

“Development of a tool for evaluating the integration of road projects”

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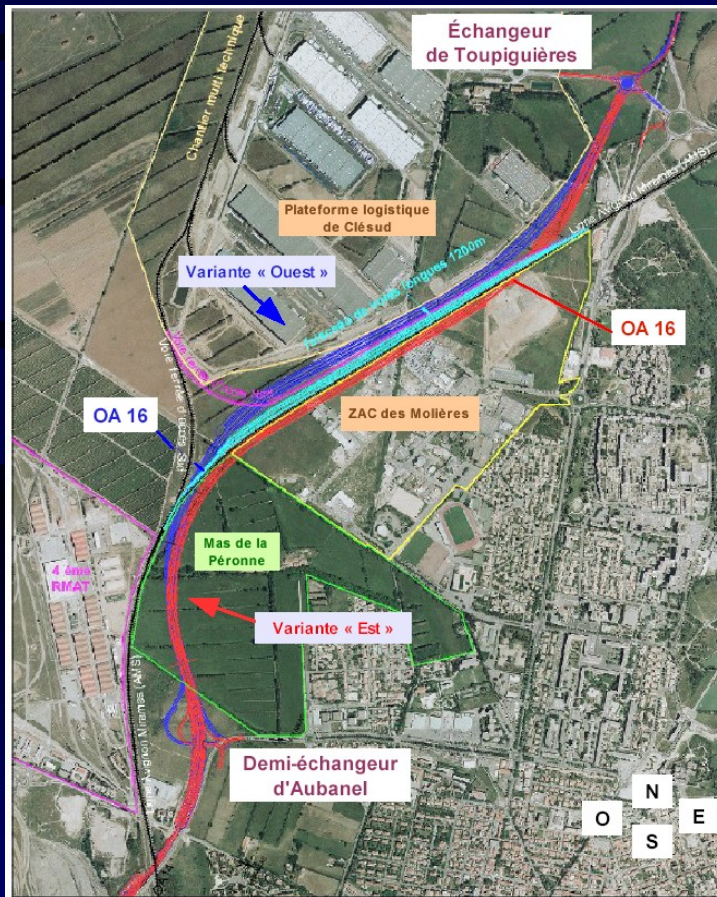
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I. Presentation of the problem

I.1 Context

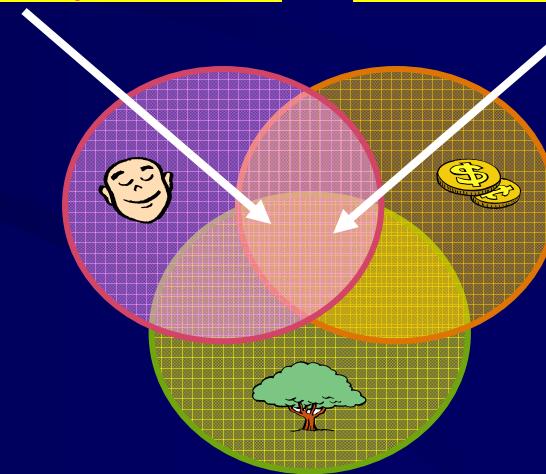
- Tool applicable to the preliminary stage of the road project, allowing the management of the various effects of infrastructure variants



Inter-urban infrastructure



Urban infrastructure

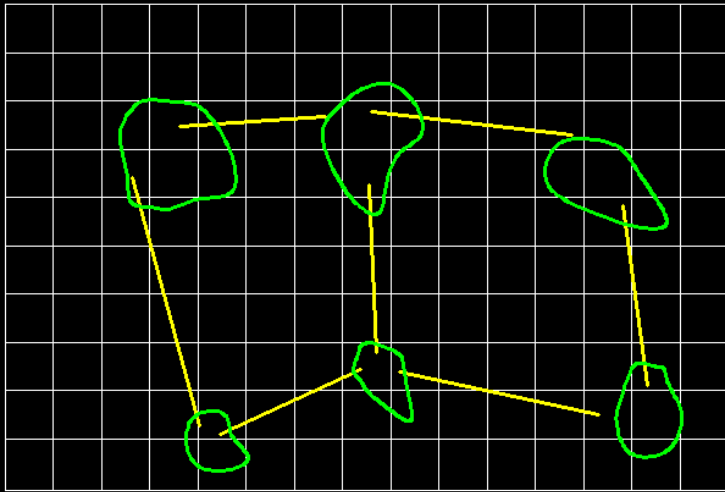


The 3 spheres of the sustainable development

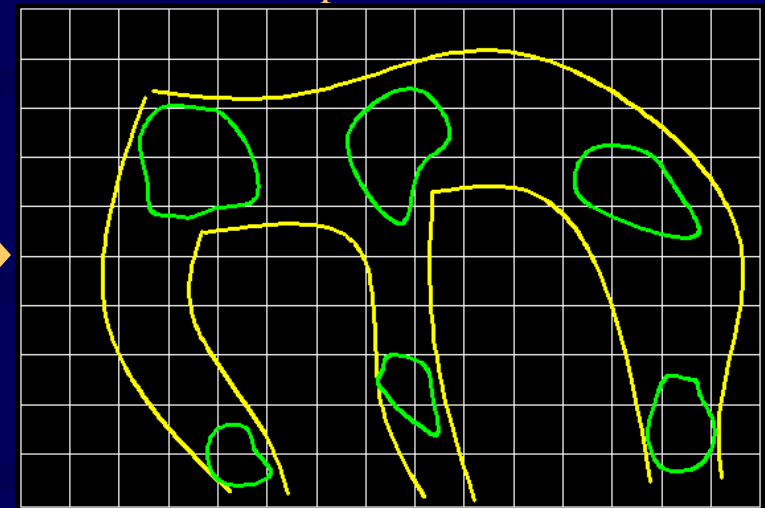
I.2 Today practice

Searching variants

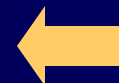
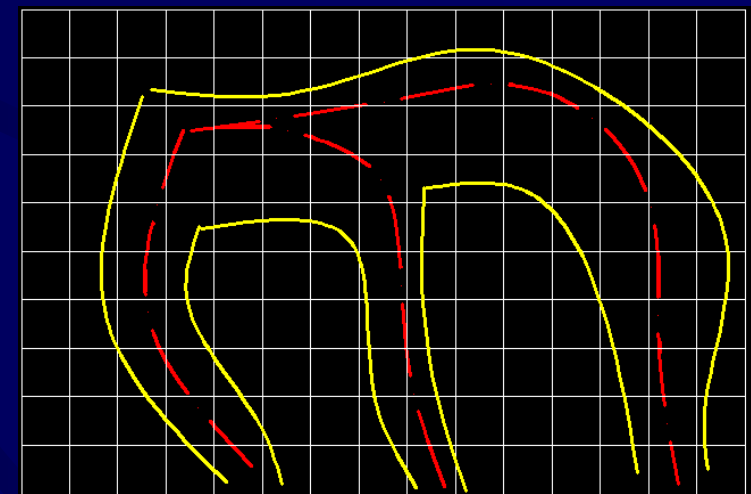
1. The least sensitive areas



2. The spindle areas



3. Variants



How can we choose variants? What is the best variant?

How to know in each point, if it is the best solution?

Can we tighten the spindle areas with supplementary criteria?

Comparison of variants

Using a table dealing with various non quantitative criteria

	Scale sennsibility	Very unfavourable	unfavourable	favourable	Very favourable		
Family Variants	Now 0	1	2	3	4	West 5	Est 6
Dimension: Social life and economic							
Territory lands							
Global approach economic							
Local approach economic							
Cultural identification							
Dimension: Space planning							
Accessibility and mobility							
Security and risk							
Dimension: Man and earth							
Ambiance and health quality							



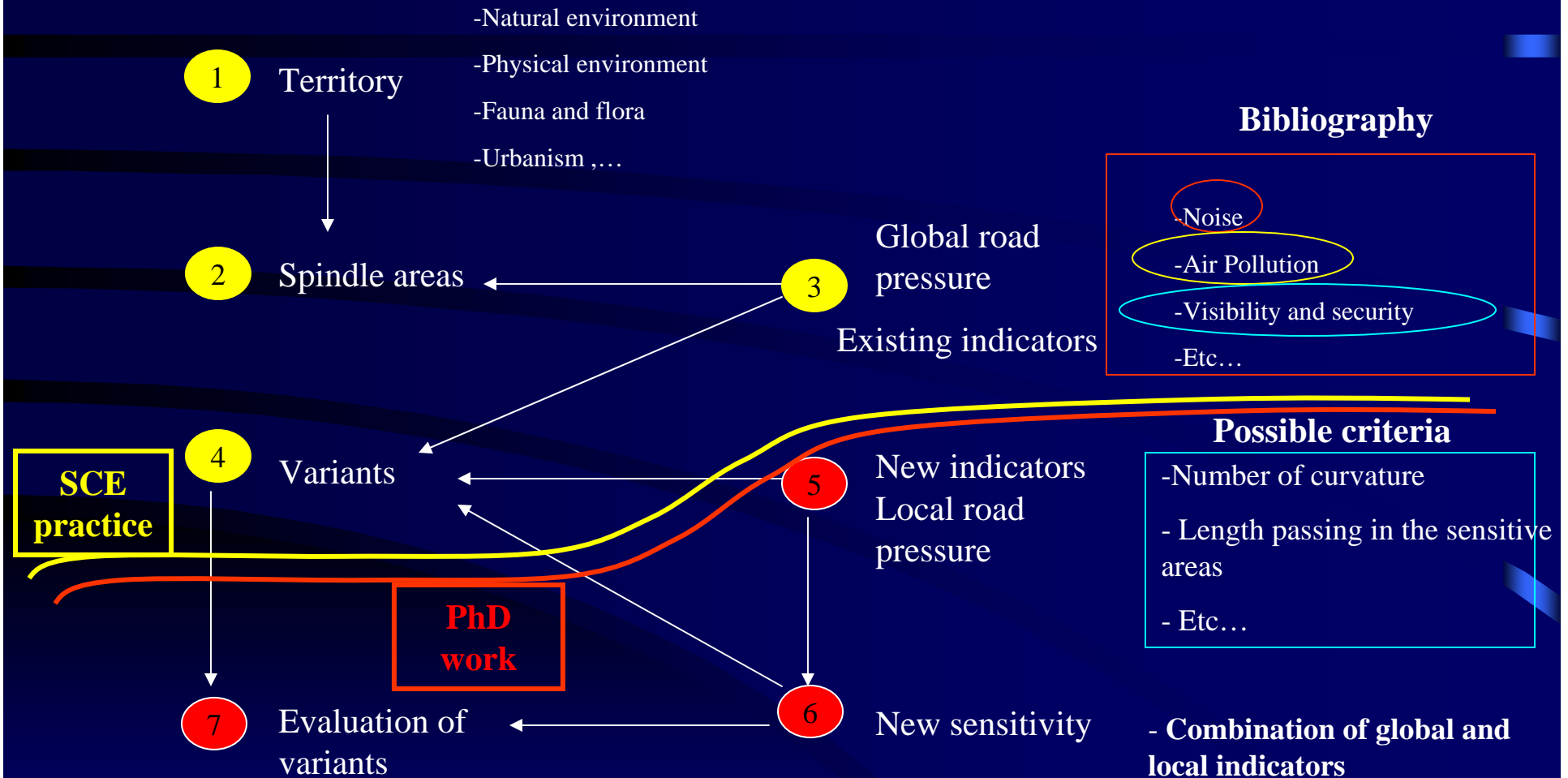
Discussion of the project and its variants with all the actors and contribution to the decision making



Needs quantitative indicators and territory map

II. Method of research

II.1 Methodology steps



II.2 Existing indicators



Noise & Air pollution



$$(L_{Aeq})_i = L_{w,i} + 10 \lg \left(\frac{N_i}{v_i T} \right) - \Delta L_{d,i} - 13 \quad (\text{Li et al., 1999})$$



Visibility and safety



$$V_{(x)} = 1 - \left(\frac{X}{X_{threshold}} \right)$$

(Piantanakulchai and Saengkhaio, 2003)



Accessibility

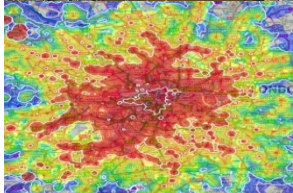


$$A_{(x)} = \frac{1}{\sum_{i=1}^n (P_i * d_i^c)}$$

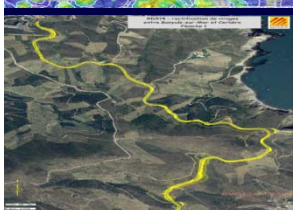
(Piantanakulchai and Saengkhaio, 2003)



Climate change



Travel time



Land use



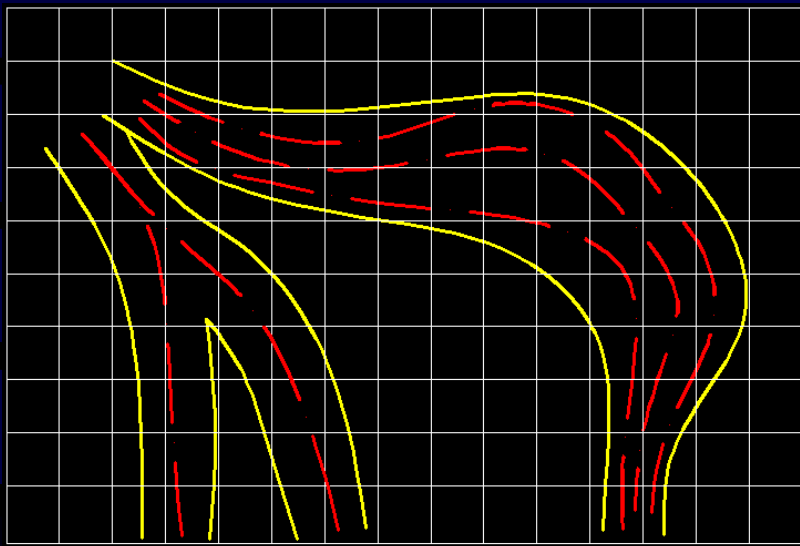
Map result but formula not provided

To tighten the spindle areas and decrease the variant number,

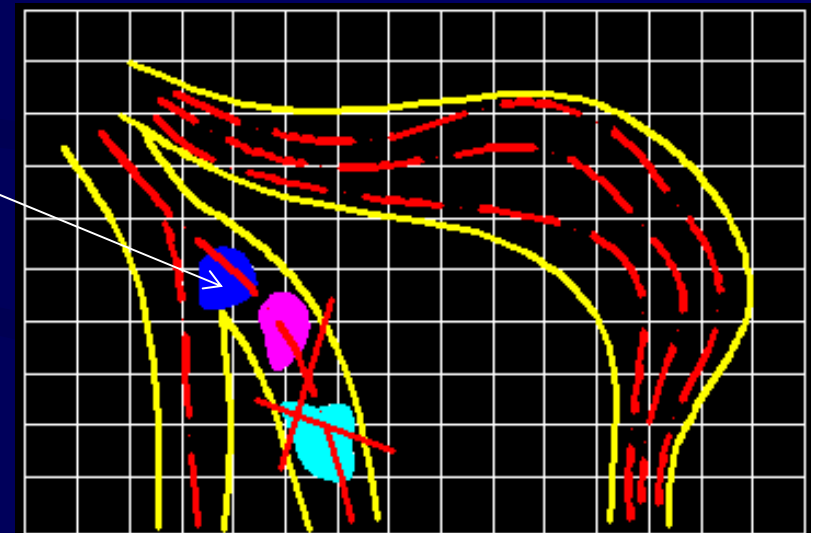


we need the new indicators

Need for a localized assessment of each variant



New
indicators



The synthetic criteria used by the environmental engineer are currently analyzed to define additional news indicators.

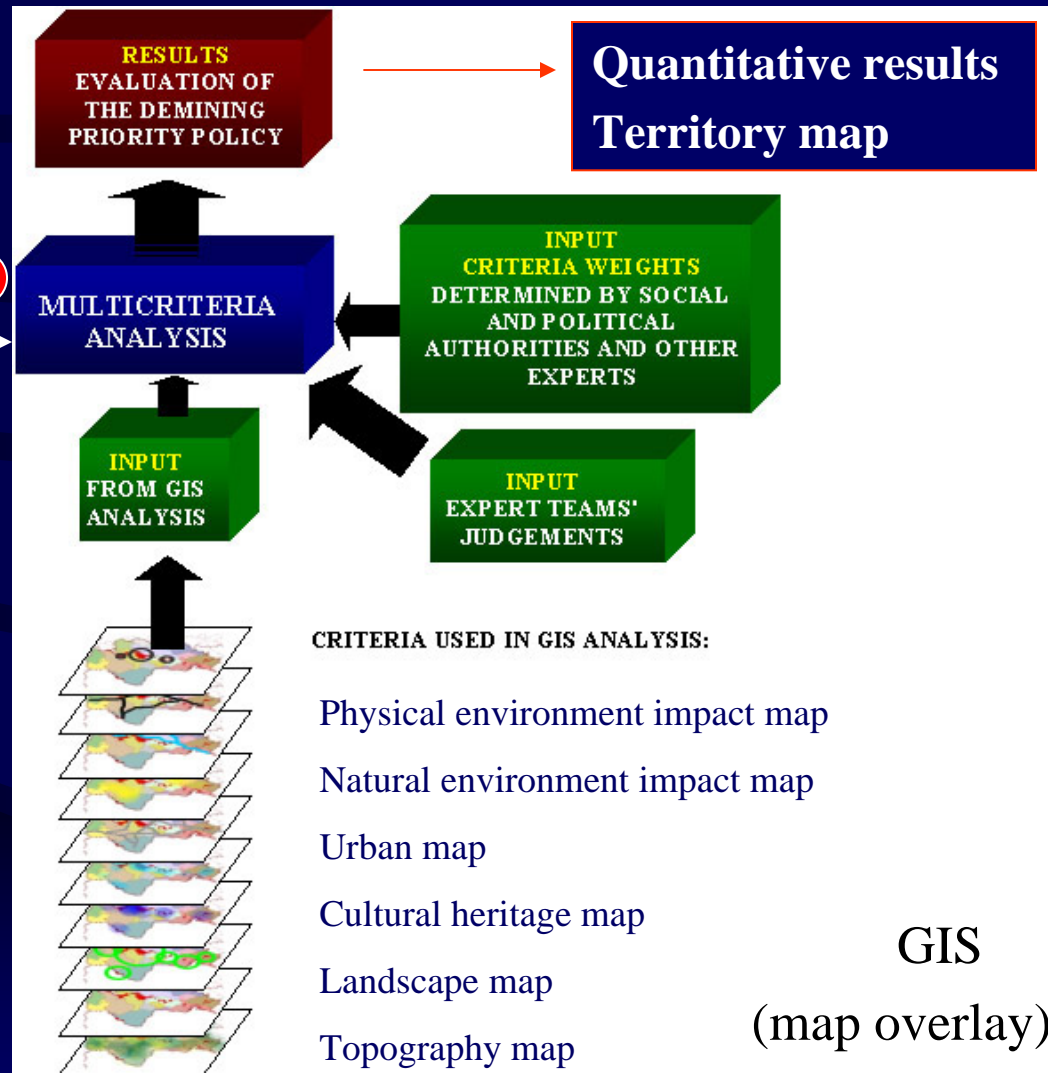
Combine and try to make explicit the geographical criteria of each variant

II.4 Method of assessment

Multi-criteria analysis

Calculation 7

Existing indicators 3 + 5
New indicators



➔ How we can calculate with GIS?

II.5 Test of calculation

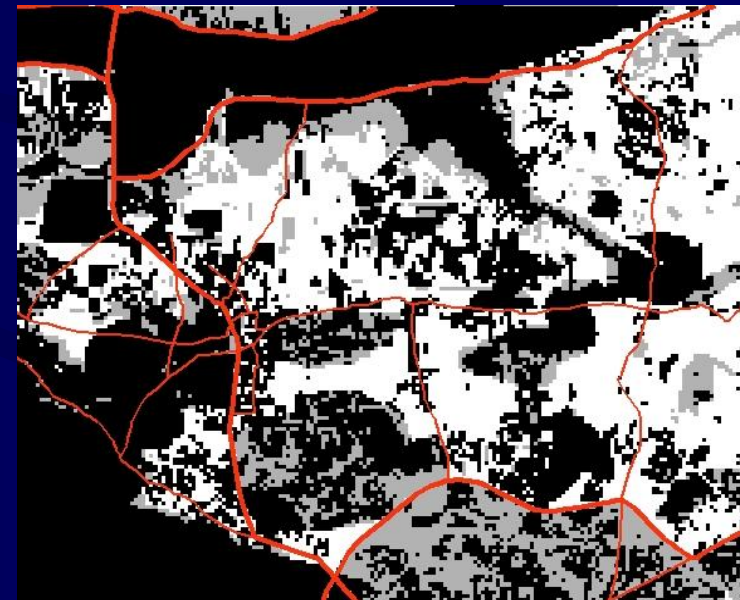
1 + 7

GIS and calculation without new indicators

1. Maps are convert to matrices (raster.)
2. For each item, values are allocated according to the expert reference system of value
3. All raster layers are combined by simple addition , a sensitivity map is obtained
4. A sensitivity filter is applied to highlight the least sensitive areas into which road variants can be drawn



Network
roads



3. Sensitivity map

4. Spindle area



Parameters can be implemented in the tool in order to optimize automatically variants drawing

III. Conclusion and perspective

- The methodology of assessment using local criteria may be applicable in the design office.
- It is based on:
 - + GIS use for discussion with stakeholders
 - + Tool for best variants visualization

Future work :

- To search new indicators and integrate them in the calculation
- To develop this methodology in a tool which is configurable and interactive
- To test this method with a new interurban road project

Thank you for your
attention!