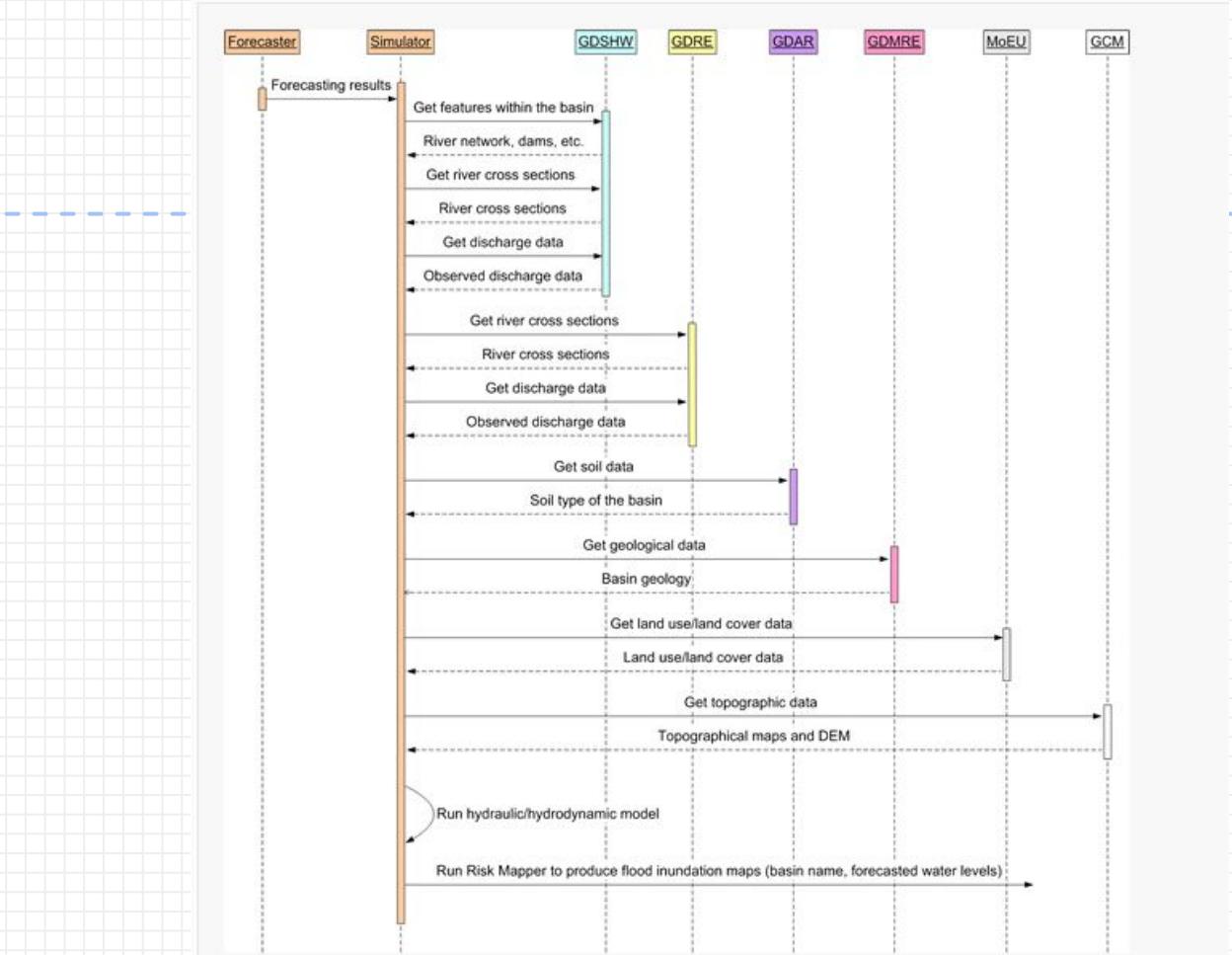
The main purpose of this study was to determine the technical architecture of the FFS intended to be developed in Turkey and to design a flood forecasting and inundation-mapping system integrated with spatial data infrastructure (SDI). Because SDIs provide interoperability among the institutions by enabling collective use of data and services, this enables decision makers to take correct and rapid decisions regarding the forecasting

**Table 1** Necessary data for FFIMS (Erdoğan 2011)

Dataset	Provider	Data structure	Scale	Coverage
Location of meteorological stations	TSMS, GDSHW, GDRE	Vector	25,000	Spatial and attribute data
Precipitation, temperature, evaporation, etc.	TSMS, GDSHW, GDRE	Text	—	Excel file
Soil moisture	GDSHW, TSMS	Text	—	Excel file
Location of stream-gauging stations	GDSHW, GDRE	Vector	25,000	Spatial and attribute data
River and reservoir levels, stream-flow, discharge, historical gauging data	GDSHW, GDRE	Text	—	Excel file
River cross sections	GDSHW, GDRE	Vector	1,000 2,000	Spatial and attribute data
Artificial facilities (dams, dikes, etc.) in basins	GDSHW	Vector	1,000 2,000	Spatial and attribute data
Basin boundaries	GDSHW	Vector	25,000	Spatial and attribute data
River network	GDSHW	Vector	25,000	Spatial and attribute data
Topographical maps and DEM	GCM	Vector raster	25,000	Spatial and attribute data
Land cover/use	MoEU	Vector	25,000	Spatial and attribute data
Soil type	GDAR	Vector	25,000	Spatial and attribute data
Basin geology	GDMRE	Vector	25,000	Spatial and attribute data
Satellite imageries	TURKSAT	Raster	5,000 25,000	Spatial data
Aerial photographs	GCM	Raster	5,000 25,000	Spatial data
Cadastral maps	GDLRC	Vector	1,000 5,000	Spatial and attribute data



**Fig. 1** Architecture suggested for FFIMS



**Fig. 3**

UML sequence diagram of the workflow realized by the Simulator

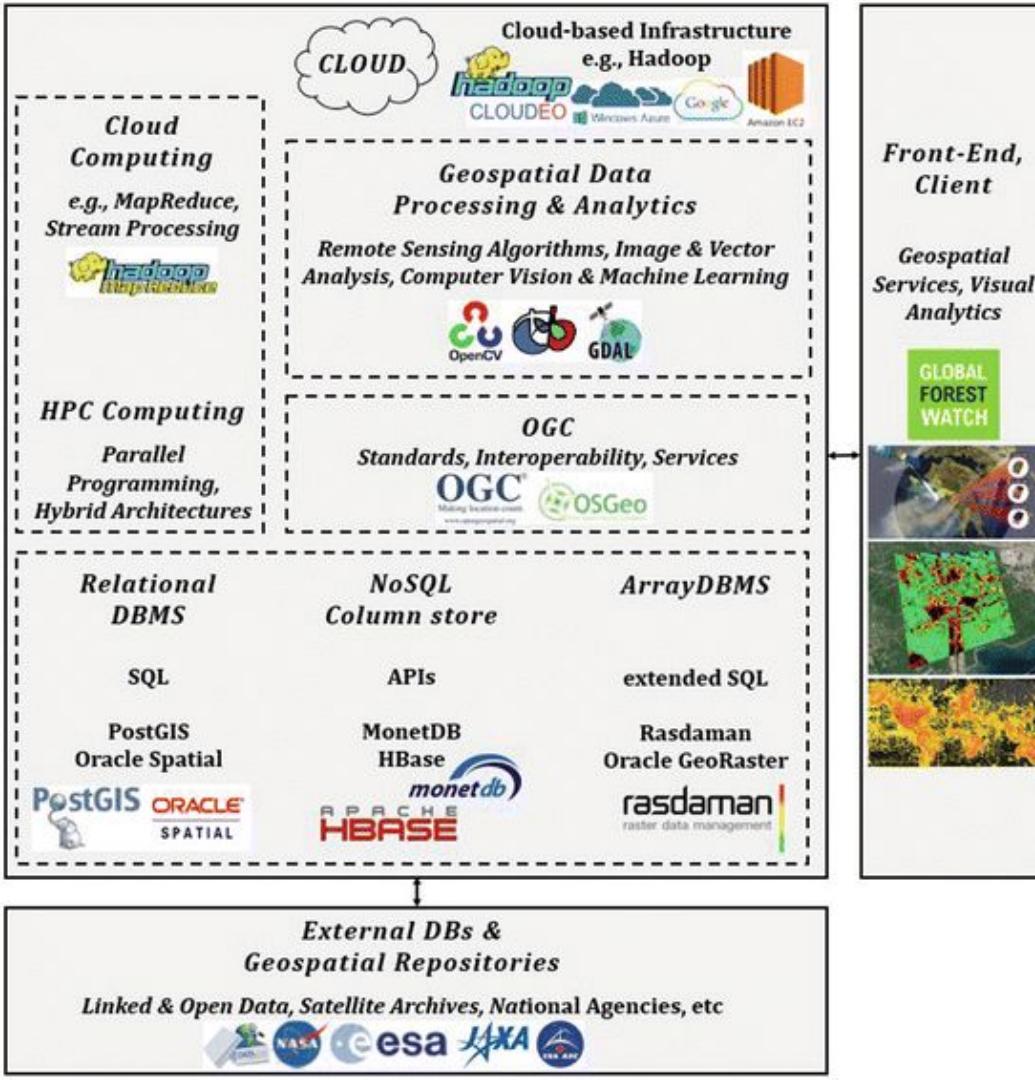
## Aplicación

---

Karmas, A., Tzotsos, A., & Karantzalos, K. (2016). Geospatial Big Data for Environmental and Agricultural Applications. In Big Data Concepts, Theories, and Applications (pp. 353–390). Springer International Publishing.  
[https://doi.org/10.1007/978-3-319-27763-9\\_10](https://doi.org/10.1007/978-3-319-27763-9_10)

# Aplicación

Fig. 10.1  
The current dominating architecture and technology for geospatial big data and analytics



Gracias



