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MONITORING AND EVALUATION OF POLICIES – THE ROLE OF SUPPORT TOOLS FOR SPATIAL DECISION SUPPORT SYSTEM APPLIED TO PORTUGUESE CASE

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Structure:

1. Spatial Decision Support Systems (SDSS) in urban planning

2. SPOTIA project – an application
   
   2.0. Presentation of SPOTIA project
   
   2.1. Consultation Platforms for diagnosis, planning and evaluation phases
   
   2.2. WEBGIS as dynamic and user-friendly monitoring system
   
   2.3. Geographical modelling as a tool to reinforce the decision-making process

3. Final remarks
1. SPATIAL DECISION SUPPORT SYSTEMS (SDSS) IN URBAN PLANNING

The need for a deeper knowledge associated with the planning and evaluation

Factors of pressure in the decision process

- More dynamique and complex processes observed in the territory, population and economy
- Market economies, public entities that implement the plans tend to adopt increasingly criteria of effectiveness and efficiency
- Crisis contexts require to rethink the effectiveness and efficiency planning
- Participatory process

In this regard, the decision making has been enhanced:
- Improvement of information technology and analytical methods of information;
- Considerable increase in the quantity and quality of information available;
- More friendly-use for stakeholders and community, among others. Greater participation of stakeholders and the community at different stages of planning;
- Strengthening monitoring and evaluation systems planning;
- Including the value "transparency" in the decision-making process
1. SPATIAL DECISION SUPPORT SYSTEMS (SDSS) IN URBAN PLANNING

• Origins and objectives:
  • The Decision Support Systems (DSS) appear at the end of the 1960s
  • But Space Systems Decision Support (SSDS) come in the late 1980s
  • come in to solving complex problems where there are conflicts between sectors and options as well as the difficulty of interaction between decision-makers and solution processes

  (Budie, 1994).

• A SEAD has three basic components:
  • a database;
  • an information analysis tools and establishment of models, including those that enable the development of scenarios;
  • and web mapping viewer which incorporates the above components

## Planning Phases

<table>
<thead>
<tr>
<th>Planning Phases</th>
<th>Technologies and their relevance in Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem and objectives definition</td>
<td>• Collection of information, sources of spatial information and it’s changes</td>
</tr>
<tr>
<td>2. Data collection</td>
<td>• Collection of information, sources of spatial information and it’s changes</td>
</tr>
</tbody>
</table>
| 3. Data analysis                       | • Store, manipulate and analyse physical, social and economic data  
                                         • Mapping function to analyse the actual situation  
                                         • Identify conflict areas through the overlay of data |
| 4. Modelling and Projection            | • Projection of future (ex. population, economic growth)  
                                         • Estimate the impact of possible trends (ex. future demand of land resources)  
                                         • Model different scenarios and formulate different planning options |
| 5. Development of Planning Options     | • The spatial optimization models with GIS – maximize or minimize some functions  
                                         • Simulation of different scenarios, integration of cellular automata, location-allocation models find optimal locations of public facilities, multi-criteria decision analysis could consider multiple criteria in deriving different planning options |
| 6. Selection of Planning Options       | • Majorly a political process, where planners could provide technical inputs to reinforce the decision-making |
| 7. Plan Implementation and Monitoring  | • Evaluate and minimize environmental impact, for programming and monitoring land development, automate the planning office, enable more consistent decision making in development control |
| 8. Plan Evaluation, and Feedback       | • Monitor and evaluate changes and dynamics as in land use and if that dynamic correspond to the planned  
                                         • It could help to develop adjustments to the plan |

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Adapted Yeh (2008)
2. SPOTIA PROJECT – AN APPLICATION

2.0. PRESENTATION OF SPOTIA PROJECT


SPOTIA Project – main goals:

I. to analyse the coherence between Portuguese territorial policies in a multiscale perspective;

II. to identify, collect and analyse the most relevant indicators for the policy areas at national and regional scale;

III. to analyse the impacts that mega-projects have or supposed to have on territory, population and economy – Ex. Multipurpose Alqueva Project

IV. to develop a Spatial Decision Support System (SDSS), through a collection of several tools, that support decision-making respecting to territorial problems.
The coherence between instruments

- Cohesion Policy
- Spatial Strategies
- Framework Programmes

Main objectives of the National and Regional Strategies
Main objectives of the National and Regional Operational programmes
2. SPOTIA PROJECT – AN APPLICATION

2.0. PRESENTATION OF SPOTIA PROJECT

SDSS, with the main goal to become it in a more coherent planning system, that are in course the following methodological experiences in SPOTIA Project:

- Consultation Platforms for diagnosis, planning and evaluation phases;
- WEBGIS as dynamic and user-friendly monitoring system, and;
- Geographical modelling as a tool to reinforce the decision-making process.

BUT BEFORE WE NEED THE INFORMATION TO SUPPORT a), b) and c)
<table>
<thead>
<tr>
<th>Phases and functions of planning</th>
<th>Tasks</th>
<th>SPOTIA Project activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Identification of the context/ start reality</td>
<td>- Identify the main demographic, economic, environmental and socio-cultural changes;</td>
<td>1.1 WEBGIS - Main themes: Agriculture, energy, Economy, Housing, Mobility, Population, Scholar network, Health network, Tourism;</td>
</tr>
<tr>
<td>- Identification of the problems and it`s causes</td>
<td>- Identify the main problems and SWOT* presented by all territorial instruments</td>
<td>1.2 WEBGIS - Land use dynamic (CLC 1990, 2000, 2006);</td>
</tr>
<tr>
<td>- Identification of the several instruments of the national planning system</td>
<td>- Identify the main territorial changes</td>
<td>1.3 Consultation platform of the problems and SWOT identified in the main national and regional planning instruments;</td>
</tr>
<tr>
<td></td>
<td>- Create different scenarios to reinforce the policy options</td>
<td>1.4. Consultation platform of the main reports of the national planning instruments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5. Geographical modelling to create scenarios</td>
</tr>
<tr>
<td><strong>2 Planning and Policy Implementation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 External coherence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Identification of the expected actions/changes in the several instruments that comprises the general structure of territorial planning</td>
<td>- Consult the expected goals for a particular instrument in the context of the national planning system (both territorial and sectoral approach), considering the objectives, the actions and the agents</td>
<td>2.1.1 Consultation platform of the objectives, measures, actions, indicators of the planning instruments organized by domains and/or agents and/or instruments;</td>
</tr>
<tr>
<td>- Identification of the results of the last planning cycle and/or the best experiences to determinate the problems and solutions</td>
<td></td>
<td>2.1.2 Network analyses based on the agents that should respond to the planned objectives;</td>
</tr>
<tr>
<td>2.2 Internal coherence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Analyse the coherence among the diagnosis and the expected plan/programme</td>
<td>- Develop an internal analysis between diagnosis and plan goals, plan and indicators, diagnosis and indicators</td>
<td>2.2.1 Exercises of internal coherence to answer to the main planning concepts: sustainability, territorial cohesion, regional competitiveness, etc.</td>
</tr>
<tr>
<td><strong>3 Evaluation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Confront the expected goals with the executed programmes</td>
<td>- Resume of the executed or non-executed project and/or objectives and understand what and where are the main difficulties</td>
<td>3.1 Analysis of the approved projects of NSRF 2007-2013 (quantitative analysis and WEBGIS)</td>
</tr>
<tr>
<td>- Identification of the new reality</td>
<td>- Monitoring and evaluation</td>
<td>3.2. Geographical modelling for monitoring and evaluation</td>
</tr>
</tbody>
</table>
2. SPOTIA PROJECT – AN APPLICATION

2.0. PRESENTATION OF SPOTIA PROJECT

Spatial Data Base (classical)
- Statistical information, to produce diagnosis;
- Level of execution of instruments in the National Framework Programme 2007-2013

Analitical/Non-Spatial Data Base (innovation)
- Data base supported in the main instruments (composed by items: diagnosis, objectives, priorities, actions, indicators)

TOOL that allow:
- To consult instruments;
- To verify the level of relevance and coherence
The first step - selection of the instruments and their classification regarding the scale and scope of activity

National planning system

Methodology to verify relevance and coherence in four steps:
1. - the first step corresponds to the selection of instruments;
2. - the second step corresponds to the validation of each instrument relevance;
3. - the third step consists of the selection of the indicators associated with the previous analyses. 
4. - the fourth step corresponds to the coherence analysis between the various instruments;

Focused documents:

National scale / Guiding approach:
-   PNPOT – National Territorial Strategy
-   ENDS – National Sustainable Development Strategy

National scale / Financing approach:
-   QREN - National Strategic Reference Framework (Territorial Enhancement Operational Programme)

Regional scale / Guiding approach : 
-   Regional Spatial Plan

Regional scale / Financing approach:
-   Regional Operational Programmes
Organisational structure of plans/programmes

Multiscalar analysis between instruments ONE EXAMPLE

ENDS
- Diagnosis
- Objectives
- Strategic Priorities
- Vectors
- Reference measures
- Indicators

PNPOT
- Diagnosis
- Strategic Objectives
- Specific Objectives
- Measures

PROT-Lisbon Metropolitan Area
- Axes
- Components
- Action lines
- Key Objectives
- Strategic options
- Indicators/targets
- Special rules

Lisbon and Tagus Valley Regional OP
- Prioritary axes
- General Objectives
- Specific Objectives
- Intervention Action
- Indicators

Selection of common levels
### List of “descriptors”
**National Strategic Reference Framework Priority Themes**

<table>
<thead>
<tr>
<th>Priority themes of QREN</th>
<th>SPOTIA Thematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and technological development, innovation and</td>
<td>1.1. Economy and business</td>
</tr>
<tr>
<td>entrepreneurship</td>
<td>1.2. Research, Technological Development and Innovation</td>
</tr>
<tr>
<td>Information Society</td>
<td>1.3. Information Society and ICT</td>
</tr>
<tr>
<td>Transport</td>
<td>4.4. Transport, Mobility and Accessibility</td>
</tr>
<tr>
<td>Energy</td>
<td>3.2. Energy</td>
</tr>
<tr>
<td>Environmental protection and risk prevention</td>
<td>3.1. Agriculture, Forestry and Industry</td>
</tr>
<tr>
<td></td>
<td>4.6. Land management</td>
</tr>
<tr>
<td></td>
<td>3.3. Sanitation and water</td>
</tr>
<tr>
<td></td>
<td>3.4. Risks</td>
</tr>
<tr>
<td></td>
<td>3.5. Environment</td>
</tr>
<tr>
<td>Tourism</td>
<td>1.5. Tourism</td>
</tr>
<tr>
<td>Culture</td>
<td>2.4. Culture and heritage</td>
</tr>
<tr>
<td>Urban and rural regeneration</td>
<td>4.1. Development of Urban System and urban areas</td>
</tr>
<tr>
<td></td>
<td>4.2. Development of rural areas</td>
</tr>
<tr>
<td>Adaptability of workers and firms, enterprises and</td>
<td>2.2. Education, lifelong training and qualification</td>
</tr>
<tr>
<td>entrepreneurs</td>
<td></td>
</tr>
<tr>
<td>Access to employment and sustainability</td>
<td>1.4. Employment and labor market</td>
</tr>
<tr>
<td>Social inclusion of less-favoured people</td>
<td>2.1. Social inclusion / exclusion</td>
</tr>
<tr>
<td></td>
<td>2.2. Education, lifelong training and qualification</td>
</tr>
<tr>
<td></td>
<td>2.3. Health</td>
</tr>
<tr>
<td></td>
<td>2.5. Housing</td>
</tr>
<tr>
<td>Improving Human capital</td>
<td>4.5. Public Administration</td>
</tr>
<tr>
<td>Investment in social infrastructure</td>
<td>2.2. Education, lifelong training and qualification</td>
</tr>
<tr>
<td></td>
<td>2.3. Health</td>
</tr>
<tr>
<td></td>
<td>4.3. Equipments and infrastructures</td>
</tr>
<tr>
<td>Mobilisation for reforms in the fields of employment and</td>
<td></td>
</tr>
<tr>
<td>inclusion</td>
<td></td>
</tr>
<tr>
<td>Reduction of additional costs hindering the outermost regions development</td>
<td></td>
</tr>
</tbody>
</table>
This step corresponds to the coherence analysis between the several instruments.

### Strategic Objectives
- **Economy and business**
- **Research, Technological Development and Innovation**
- **Information Society and ICT**
- **Employment and labor market**
- **Tourism**

### Specific Objectives
- **Social inclusion / exclusion**
- **Education, lifelong training and qualification**
- **Health**
- **Culture and heritage**
- **Housing**

### Codification by descriptors

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Specific Objectives</th>
<th>Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMIOP/01</td>
<td>Economy and business</td>
<td>PMIOP/01</td>
</tr>
<tr>
<td>PMIOP/02</td>
<td>Research, Technological Development and Innovation</td>
<td>PMIOP/02</td>
</tr>
<tr>
<td>PMIOP/03</td>
<td>Information Society and ICT</td>
<td>PMIOP/03</td>
</tr>
<tr>
<td>PMIOP/04</td>
<td>Employment and labor market</td>
<td>PMIOP/04</td>
</tr>
<tr>
<td>PMIOP/05</td>
<td>Tourism</td>
<td>PMIOP/05</td>
</tr>
<tr>
<td>PMIOP/06</td>
<td>Social inclusion / exclusion</td>
<td>PMIOP/06</td>
</tr>
<tr>
<td>PMIOP/07</td>
<td>Education, lifelong training and qualification</td>
<td>PMIOP/07</td>
</tr>
<tr>
<td>PMIOP/08</td>
<td>Health</td>
<td>PMIOP/08</td>
</tr>
<tr>
<td>PMIOP/09</td>
<td>Culture and heritage</td>
<td>PMIOP/09</td>
</tr>
<tr>
<td>PMIOP/10</td>
<td>Housing</td>
<td>PMIOP/10</td>
</tr>
</tbody>
</table>

### Measures

- **1.1. Economy and business**
- **1.2. Research, Technological Development and Innovation**
- **1.3. Information Society and ICT**
- **1.4. Employment and labor market**
- **1.5. Tourism**

- **2.1. Social inclusion / exclusion**
- **2.2. Education, lifelong training and qualification**
- **2.3. Health**
- **2.4. Culture and heritage**
- **2.5. Housing**

- **3.1. Agriculture, Forestry and Industry**
- **3.2. Energy**
- **3.3. Sanitation and water**
- **3.4. Risks**
- **3.5. Environment**
2.1. Consultation Platforms for diagnosis, planning and evaluation phases

1. **Diagnósticos** - items of diagnosis / SWOT of the planning instruments at national and regional levels;
2. **Orientações políticas** – specific objectives or similar; actions, agents and financing; 
3. **Sistema de monitorização e avaliação** – systems of indicators proposed by the instruments; 
4. **Agentes responsáveis** pela acções identificadas nos PROT
### The coherence between the instruments

<table>
<thead>
<tr>
<th>NSRF Domains</th>
<th>PNPOT (National Policy Programme for Spatial Planning)</th>
<th>PROT Norte (Regional Spatial Planning Plan for the North Region)</th>
<th>PO Norte (Operational Programme of the North Region, 2007-2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specific Objectives</td>
<td>Measures</td>
<td>Strategic Options</td>
</tr>
<tr>
<td>1. Research and Technological Development (RTD)</td>
<td>1,0</td>
<td>2,6</td>
<td>5,3</td>
</tr>
<tr>
<td>Innovation and Entrepreneurship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Information Society</td>
<td>4,4</td>
<td>8,7</td>
<td>4,3</td>
</tr>
<tr>
<td>3. Transport</td>
<td>8,1</td>
<td>11,7</td>
<td>26,3</td>
</tr>
<tr>
<td>4. Energy</td>
<td>2,7</td>
<td>2,6</td>
<td>10,5</td>
</tr>
<tr>
<td>5. Environment Protection and Risk Prevention</td>
<td>27,0</td>
<td>33,2</td>
<td>26,3</td>
</tr>
<tr>
<td>6. Tourism</td>
<td>2.7</td>
<td>1,5</td>
<td>5,3</td>
</tr>
<tr>
<td>7. Cultural activities</td>
<td>5,4</td>
<td>3,1</td>
<td>0,0</td>
</tr>
<tr>
<td>8. Urban and Rural Rehabilitation</td>
<td>2,7</td>
<td>12,2</td>
<td>1,0</td>
</tr>
<tr>
<td>9. Increasing Adaptability of Workers, Companies and Entrepreneurs</td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td>10. Improving Access to Employment and Sustainability</td>
<td>1,7</td>
<td>1,0</td>
<td>1,0</td>
</tr>
<tr>
<td>11. Improving Social Inclusion of Disadvantaged Groups</td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td>12. Improving Human Capital</td>
<td>1,0</td>
<td>2,0</td>
<td>0,0</td>
</tr>
<tr>
<td>13. Mobilisation for Reforms in the Areas of Employment and Inclusion</td>
<td>16.2</td>
<td>11,3</td>
<td>0,0</td>
</tr>
<tr>
<td>14. Investment in Social Infrastructure</td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td>15. Strengthening Institutional Capacity at the National, Regional and Local Levels\</td>
<td>2.7</td>
<td>3,1</td>
<td>0,0</td>
</tr>
<tr>
<td>16. Reduction of the Additional Costs hindering the Development of the Outermost Regions</td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
</tr>
<tr>
<td>17. Others</td>
<td>24,3</td>
<td>7,1</td>
<td>21,1</td>
</tr>
<tr>
<td>Total</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
</tr>
</tbody>
</table>
3.1. Consultation Platforms for diagnosis, planning and evaluation phases

**SPOTIA Consultation Platforms:**

1. Main planning instruments at European, National and Regional scales;
2. Diagnosis - in the main national and regional planning instruments;
3. Policy`s guidelines - Objectives, measures, actions, indicators of the planning instruments;
4. Approved projects of NSRF 2007-2013 related with the respective programmatic axes and objectives.

- Difficulty to actualize the platforms
- Require an active participation of the various actors of planning
- Difficulties on the compatibilization
- Need to transform the raw information provided by the agents in the proper format
2. SPOTIA PROJECT – AN APPLICATION

2.2. WEBGIS AS DYNAMIC AND USER-FRIENDLY MONITORING SYSTEM

The web mapping the SPOTIA project, with an interface platform, enabled visualization of thematic cartography for analysis on the pillars of national regional policies, local / municipal utility, for example:

- Population (2001, 2011);
- Land Use - mapping based on Corine Land Cover (1990, 2000, 2006);
- Employment - Persons Employed and Establishments (2005, 2011);
- Schools Network - location of schools by level of education (2005, 2013)
2.2. WEBGIS as dynamic and user-friendly monitoring system

The web mapping the SPOTIA project, with an interface platform, enabled visualization of thematic cartography for analysis on the pillars of national regional policies, local / municipal utility,
2.2. WEBGIS AS DYNAMIC AND USER-FRIENDLY MONITORING SYSTEM

Land Use Evolution
Eg. Evolution of a single class of Corine Land Cover 1990 – 2006 - Water bodies

Land Use WEBGIS for EFMA area. Case of “Water bodies” CLC category
Data Source: CLC 1990 and CLC 2006. Own production
After programming, the implementation
Objectives related to cohesion
Approved projects of NSRF 2007-2013

<table>
<thead>
<tr>
<th>Programs</th>
<th>Domains and Investment made until Junin 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Potential - 50%</td>
<td>Includes:</td>
</tr>
<tr>
<td></td>
<td>Young people qualification – 26% (social capital investment)</td>
</tr>
<tr>
<td></td>
<td>Adult qualification – 21% (social capital investment)</td>
</tr>
<tr>
<td></td>
<td>Education – 27% (physical investment)</td>
</tr>
<tr>
<td>Competitiveness – 22%</td>
<td>Including Innovation and entrepreneurial investment</td>
</tr>
<tr>
<td>Territorial Valorization</td>
<td>Includes:</td>
</tr>
<tr>
<td>(including regional) - 28%</td>
<td>Cities policy – 19%</td>
</tr>
<tr>
<td></td>
<td>Equipment's – 15%</td>
</tr>
</tbody>
</table>

Physical Investment are decreasing importance
Human and social capital investment growth
After programming, the implementation
Approved projects of NSRF 2007-2013

The pattern of Regional Programmes

Investment per inhabitant in Regional OP (euros/inhab.)

Competitiveness, I&D Axe

Investment per inhabitant in Regional OP (euros/inhab.)
Axe 1 - Competitiveness, Innovation and Knowledge

Average - 418 euros/inhabitant

Investment per inhabitant (euros/inhab.)
Average - 1084 euros/inhabitant
After programming, the implementation of the Cities Policy - Approved Investment NSRF 2007-2013:

<table>
<thead>
<tr>
<th>Cities Policy</th>
<th>Lisbon Metropolitan Area</th>
<th>Porto Metropolitan Area</th>
<th>Municipalities with cities</th>
<th>Other Municipalities</th>
<th>Multi-municipal /regional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>137818514,7</td>
<td>159010390,2</td>
<td>181467871,3</td>
<td>707543147,7</td>
<td>202639058,5</td>
<td>1388478982</td>
</tr>
<tr>
<td></td>
<td>9,9</td>
<td>11,5</td>
<td>51,0</td>
<td>13,1</td>
<td>14,6</td>
<td>100,0</td>
</tr>
</tbody>
</table>

**6 Operation Typologies**

<table>
<thead>
<tr>
<th>Type</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>POVT - “Innovative Actions for Urban Development”</td>
<td>11438743,8</td>
<td>0,8</td>
</tr>
<tr>
<td>POVT - “Urban Structure Equipment System”</td>
<td>219854537,5</td>
<td>15,8</td>
</tr>
<tr>
<td>PO R - “JESSICA Community Initiative”</td>
<td>165510639,1</td>
<td>11,9</td>
</tr>
<tr>
<td>PO R - “Cities Policy - Partnerships for Urban Regeneration”</td>
<td>866052684,2</td>
<td>62,4</td>
</tr>
<tr>
<td>PO R - “Politics of Cities - Urban Network for Competitiveness and Innovation”</td>
<td>97707123,9</td>
<td>7,0</td>
</tr>
<tr>
<td>PO R - “Urban and Rural Rehabilitation”.</td>
<td>27915253,9</td>
<td>2,0</td>
</tr>
<tr>
<td>CITIES POLICY</td>
<td>1388478982,0</td>
<td>100</td>
</tr>
</tbody>
</table>

GOOD TERRITORIAL DISTRIBUTION, BUT STILL RELATED TO PHYSICAL INVESTMENTS
After programming, the implementation

POVT – Eixo IX – Development of Urban System

POLIS XXI

Regional Programmes
2.3. Geographical modelling as a tool to reinforce the decision-making process

Some working groups developing different studies, using several methods:

- Graph Theory and Complex Networks;
- Neural networks (e.g. SOM); combining neural networks with Multicriteria Analysis;
- Cellular automata (combining neural networks and or Multicriteria Analysis, i.e. Weighted linear combination (WLC) to adjust the transition rules).

Activities that are now under development:

1. Build, analyse and visualise the network of actors (stakeholders) concerning spatial planning, for all scales of Spatial planning instruments (IGT) and for each individually

2. Data-mining, namely to explore the variables of the different domains (social, economic, demographic, biophysical, legal, etc.), and to develop explorative (what if scenarios?) and predictive scenarios

3. Building a predictive model to land use/cover changes
3.3. GEOGRAPHICAL MODELLING AS A TOOL TO REINFORCE THE DECISION-MAKING PROCESS

Evolution of School network (all schools) » basis for geographical modelling
Before and after the scholar network reform
2005 – 2010 - 2013
3.3. Geographical modelling as a tool to reinforce the decision-making process

Distance-time to the nearest school
- Region of Alentejo
- All schools
3.3. Geographical modelling as a tool to reinforce the decision-making process

Distance-time to the nearest hospital (Region of Alentejo)

Note: these areas don’t cover linearly the resident population
2.3. Geographical modelling as a tool to reinforce the decision-making process

Land Use

Evolution of Agricultural Area (1989-2019)
Benefits:
- Productivity – more info in less time
- Efficiency – advanced analysis, faster and cheaper mapping
- Cost reduction (work, space)
- Improvement on decision support

Constrains:
- Great volume of work to create and maintain an actualized GIS;
- The huge cost of data and its updating;
- Need of high specialized workers
- Lack of data - existence and actualization
- Gap between the available technologies and the technics, decision-makers and community's knowledge
Thanks

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References


REFERENCES


