

Advances in geospatial analysis platforms and tools:

Creating space for differentiated policy and investment responses

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CSIR, Built Environment, Planning Support Systems

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Introduction

- The importance of **spatial dimension** in planning objectives
- Understanding of **complex spatial relationships**
- S.A policy focused on need for **aligned collaborative & coordinated targeted investment**
- Need for tools, methods & procedures to support collaborative, coordinated and integrated planning and decision-making
- Geo-information(GI) science and analysis to support planning analyses tasks and related decision making processes

Outline of presentation

1. SA planning context and challenges – need for enhanced understanding of the complex spatial dynamics of social, economic and environmental patterns within SA
2. Typical geo-science challenges
3. Targeted responses and collaborative innovations
4. Value and contribution – to support policy development, strategic planning and investment



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1. SA planning context and challenges

- Related to key government (MTSF) priorities
- Typical fields in which this work is situated
 - Service delivery and improved quality of life
 - Viable and resilient development in rural areas
 - Sustained economic growth and regional development
 - Challenges of rapid urbanisation and unprecedented urban growth
 - Improved governance – 3 spheres alignment

1. SA planning context and challenges ...

- Questions often asked / challenges raised when addressing development and policy priorities:
 - Where are settlements growing, where are service delivery backlogs increasing? Where will this happen in space?
 - What is the accessibility of various settlements to socio-economic opportunities and services?
 - How can governance and investment responses be coordinated in time and in space between three spheres, multiple departments, agencies of government?

1. SA planning context and challenges ...

- Need for enhanced understanding of complex dynamics of social, economic and environmental spatial patterns within South Africa:
 - Current magnitudes, past trends and future implications
 - To access and '**making sense**' in data scarce environments and capacity constrained contexts
 - To enable **temporal analysis** (given change in admin boundaries), cross border regional analysis, and cross-sector analysis

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1. SA planning context and challenges – need for enhanced understanding of the complex spatial dynamics of social, economic and environmental patterns within SA

2. Typical geo-science challenges

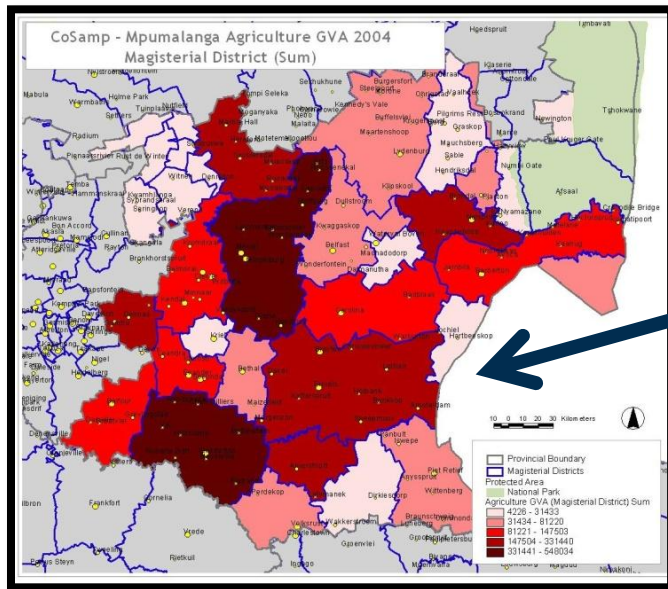
3. Targeted responses and collaborative innovations
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2. Geo-science challenges

- To enable more rigorous and spatially nuanced socio-economic data analysis to answer questions such as:
 - What is where? How much is where? How do these relate?
 - Spatial data availability and analysis on areas that are not bound by administrative areas - analysis across data sectors, scales, time and boundaries
- Ability to access and process large amounts of data and information for integrated planning purposes
- Easy communication, access to- and display of spatial data (visualisation) to answer specific policy questions
- Simulations of future trends

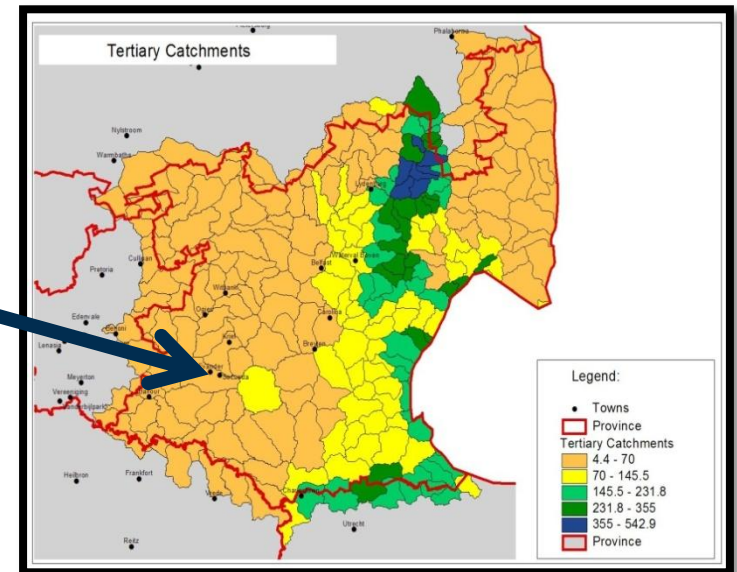
2. Geo-science challenges (...continued)

Example 1: Need to compare varying types of spatial data



Mpumulanga's *economic* statistics (per Magisterial District, 2001)

Absence of common analysis zones and databases – e.g. for comparing economic and other territorial statistics



Mpumulanga's *ecosystem* statistics (per water catchment)

2. Geo-science challenges (...continued)

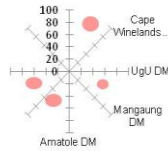
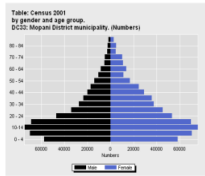
Example 2: Need for spatial data availability for IDPs

Data

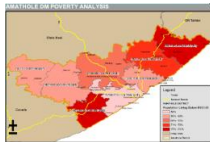
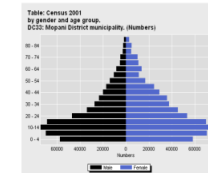
Analysis

Plan and
respond

Monitoring and
evaluation



- Critical Focus Areas
 - 2010 Footprint - new
 - Model Economic Development
 - Cluster Development (MSI & SMI)
 - Mobility and Connectivity (SPT)
- Continuity
 - Consolidation
 - Upgrade and Regeneration
 - Settlements
 - Opportunity Areas
 - Established areas
 - Conservation



gap

gap

gap

gap

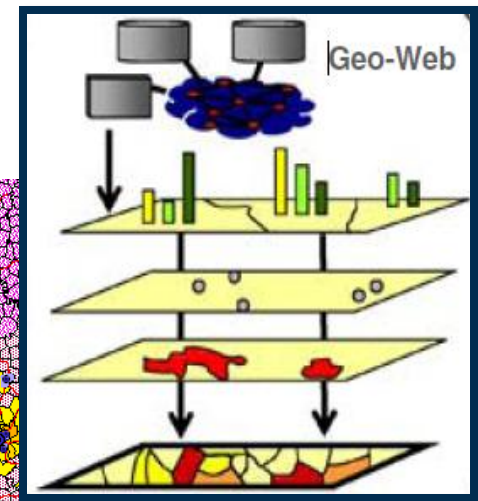
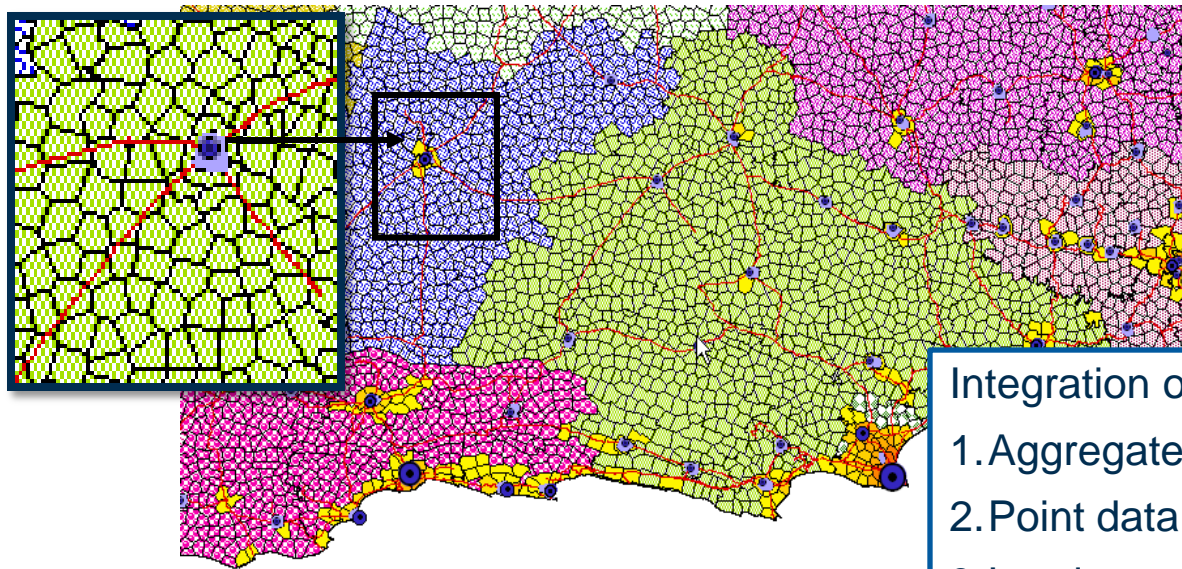
Data and analysis gaps leading to more serious gaps downstream...

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3. Targeted responses and collaborative innovations

- Geospatial Analysis Platform (GAP)
 - A demarcation of South Africa into more than 25 000 “mesozones” of approximately 50 km² in size (about 7 x 7 km), nested within important administrative and physiographic boundaries.
 - Analysis tools & aggregate data

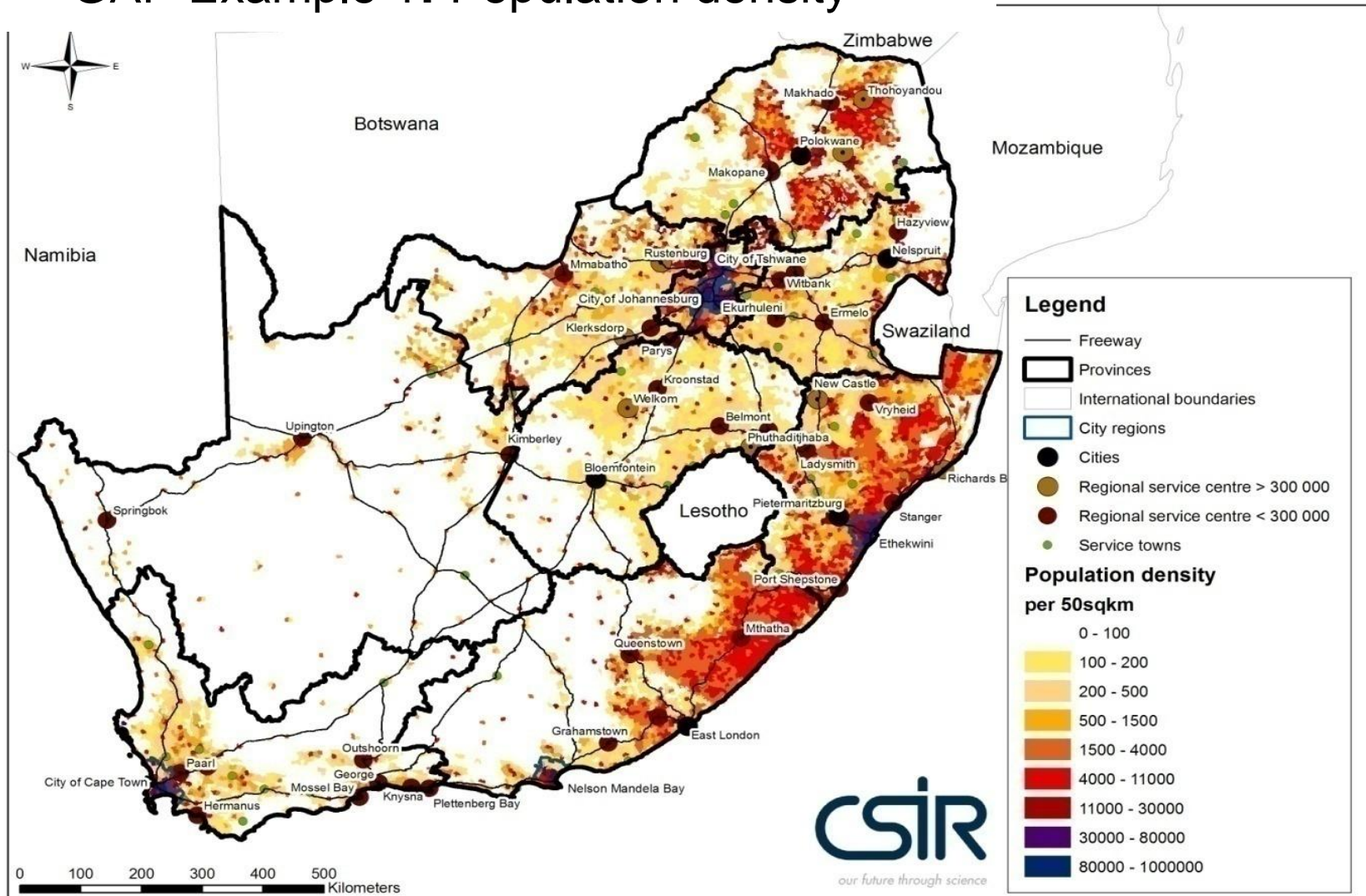


Integration of:

1. Aggregate area statistics,
2. Point data (e.g. facilities per town)
3. Land cover data (from satellite imagery)

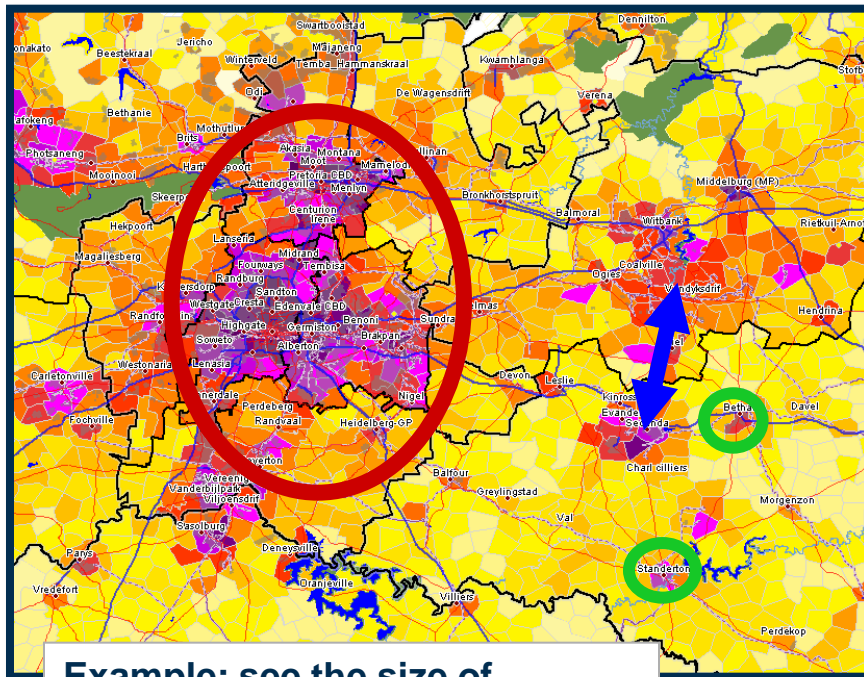
3. Targeted responses and collaborative innovations (...continued)

- GAP Example 1: Population density



3. Targeted responses and collaborative innovations (...continued)

- GAP Example 2: Regional economic context

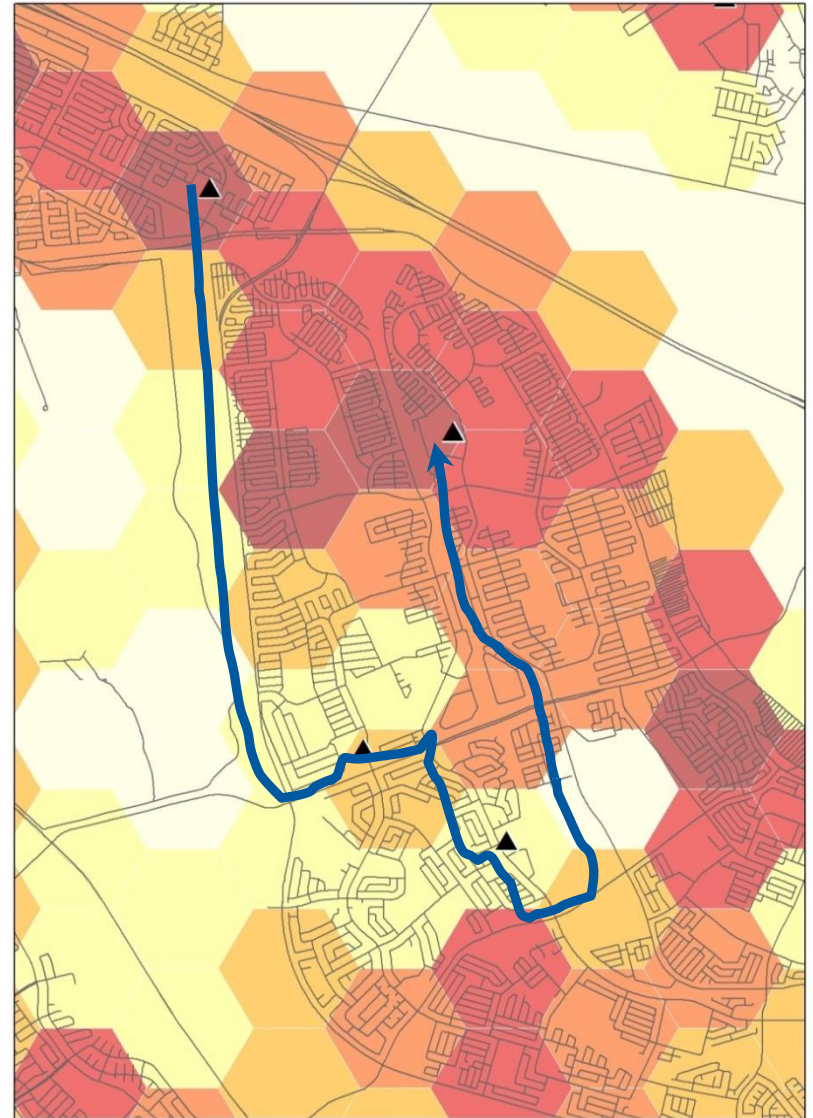
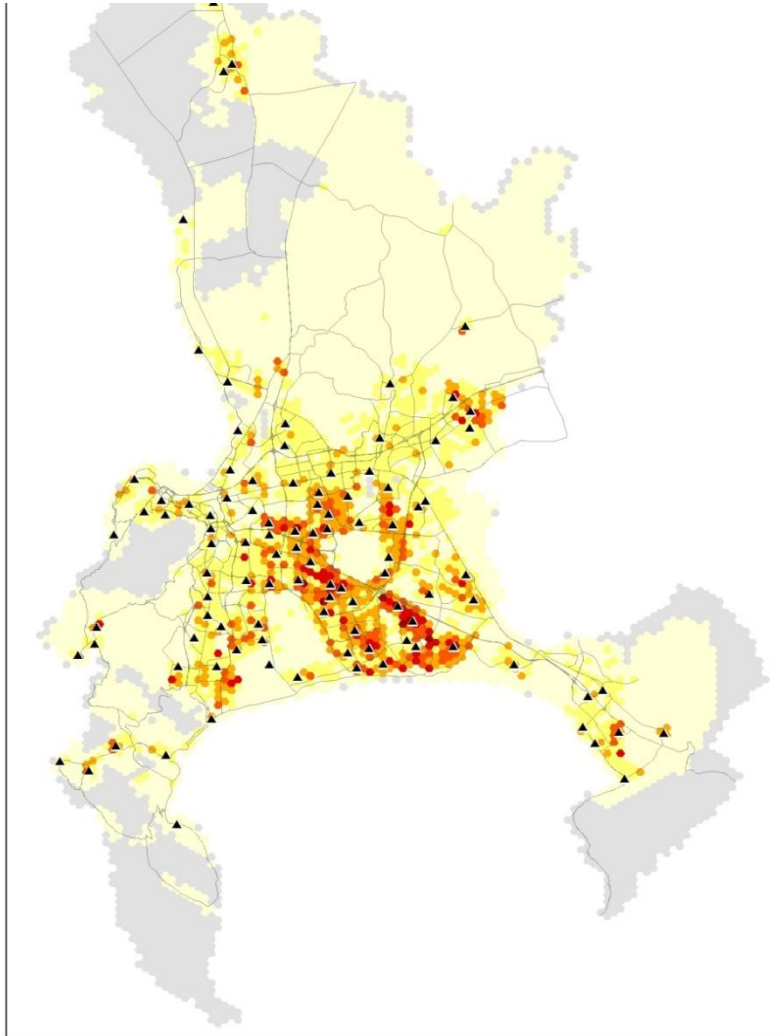


Example: see the size of Gauteng's economy versus (1) the Witbank area and (2) smaller nodes in rural areas to the east.

- Role of area in broader functional region,
- relative size / importance of e.g. economic activity and poverty in relation to country as a whole,
- opportunities and threats in nearby and further away localities

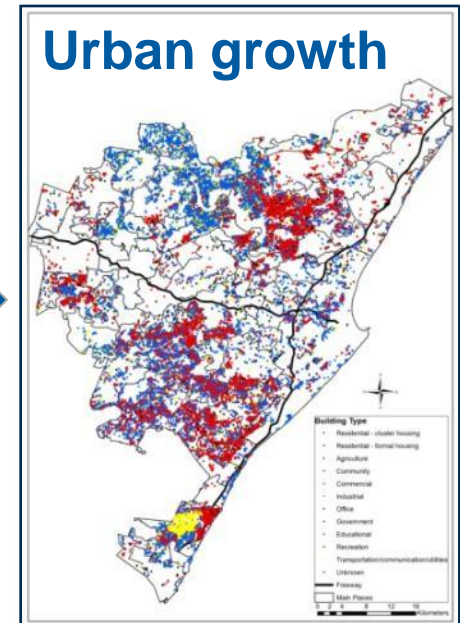
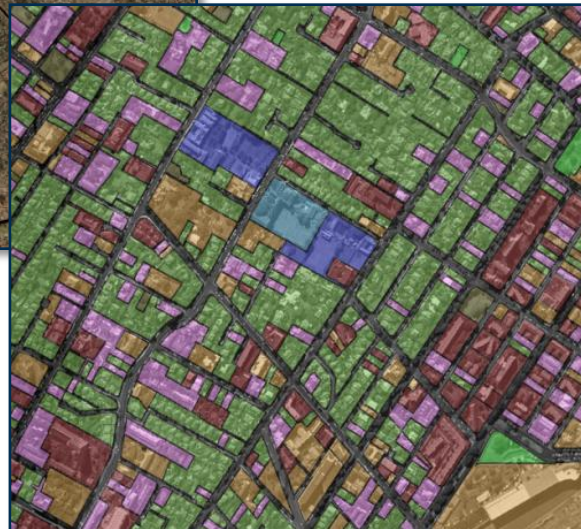
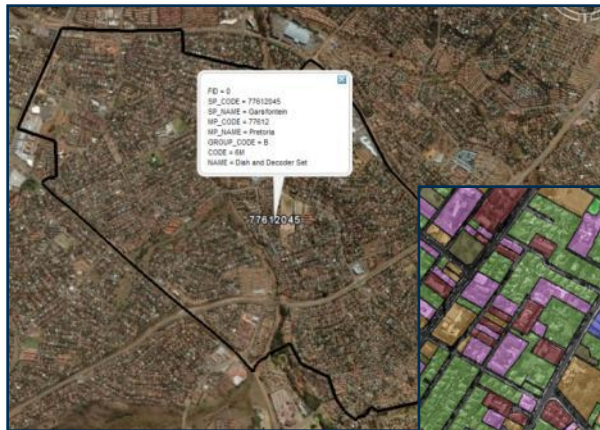
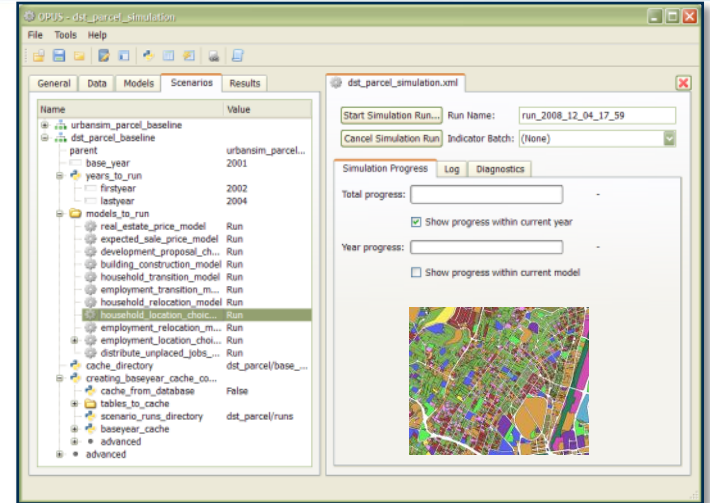
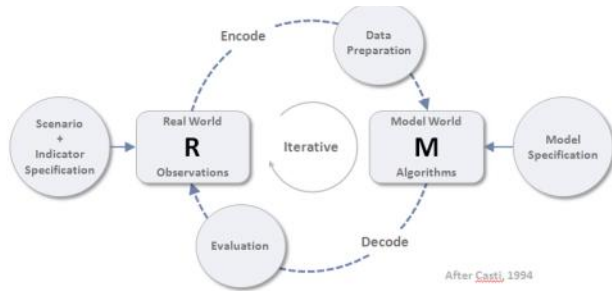
3. Targeted responses and collaborative innovations (...continued)

- Spatial Relational Analysis



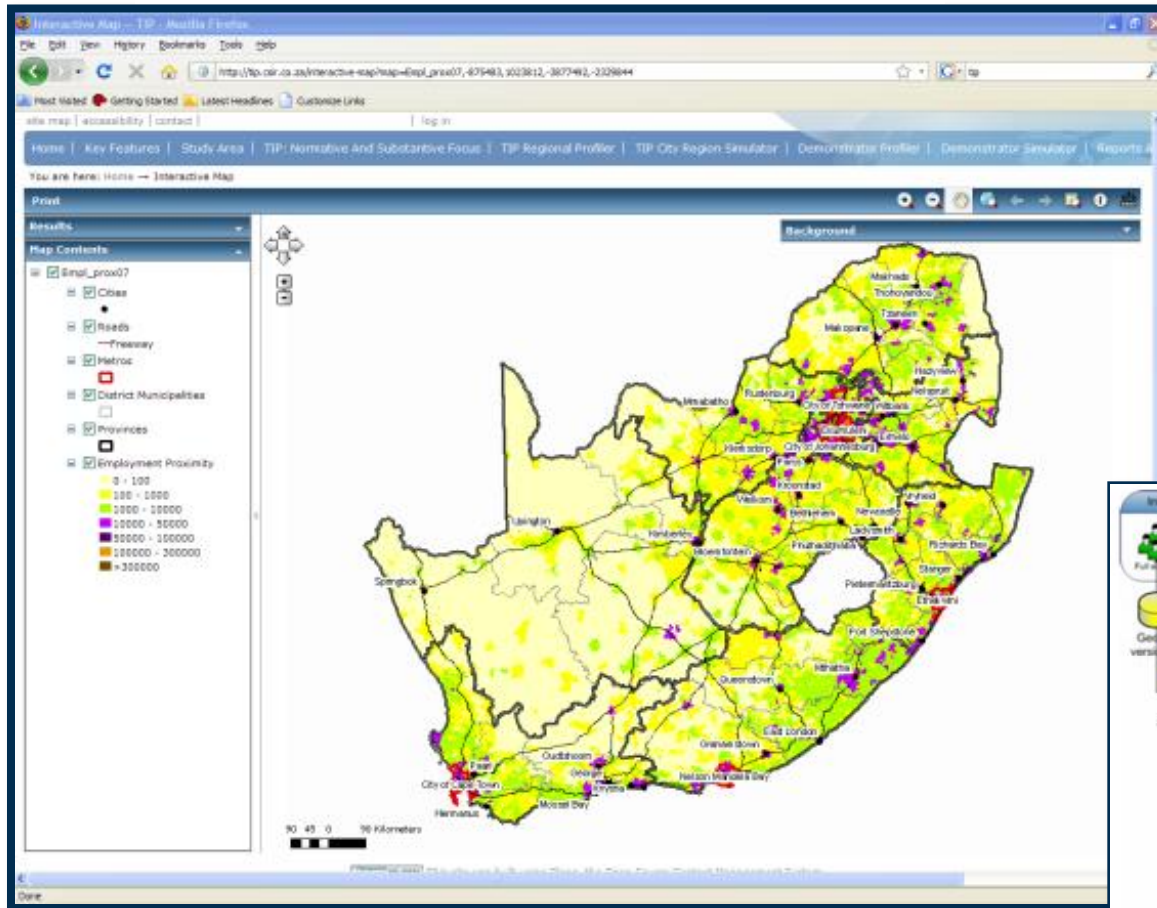
3. Targeted responses and collaborative innovations (...continued)

- Simulation and modeling



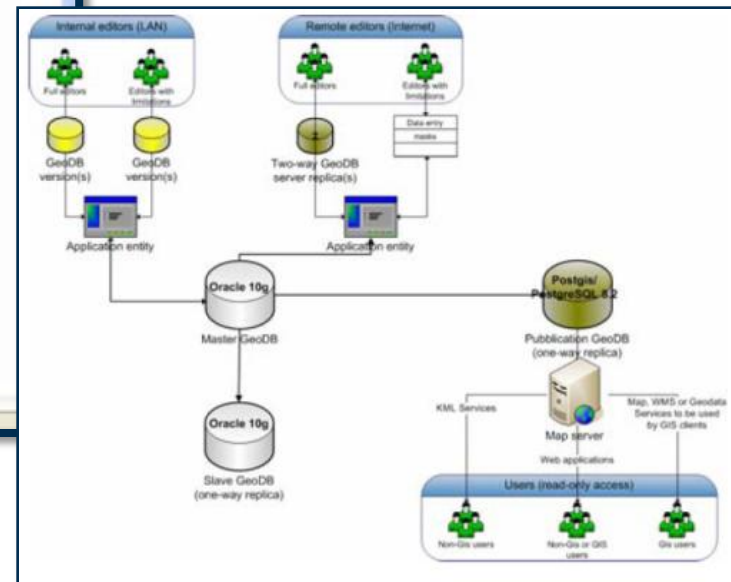
3. Targeted responses and collaborative innovations (...continued)

- Web portals



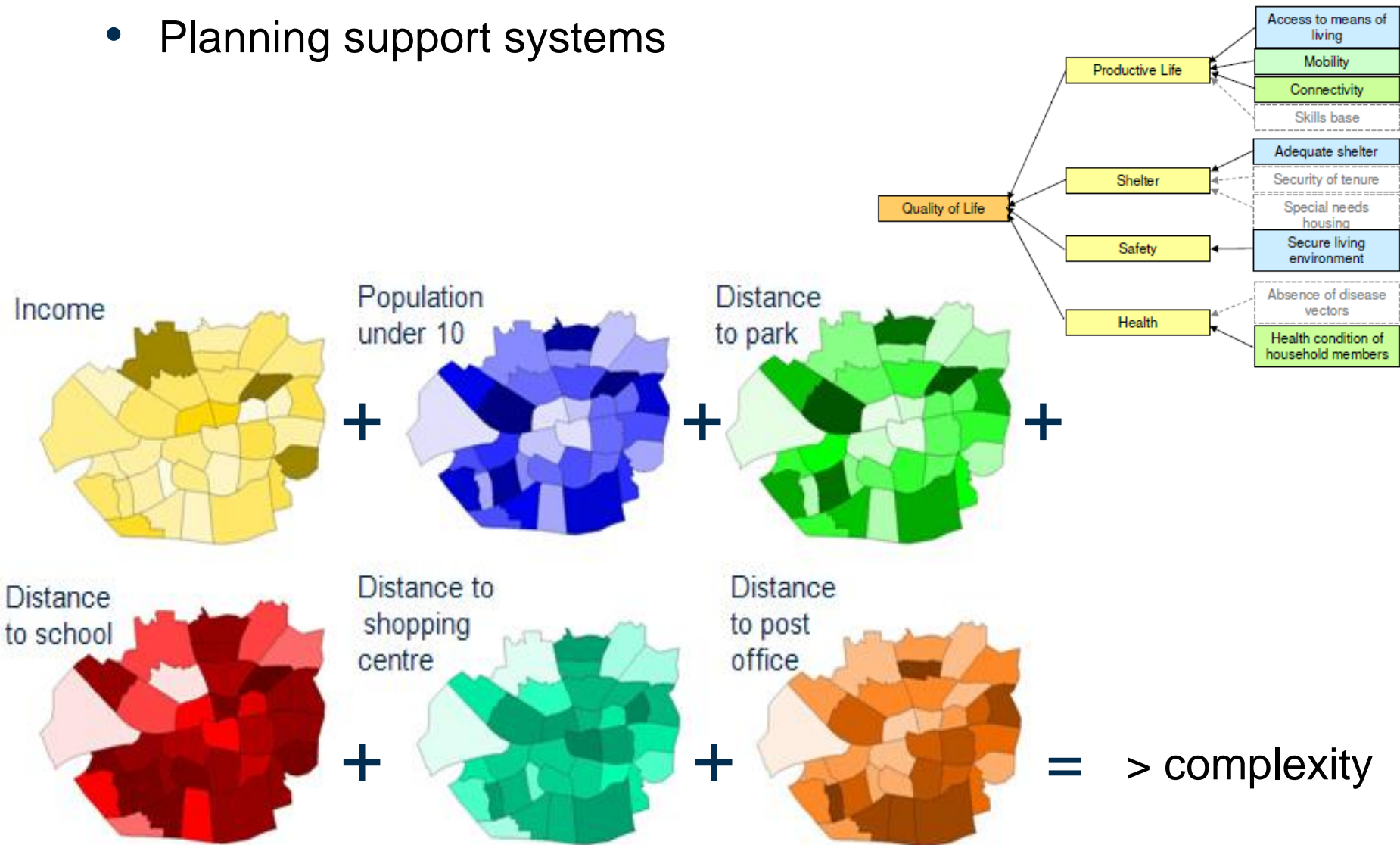
- Web-based portals that provide:

- Interactive maps
- Tables
- Databases
- Frameworks



3. Targeted responses and collaborative innovations (...continued)

- Planning support systems



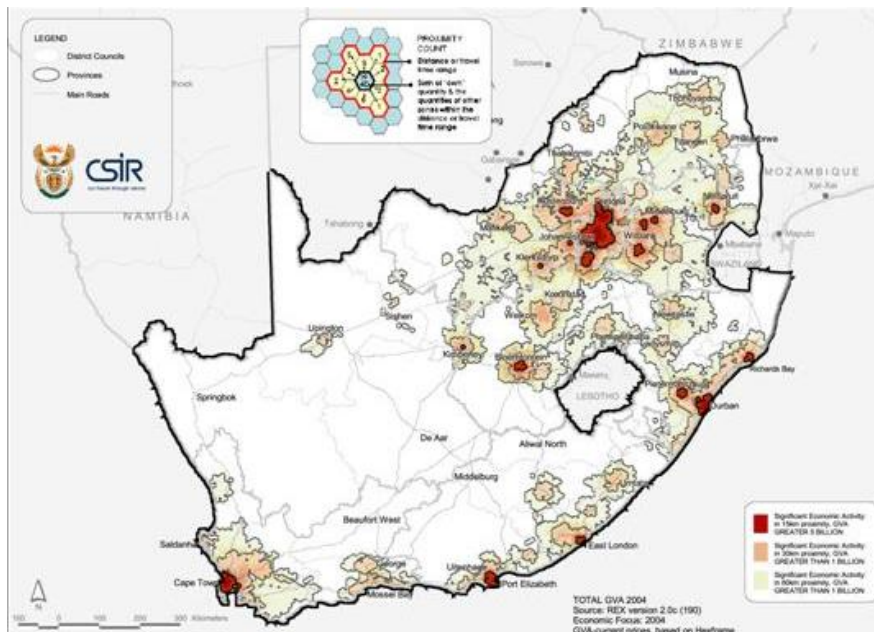
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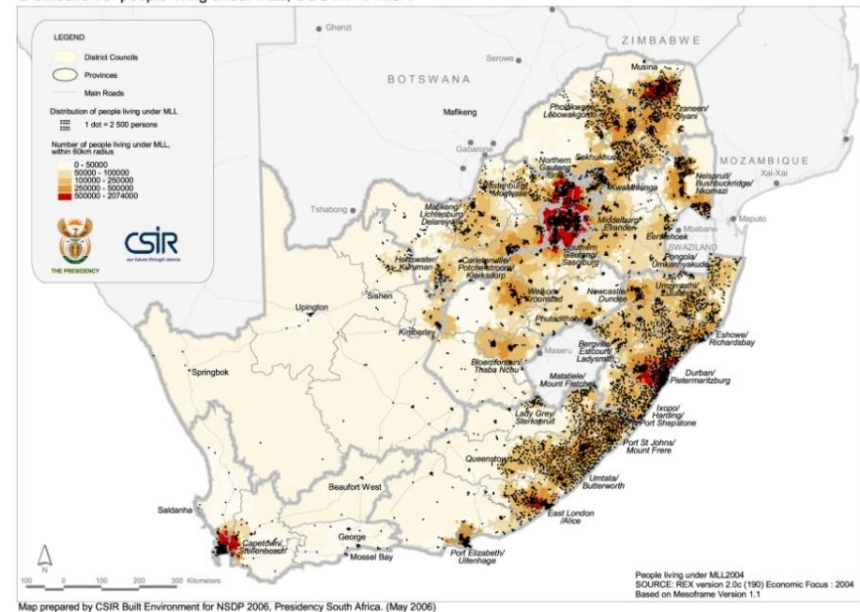
4. Value and contribution

Example 1: National Spatial Development Perspective

- Developed with The Presidency
- Need: Inform strategic plans, guide infrastructure investment decisions (Areas of national economic significance and concentrations of people living in poverty)
- Innovation: Use geospatial platform & spatial relational analysis, aggregated data
- Value: Strategic planning guidance for national, provincial, local spheres. Rolled out to all 9 provinces, all district and metro municipalities



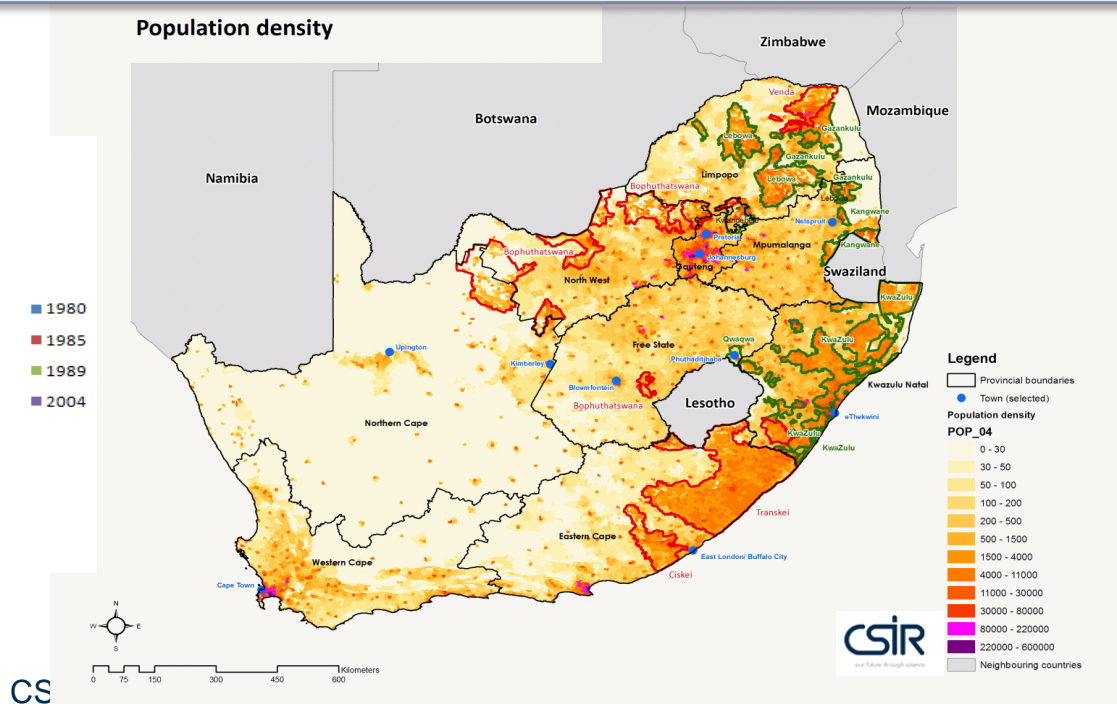
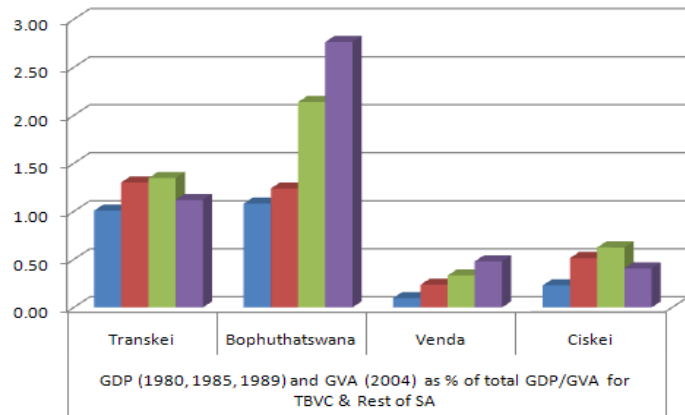
Distribution of people living under MLL, SOUTH AFRICA



4. Value and contribution

Example 2: Policy question: Former Bantustan areas

- **Developed** on request of The Presidency (2009)
- **Need:** To determine the progress in quality of life of former Bantustan areas, compare development indicators
- **Innovation:** GAP, aggregated data, spatial relational analysis to compare data over time, in spite of no data capturing on former borders since 1994
- **Value:** Address policy question re. Comparative development between the former Bantustan areas and the rest of SA



4. Value and contribution

Example 3: Toolkit for Integrated Planning (TIP)

- Developed collaboratively with DST, HSRC & municipalities
- Need: Support IDPs & SDFs & sector plan development
Access to all local and district municipalities in country
- Innovation: Spatial planning information web/portal
- Value: Address spatial planning data and analysis gap
Capacity building

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Navigation

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 - Land supply and household settlement pattern in City Region?
 - Travel implication for city region as a whole?
 - Travel time variations across the city region?
 - Local scale travel implications?
- Reports and Documents
- Disclaimer

Search

Search Site

Advanced Search...

Attention Please allow no further changes to data. The portal is undergoing a migratory phase. Thank you for your patience.

Regional population movements?

What are the predicted changes in inter-regional population movements, if population follow job opportunities to a greater extent?

Given the strong national or inter-regional influences on sub-national or regional economic, demographic and built environment trends, a *prototype regional growth simulator* has been developed for the country as a whole. Stated very briefly, it attempts to model inter-regional migration flows as a function of differences in employment and associated livelihood prospects, as well as a range of variables that relate to the type of local

municipality (see map).

Legend

Towns

- Mean
- 0 - 1 Std. Dev.
- 1 - 2 Std. Dev.
- 2 - 3 Std. Dev.
- > 3 Std. Dev.

LM typology

- Metropolitan areas
- Metro functional areas
- Outer core/ secondary nodes
- Intermediate periphery
- High density periphery
- Low density periphery

Peripheral nodes/ resource frontiers

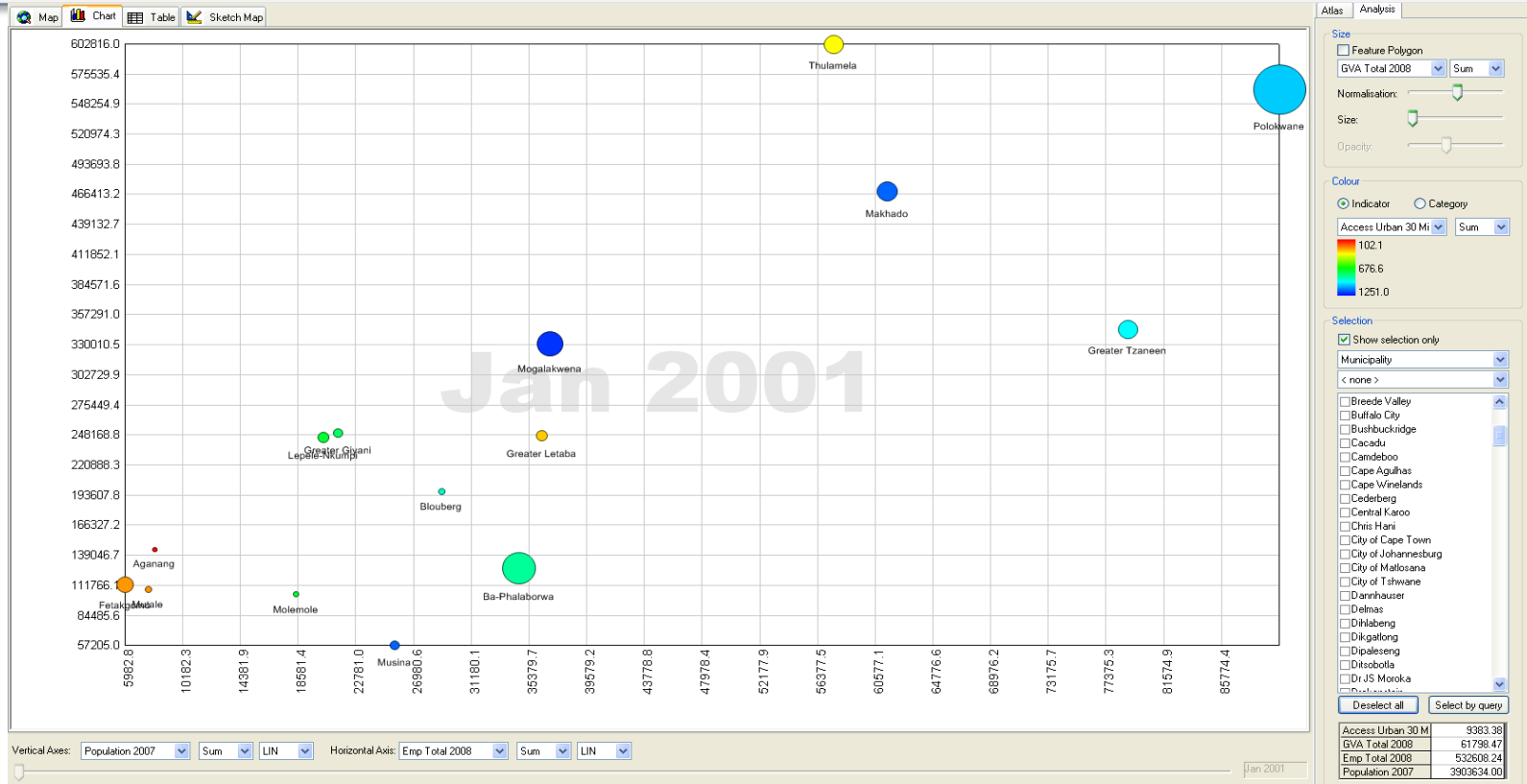
provincial boundaries 2006

Date: 24 June 2008

4. Value and contribution

Example 4: LEDET geo-spatial medium client

- **Developed for Limpopo Economic Development and Tourism (LEDET)**
- **Need: Ability to view multiple data dimensions**
- **Innovation: Medium client integrating background mapping with live layers that can be compared, can initiate remote (server) processing for inclusion to data parcel**
- **Value: Serves as a delivery mechanism (where no GIS tools are available)**



Conclusion

- Proven **need** for evidence-based planning
- **Significant progress** made in geo-science innovations over last few years, within CSIR and within domain
- Highly data intensive, thus urgent need for better data management, sharing and access by all stakeholders
- **Importance of collaborative innovations**, that require innovative solutions and has specific value
- Geo-science innovations (spatial data, analysis planning support systems) **not the only answer** but can contribute significantly
- **Advances in geo-science can create ‘space’ for differentiated policy and investment responses**

Thank you

For more information:

www.csir.co.za/Built_environment/Planning_support_systems

