

Public Health and Territory

What do we need?

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When space is essential in Public Health

- To understand how **context** affects people health: ecological studies
- **Environmental** factors (weather, pollution, insects)
- Health services **access** and definition of functional **regions**

**Spatial
Analysis
for Public
Health**

Spatial Analysis for Public Health

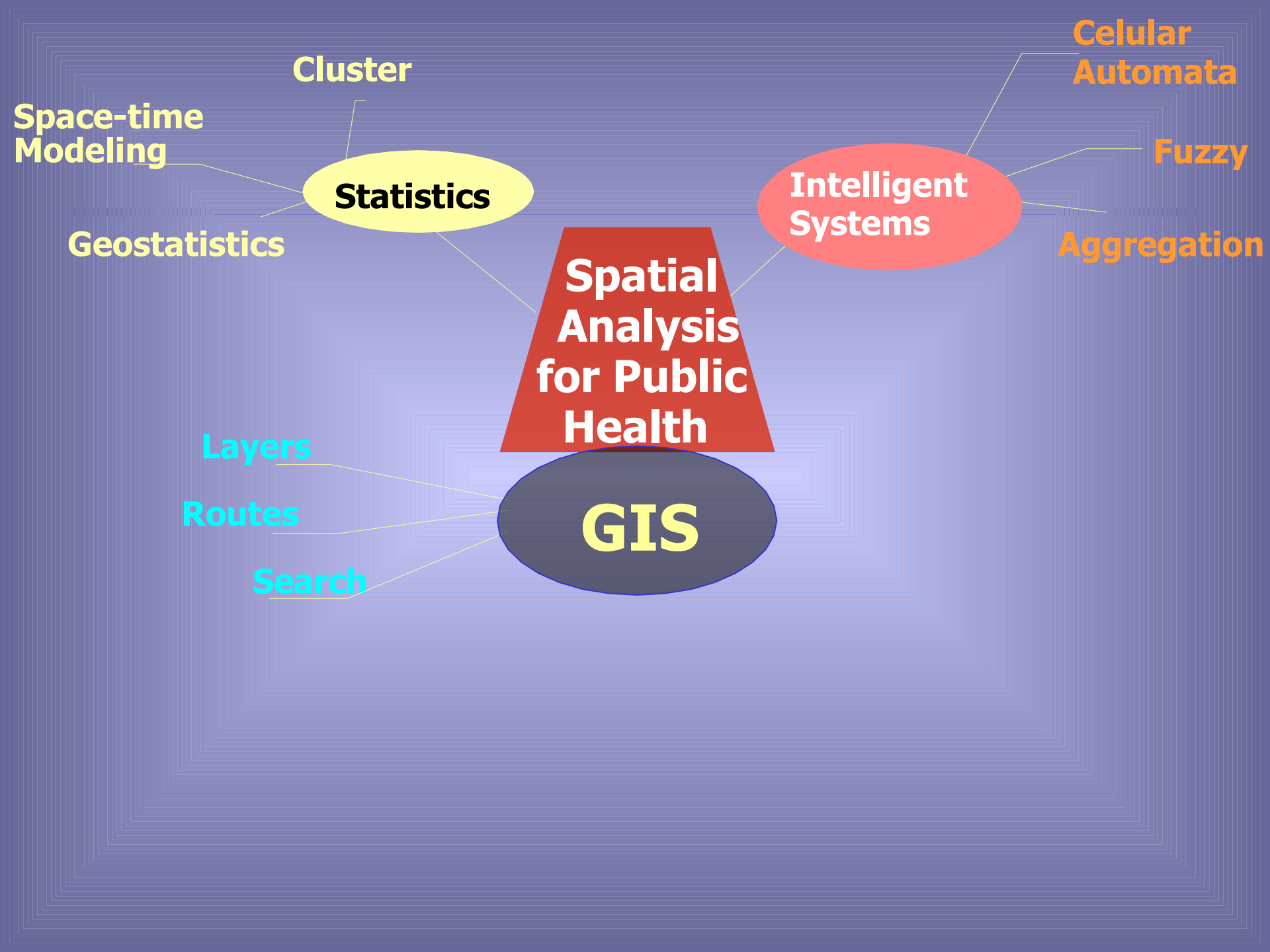
Layers

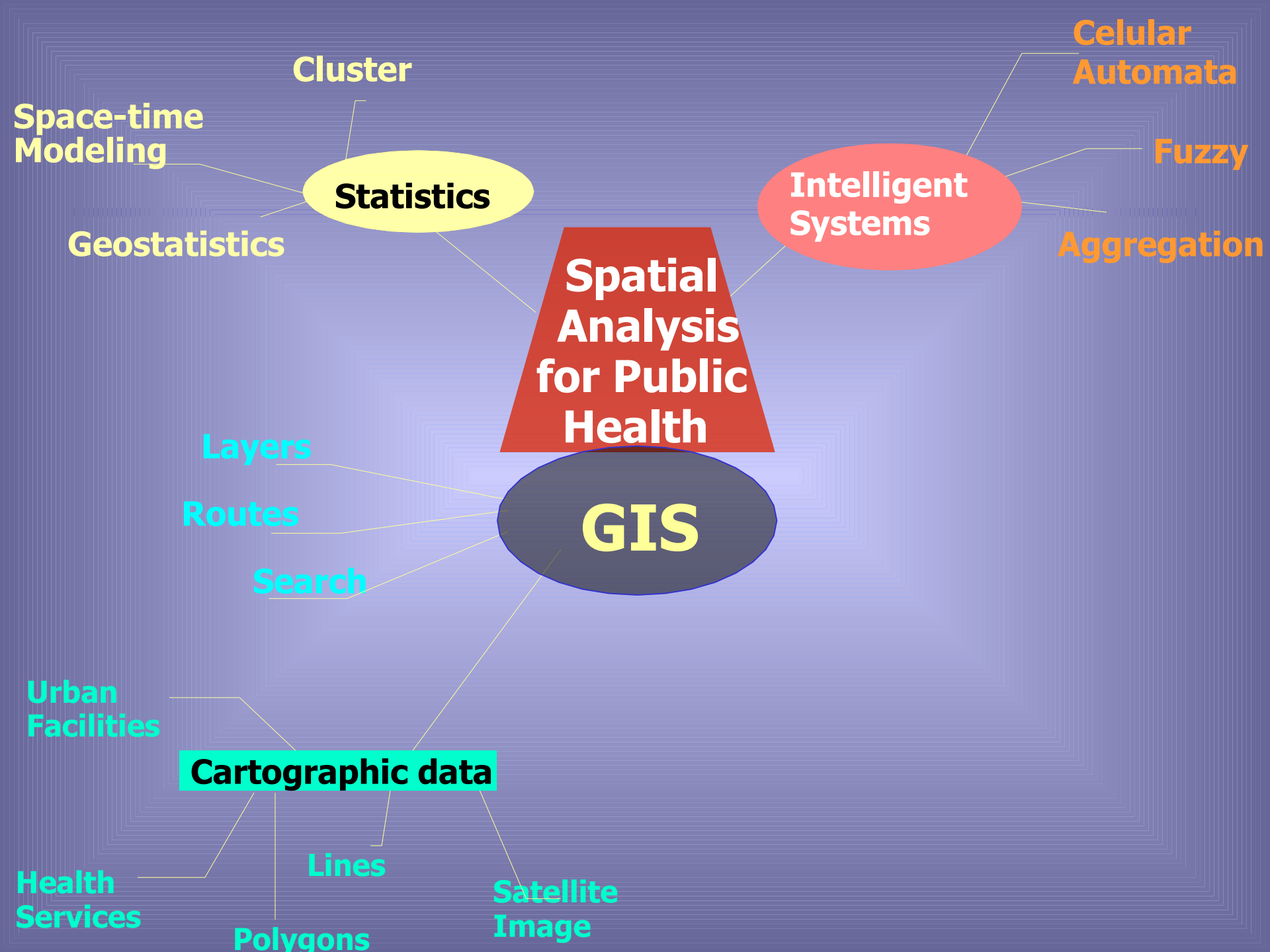
Routes

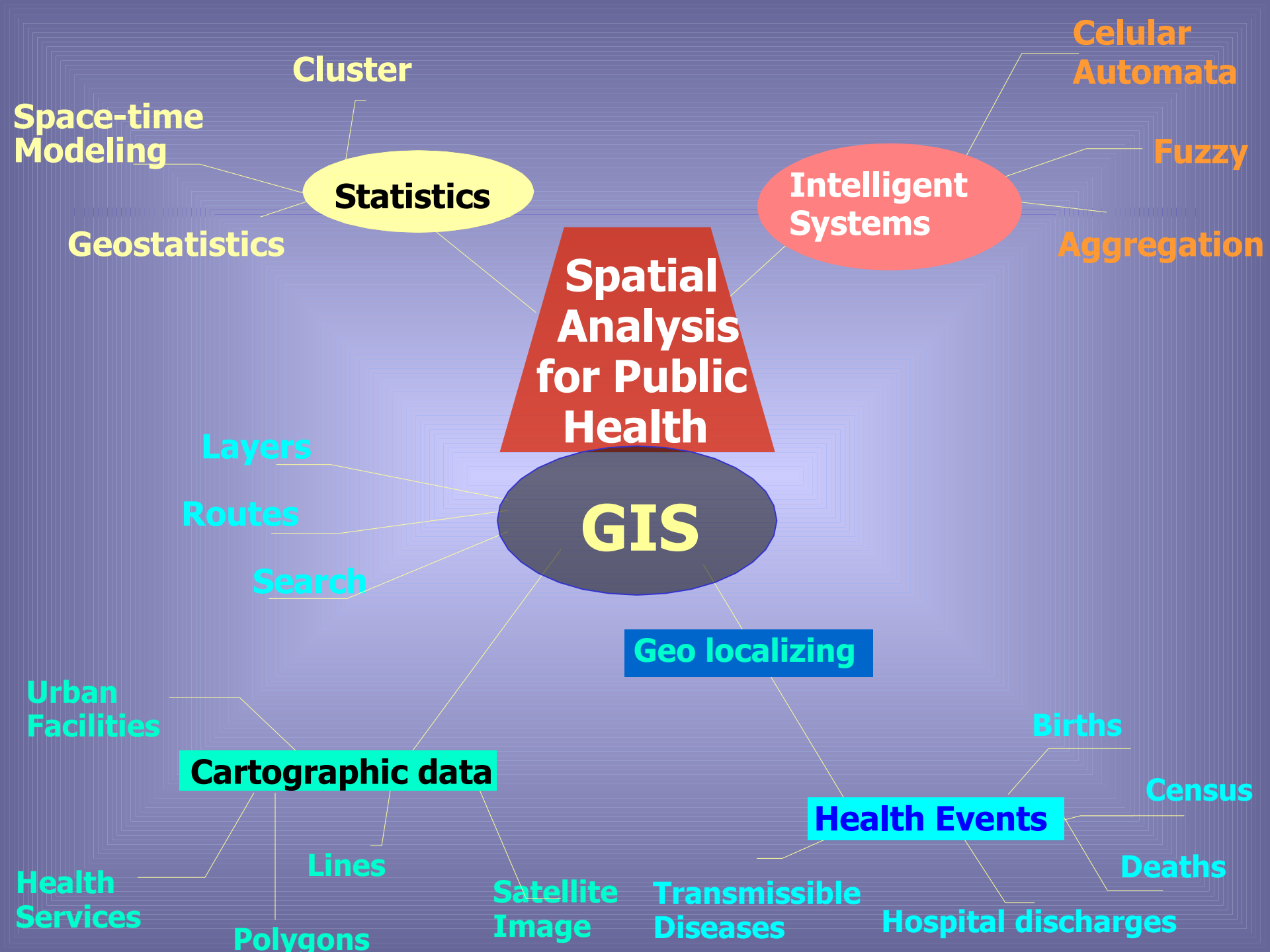
Search

GIS

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graph TD; SA[Spatial Analysis for Public Health] --- GIS([GIS]); GIS --- Layers[Layers]; GIS --- Routes[Routes]; GIS --- Search[Search];
```







Applications

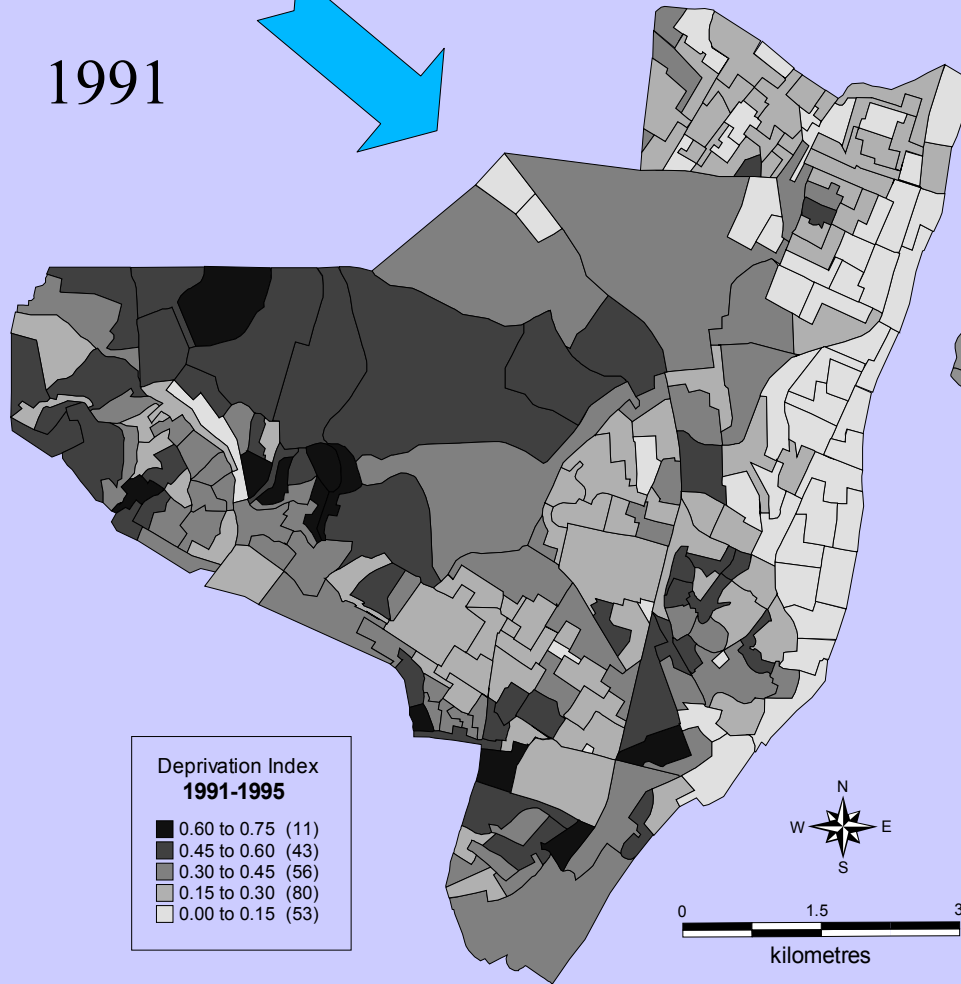
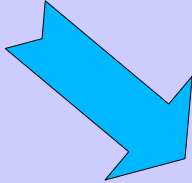
Context:
Leprosy and poverty

Small area analysis and detection of risk to leprosy

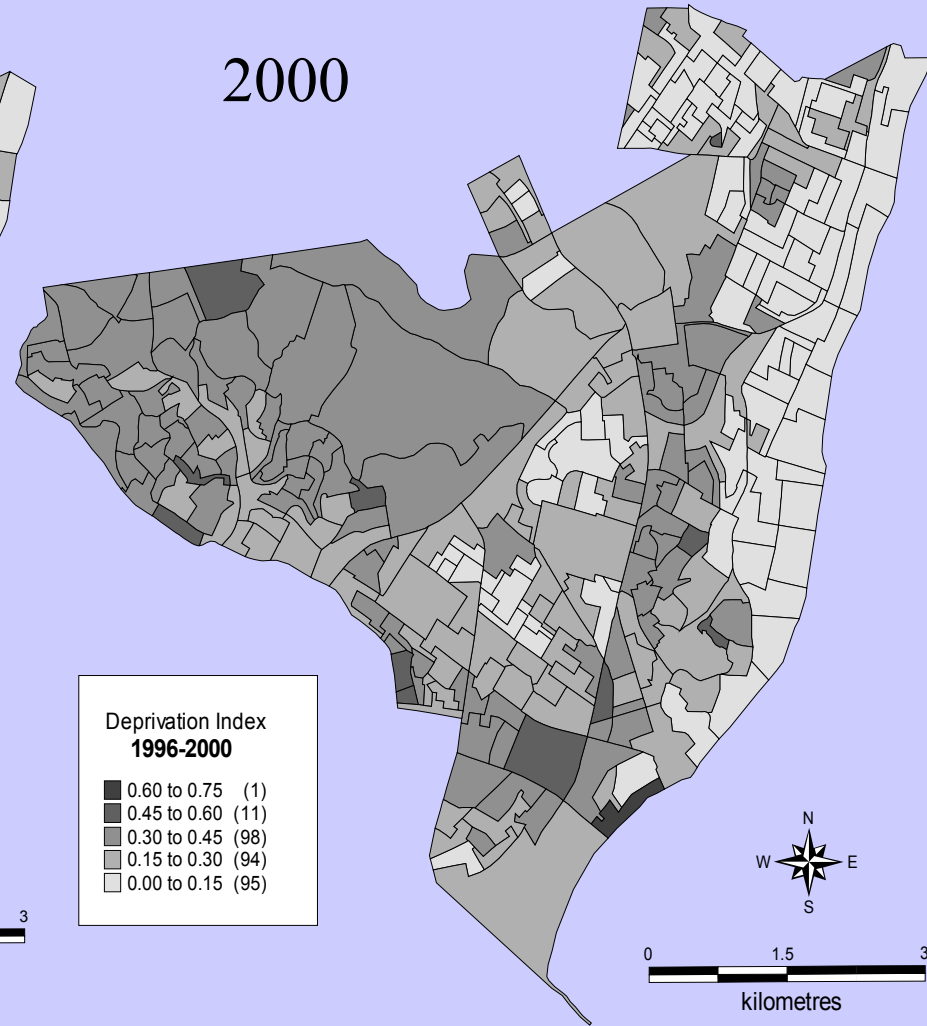
- The problem:
 - Very high rates of leprosy detection in Pernambuco
 - Leprosy control is based on cases treatment
 - Under-registration and poverty
- Objective:
 - Identify high-priority areas
 - Evaluate the control program
- Method: to model the cases distribution based on the spatial structure and a deprivation indicator.

Deprivation map of Olinda

1991

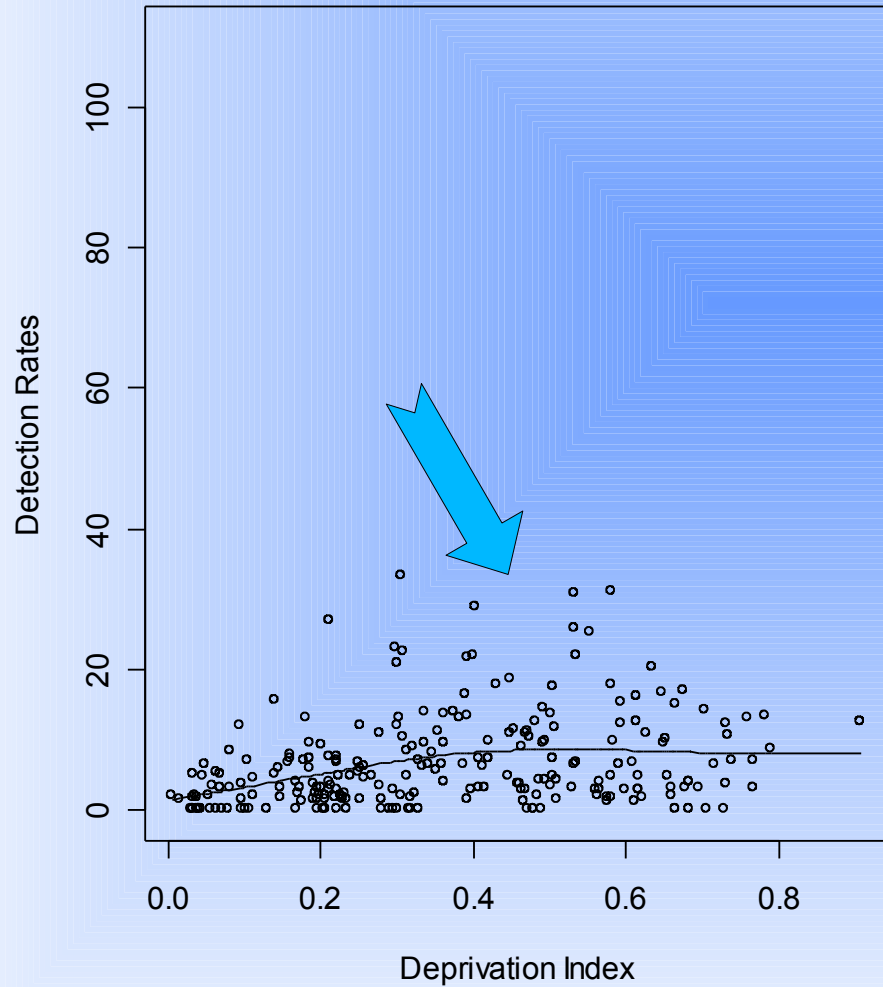


2000

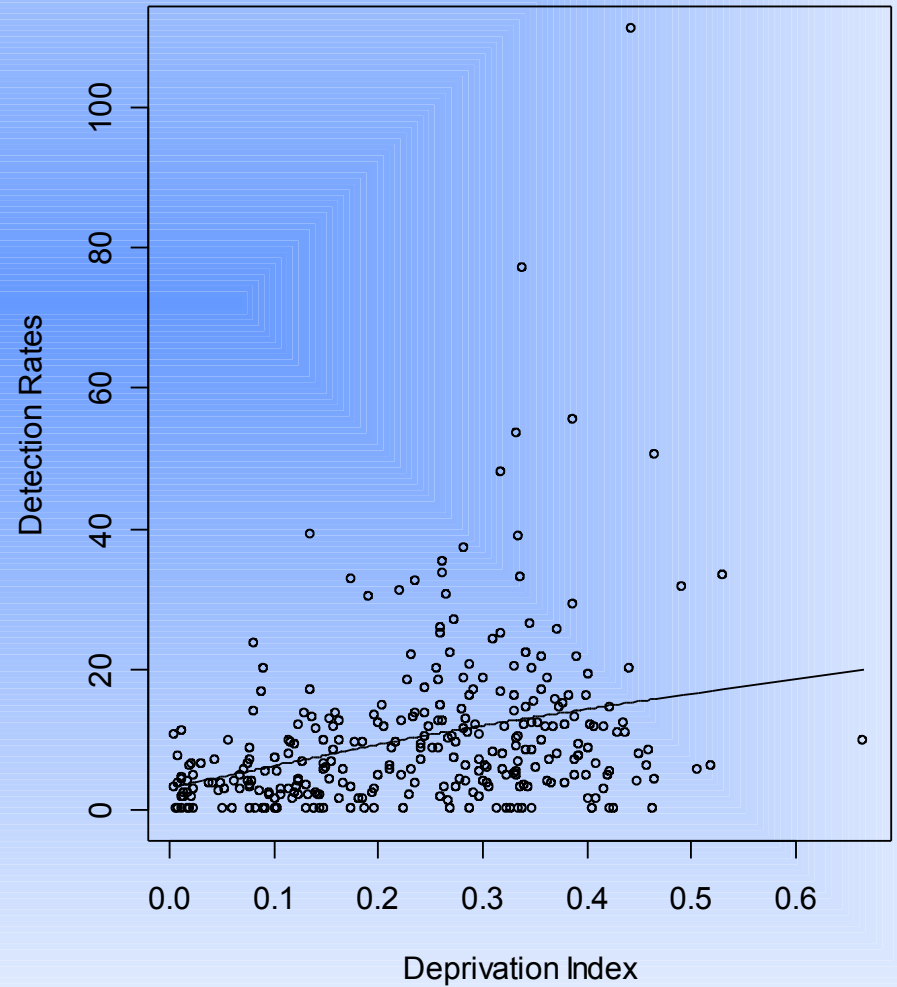


Leprosy X Poverty

a) 1991-1995

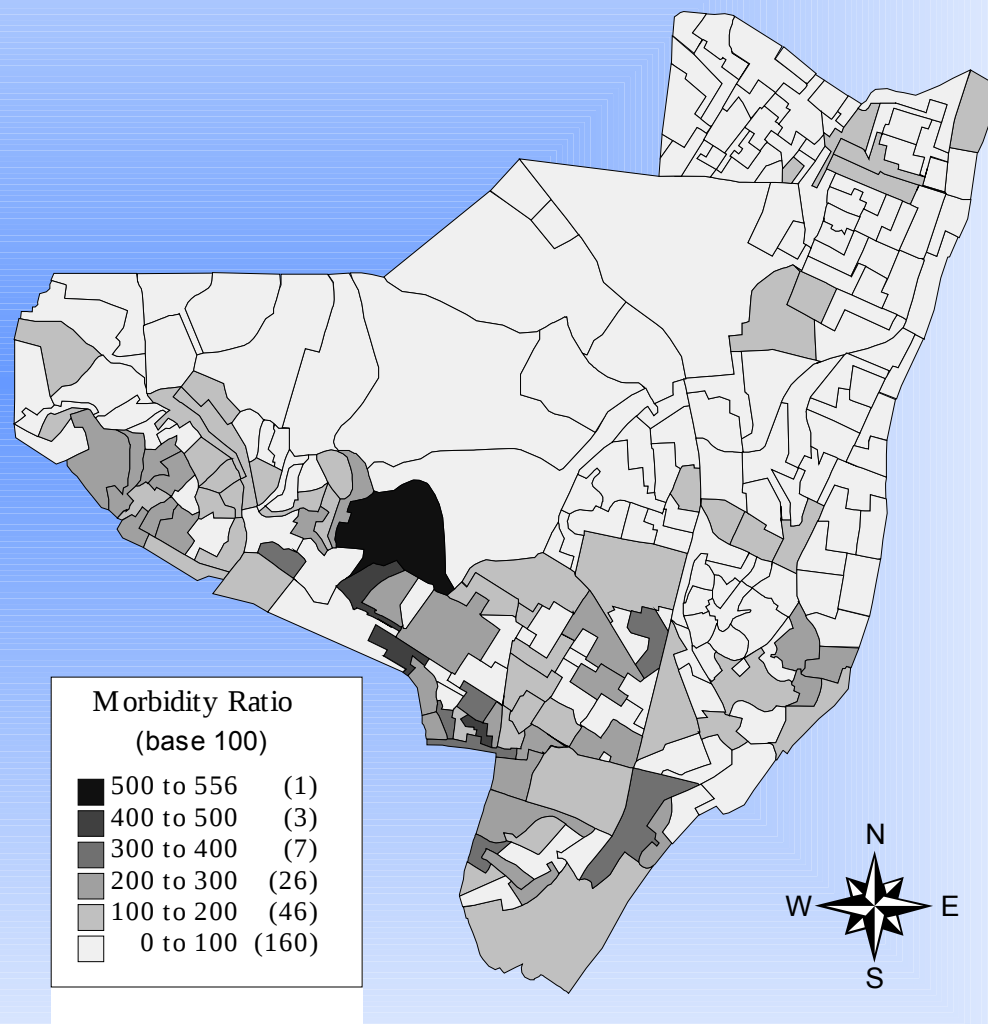


b) 1996-2000



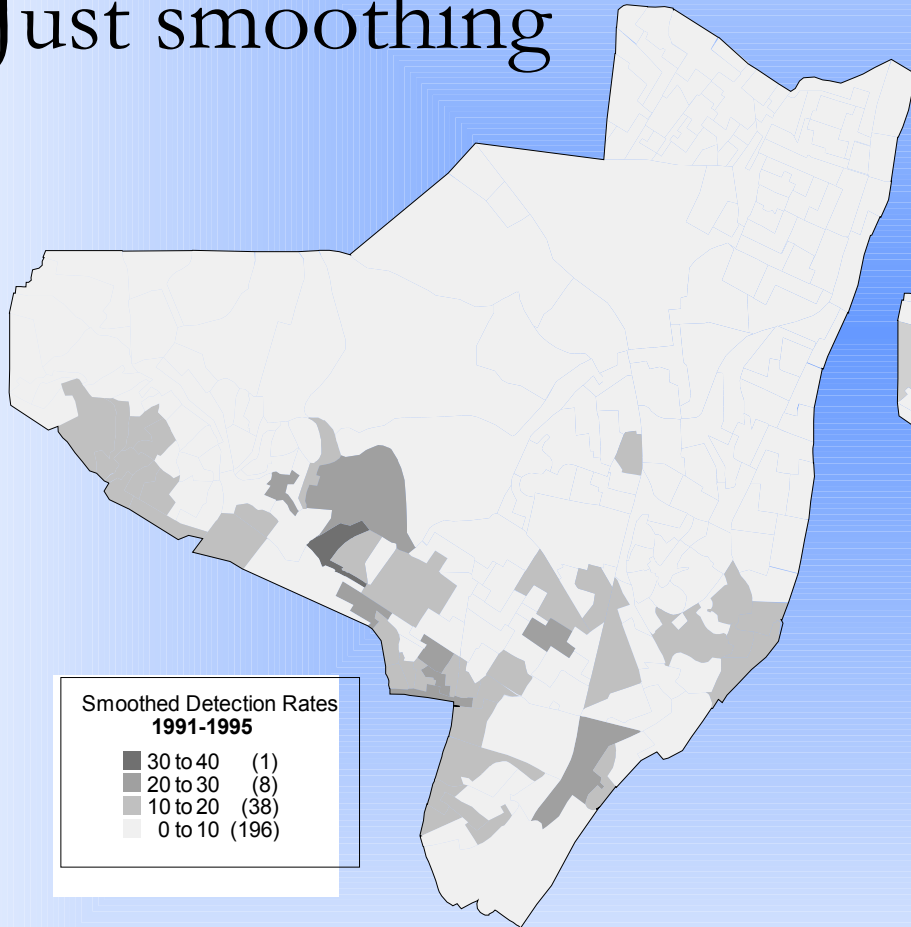
Cases per census tract

- Sources of error:
 - Geocoding – addresses!
 - Health Services access under registration
 - Small areas

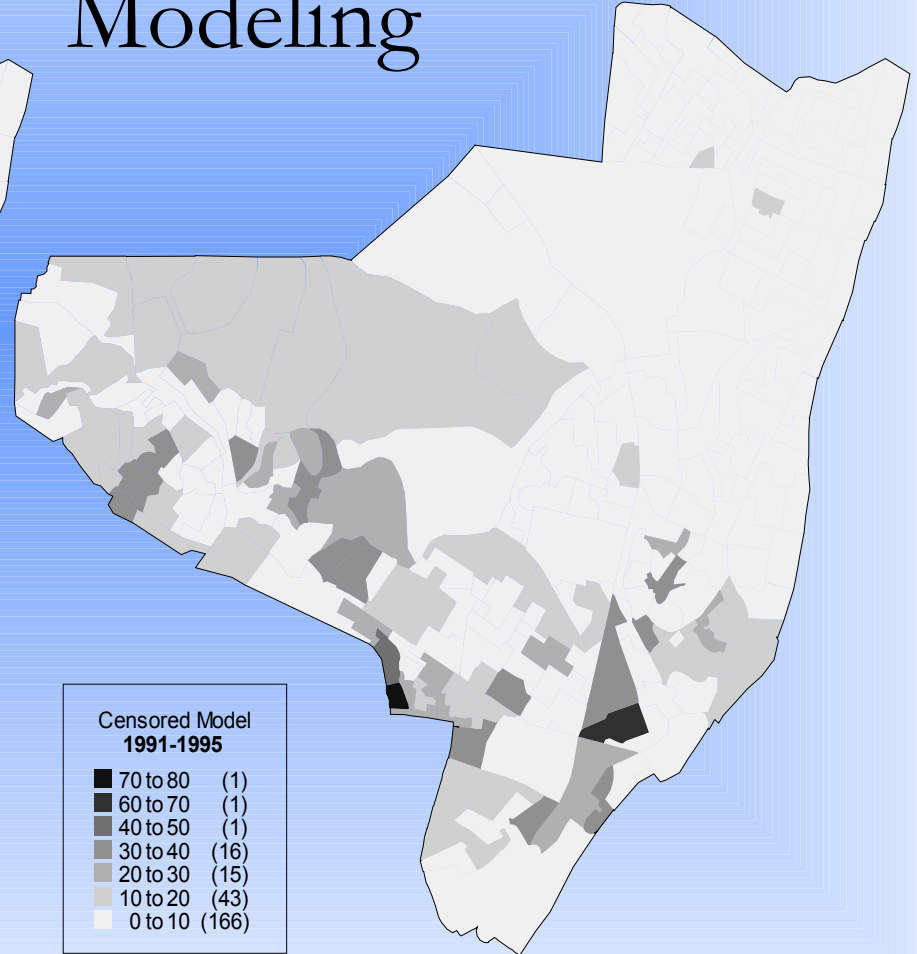


Number of cases

Just smoothing

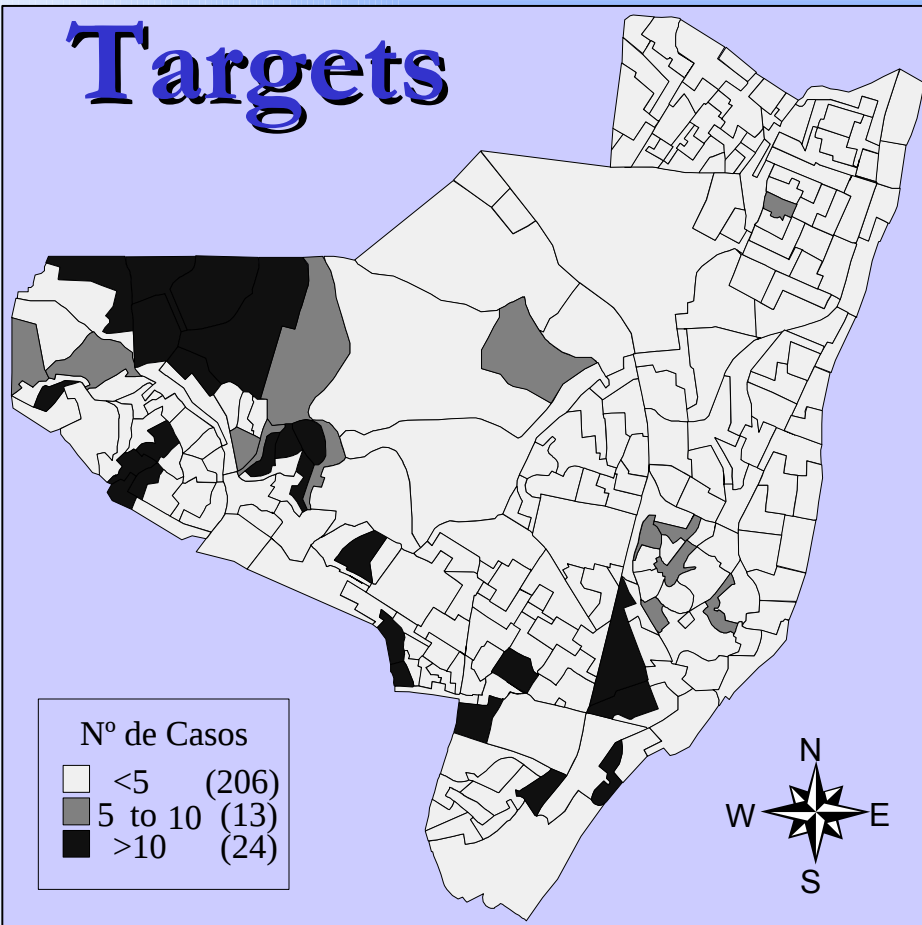


Modeling

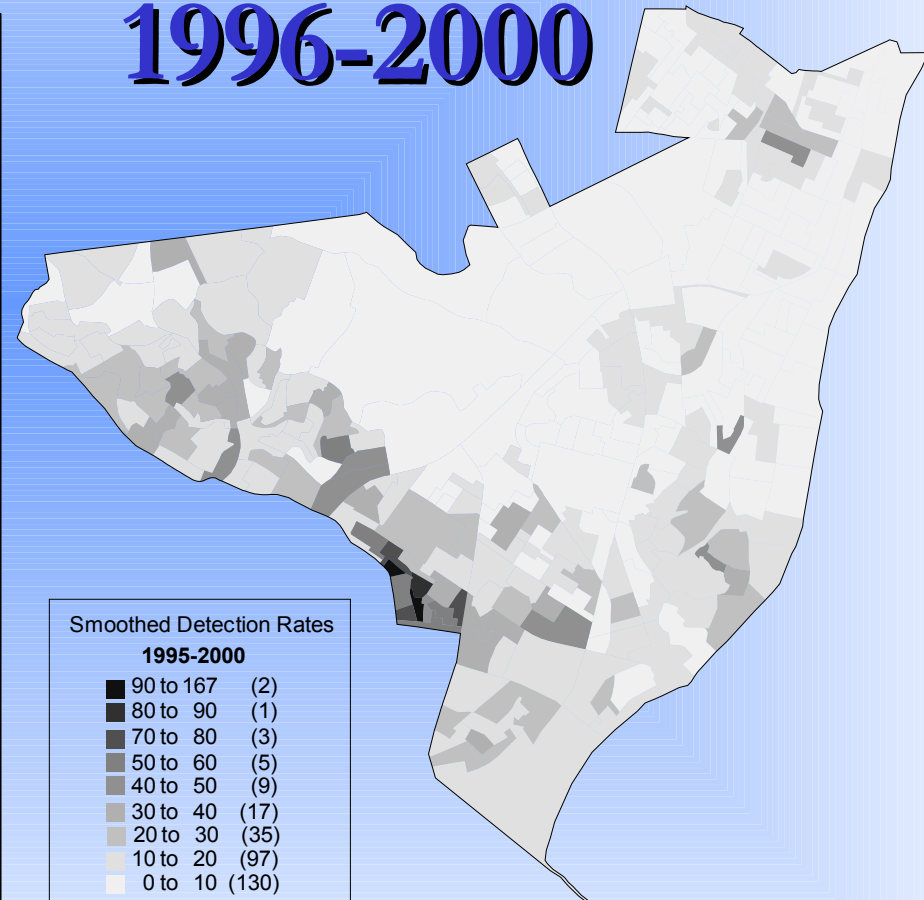


Predicted number of cases: modeling the under registration

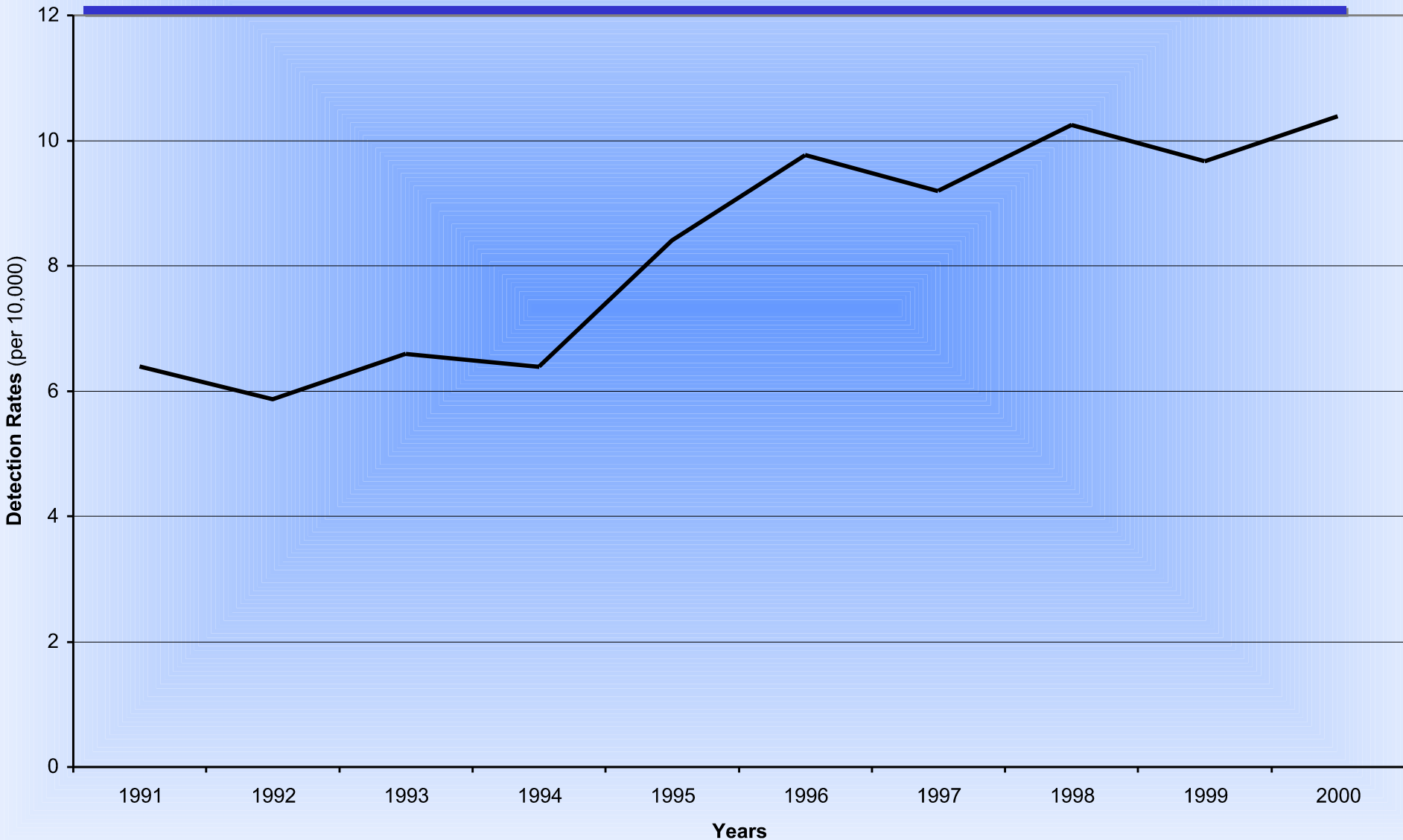
Targets



1996-2000



The PSF Family Health Program

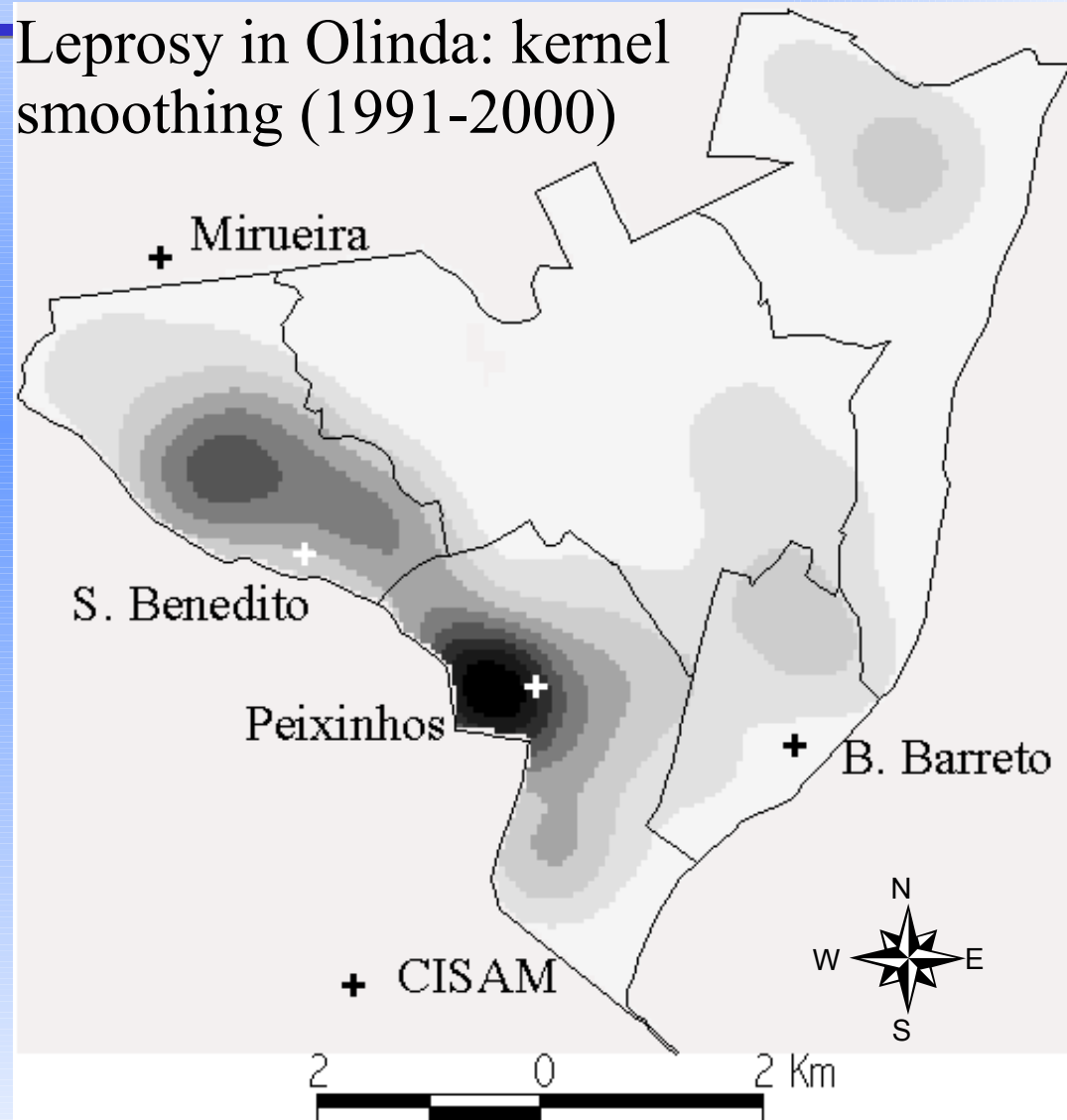


Functional Regions

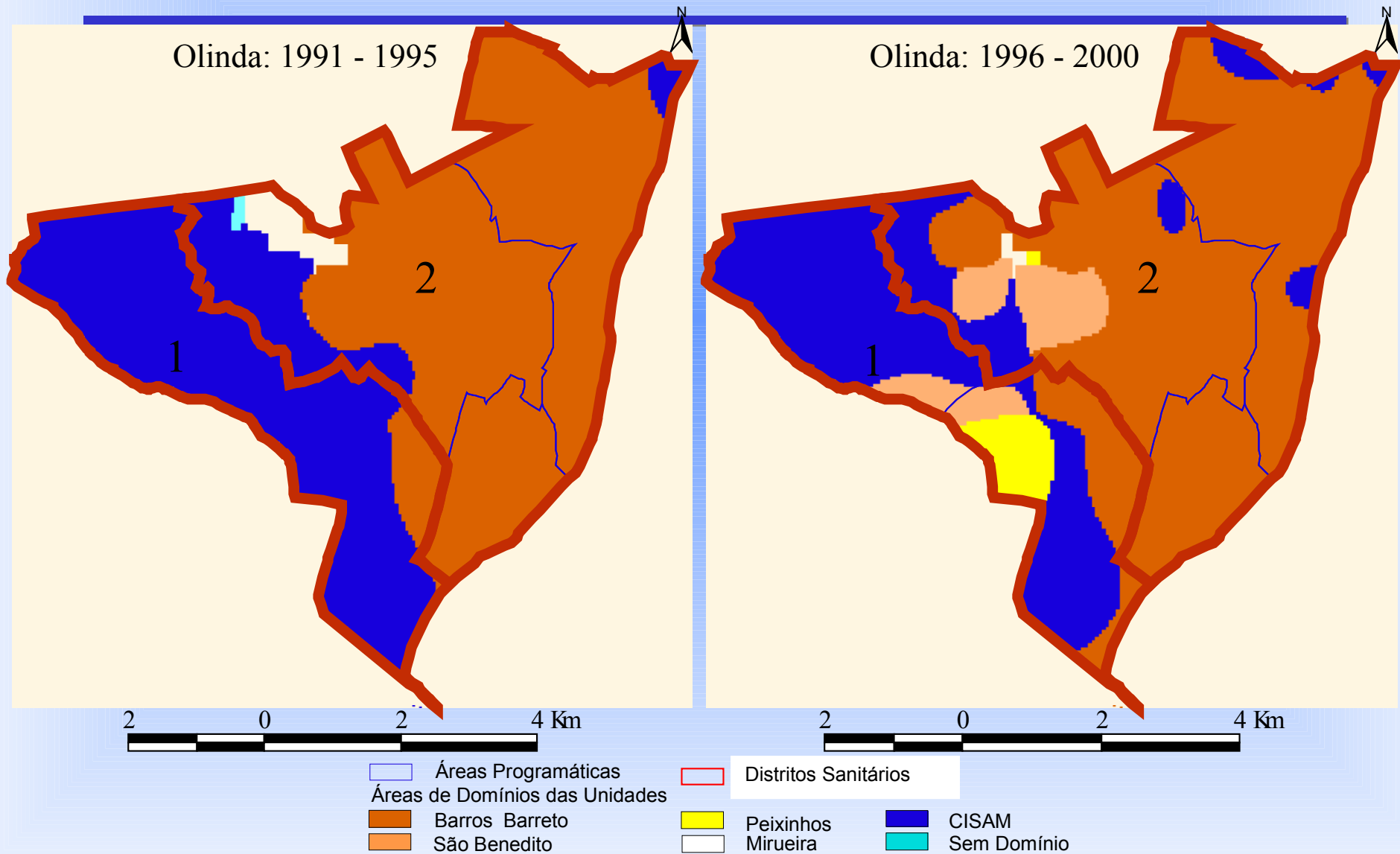
Functional regions

- Cases localized at census tract level
- Coordinates of Health Services
- GIS with statistical capabilities (kernel)

Leprosy in Olinda: kernel smoothing (1991-2000)

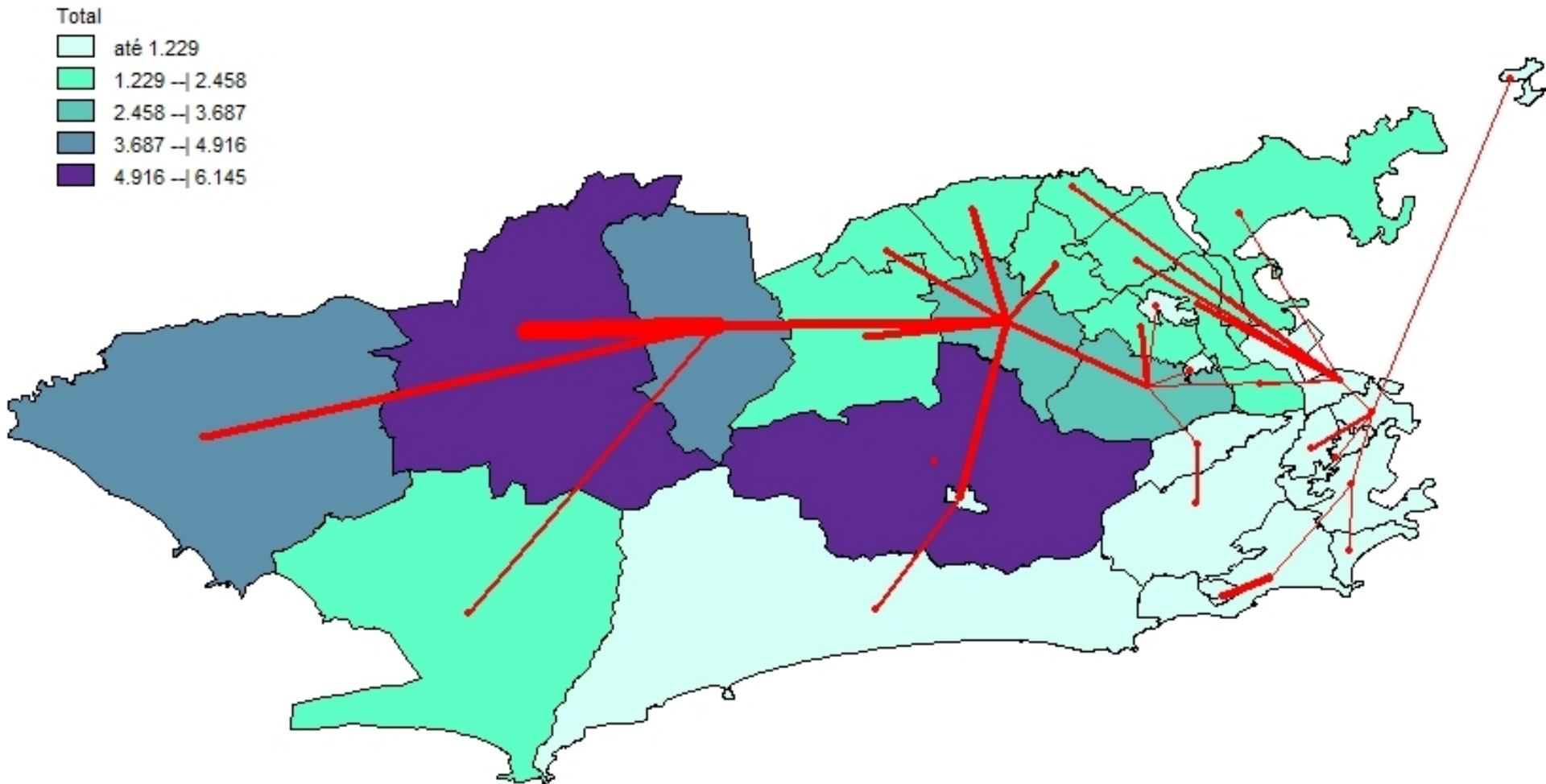


Functional regions based on use



Health Services Access

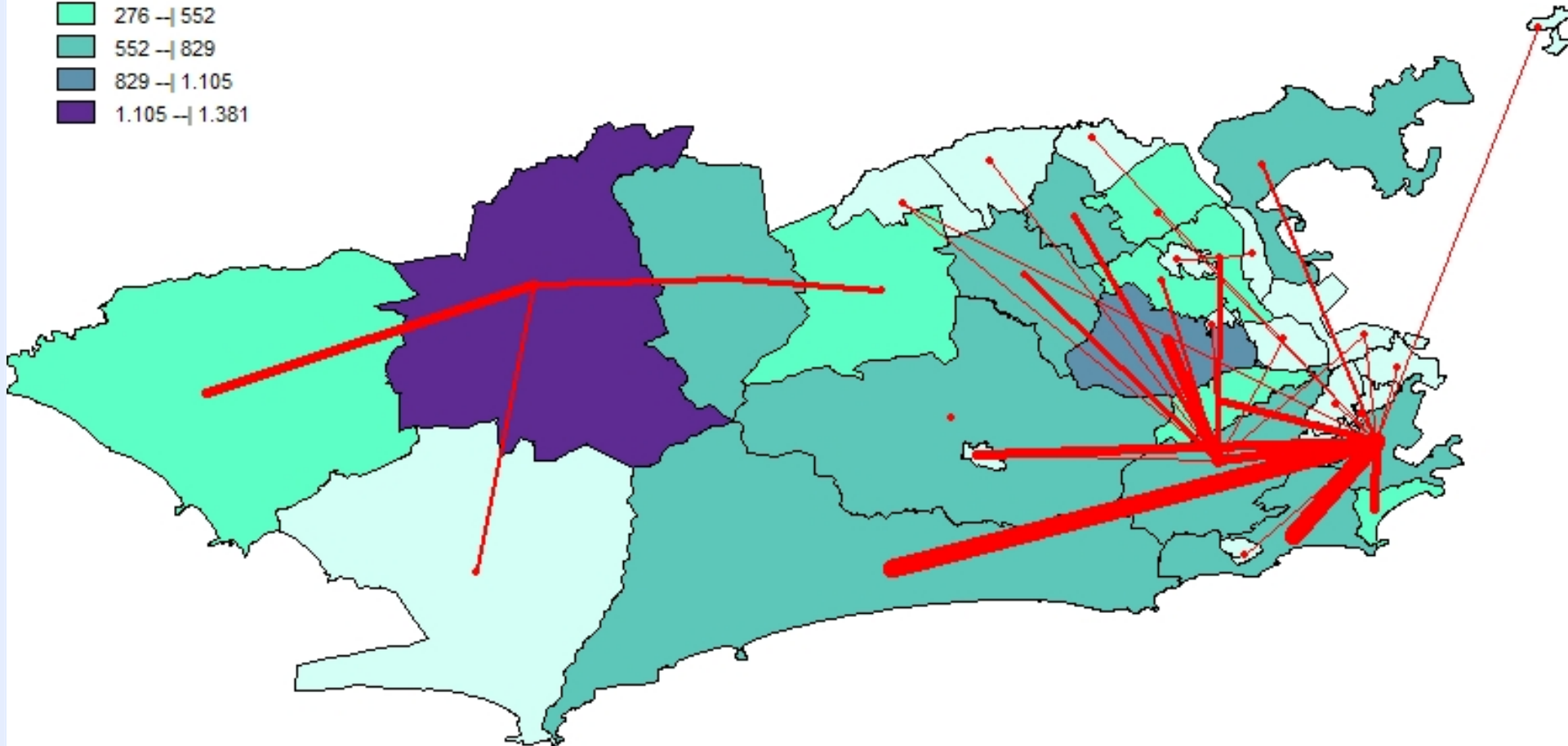
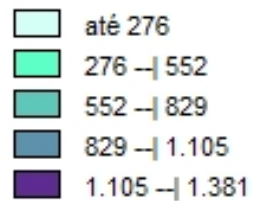
Maternity wards – Public System



- TabWin (Datusus) and Inpe

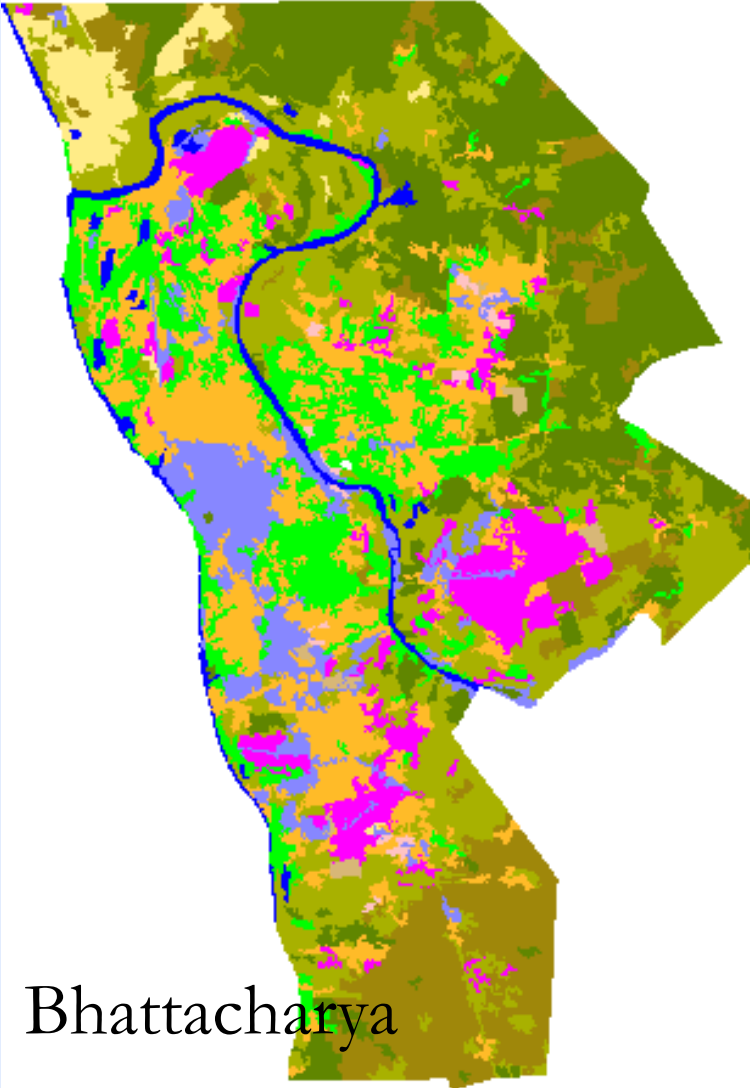
Maternity wards – Private System

Total



Satellite image:
the environment

Satellite in urban areas and vector borne disease



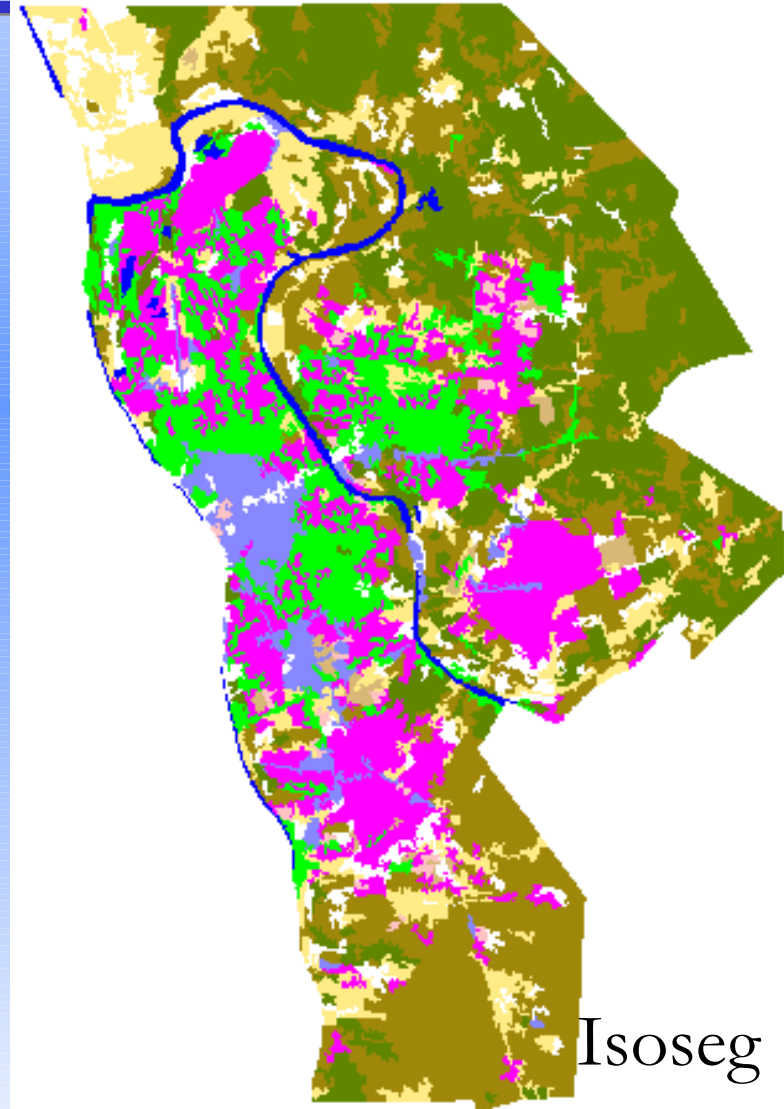
Bhattacharya

Low
resolution
for urban
areas

Data on
weather,
humidity

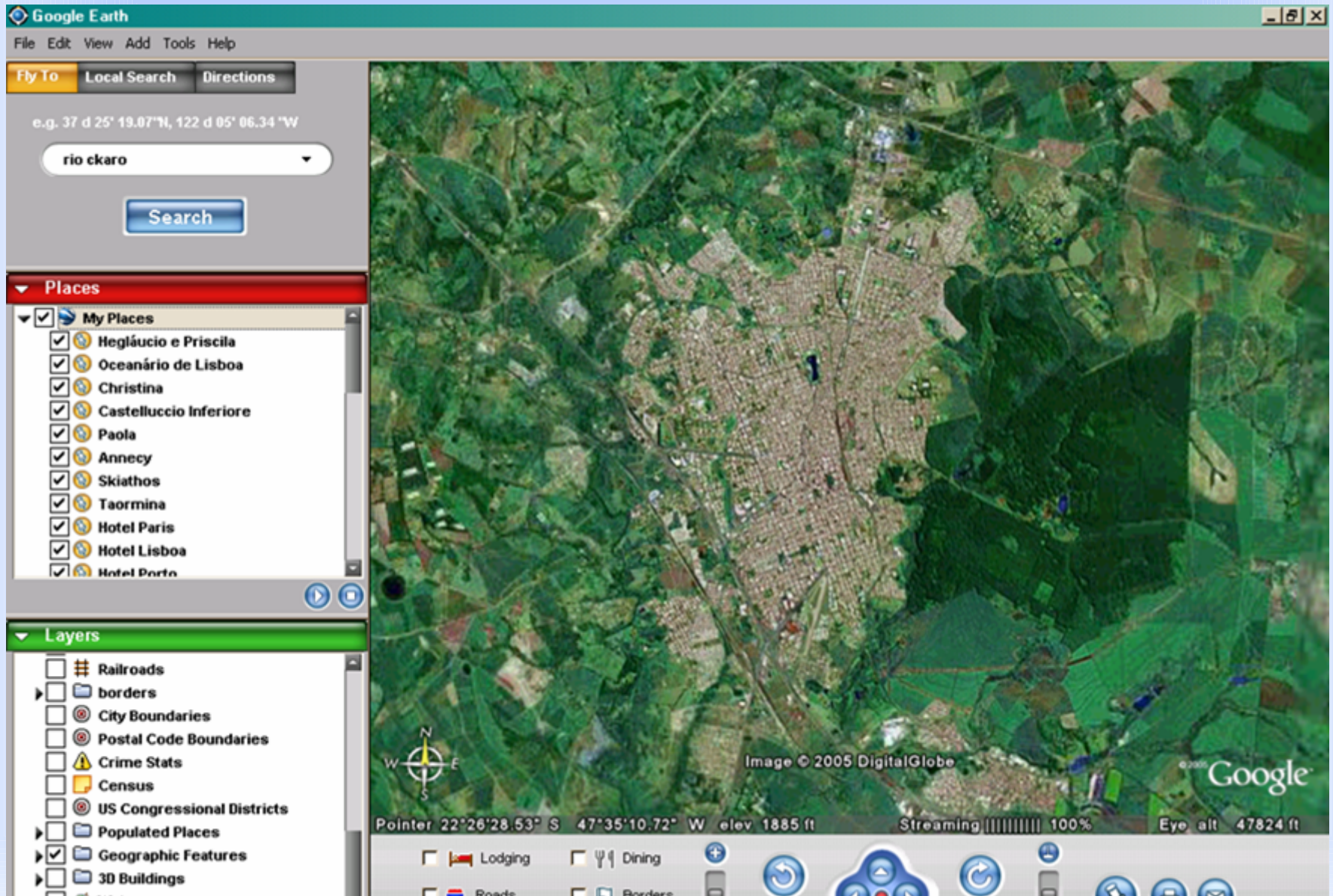
Terribly
difficult

Correia, 2005

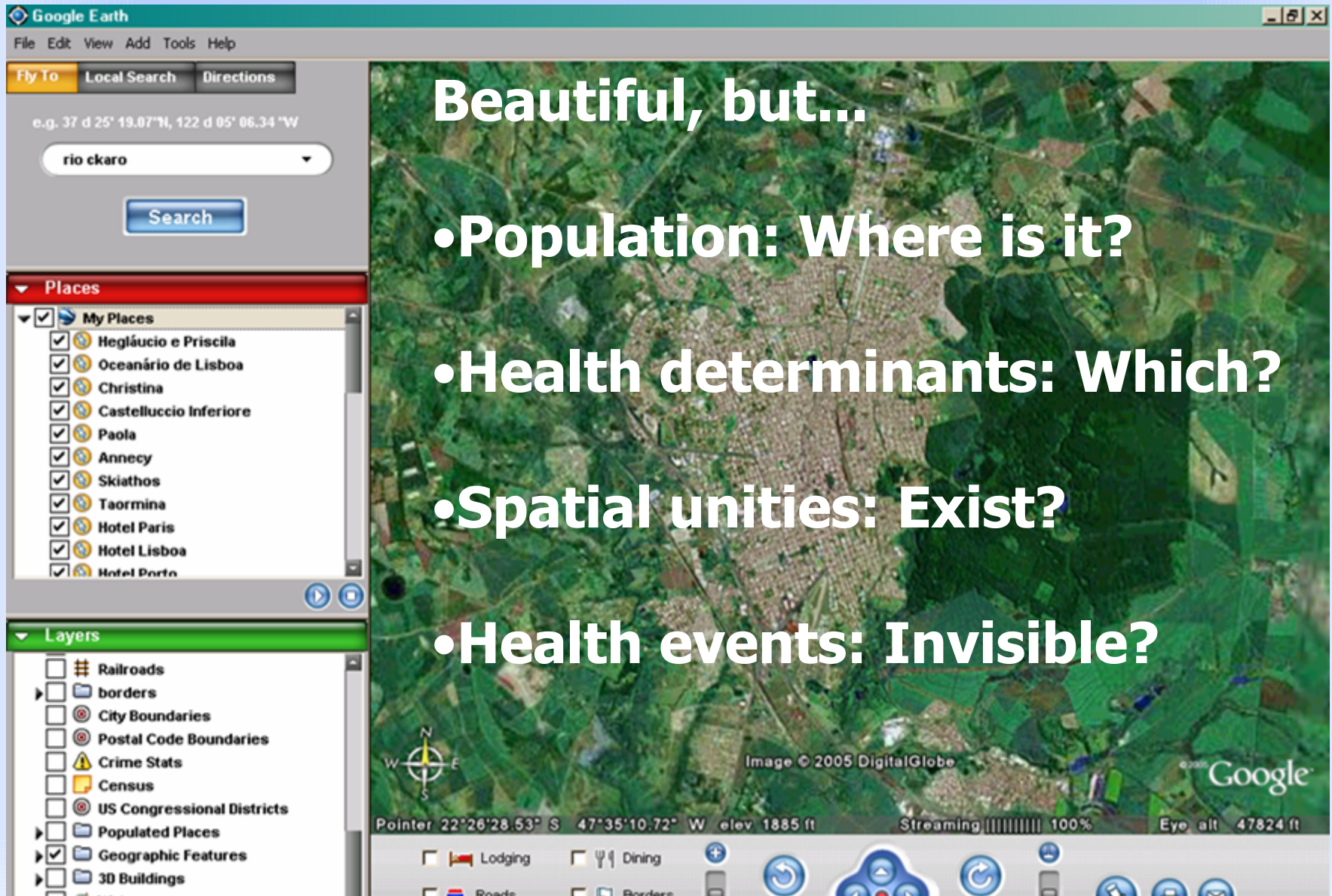


Isoseg

The Google revolution



The Google revolution



We need

- Dataware
- Software
- Specific technological and methodological development
- Peopleware

Data and Information

- Health events – our responsibility
- Health facilities localization
- Population and Socioeconomic indicators – IBGE (Brazilian Census Bureau)
- Routes – inter and intra-urban
- Environment – satellite (high resolution?)
- Climate – temperature, rainfall, humidity

ALL FREE

Free Software

- Terra
- Spring
- R (aRT)
- TabWin

Development of Technology

- Addressing system
- Adequate models
- Capacitation

We have been working...

(for about 15 years)

- RIPSAs – Health Information Network (joining all potential sources of health related information)
 - Geo working group:
 - A book – *“Introdução à análise de dados espaciais em saúde”*
 - Leaflets to Municipal Health Authorities;
 - Guidelines for address registration;
 - All Health Information Systems (SUS) can be analysed at municipal scale (maps available);
 - Software;
 - Courses

Peopleware: partnership

- Instituto Nacional de Pesquisas Espaciais:
 - Gilberto Câmara, Miguel Monteiro, Virginia Ragoni e ...
- IBGE
 - DGEO/CESTE: Daniel Skaba, Sonia Sterron e Paulo Cezar Martins
 - Dept Geografia: Evangelina Gouveia
- DATASUS
 - Ernani Bandarra e Claudia Risso

Universities....

- Estadual do Rio de Janeiro/IMS:
 - Guilherme Werneck
- Federal de Minas Gerais/LESTE:
 - Renato Assunção e equipe
- Federal da Bahia/ISC:
 - Florisneide Barreto,
Maria da Glória Teixeira
- University of Exeter:
 - Trevor Bailey
- Universidade do Rio de Janeiro - UNIRIO
 - Tereza Serrano Barbosa, Enirtes Melo
- Federal de Pernambuco/D.CAR:
 - José Luiz Portugal
- Universidade do Porto (PT)
 - Fátima Pina
- Federal do Paraná/D.EST:
 - Silvia Shimakura, Paulo Justiniano Ribeiro

And more....

- Students-partners (not referred elsewhere)
 - Débora Pellegrini
 - Eliana Bender (UFPel)
 - Francisco Santana
 - Franz Muñoz
 - Tatiana Campos (SMS-RJ)
 - Wagner Tassinari
 - Cláudio Bustamante Sá (in memorian)
 - Simone Santos

At home...

- Fundação Oswaldo Cruz
 - Salvador: Albert Ko e equipe
 - PROCC: Oswaldo G. Cruz, Claudia Codeço
 - CICT: Christovam Barcellos, Mônica Magalhães, Renata Gracie
 - ENSP: Reinaldo Souza-Santos, Carlos Osanai, Paulo Sabroza
 - Recife: Wayner Souza, Tiago Lapa, Fátima Militão, André Furtado, Leda Régis, Alice Varjal, Cynthia Braga, Constantino Silveira Jr e todos mais!

On development

- Large capacitation program, financed by the Health Ministry
 - Objective: training people at State and Municipal level in geo-related techniques
 - Includes:
 - Texts based on real life problems;
 - Practical exercises;
 - Based on TerraView & TabWin

Bancos de Dados

 BD_RJ_1995_Saude.mdb
 Bairros_95_pol
 KernalGRavAdolesc50columna
 TM_543

Vistas/Temas

☒ Pesquisa Bairros RJ 1995
☒ LandsatTM 345
☒ Bairros RJ - 1995
☐ LISA Map for Cesareas
☐ Not Significant
☐ 95%
☐ 99%
☐ 99,9%
☒ KernalGRavAdolesc50columna


	SPRAREA	SPRPERIMET	SPRROTULO	SPRNOME	BAIRROMA	NASCTOT	OBITNEO	OBPOSNEO	TAXATOT	TAXANEO	TAXAPOS	PROBNEO	PROBPOS	APGAR
1	1688035.25	7523.8003	101	101	TAUA	366	2	0	5.46	5.46	0	0.1	0.07	79.08
2	426304.875	2827.3655	102	102	MONERO	51	2	1	58.82	39.22	19.61	0.04	0.05	68
3	1647051.875	6309.5352	111	111	ACARI	710	5	4	12.68	7.04	5.63	0.06	0.41	68.04

Tabela: Bairros_95_pol - Tipo de tabela: TeAttrStatic - Coluna: SPRAREA - Tipo da coluna: TeREAL - Coluna é editável

Thank you