

A model for the assessment of the impact of Strategic Policy Documents on urban and environmental planning.

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ABSTRACT

Local authorities are regulated by a huge number of planning documents developed in different periods, with various purposes and different scales. In most cases recent, local plans do not take in to account other plans (transport, environmental, etc.) completely developing opposite objectives. The use of GIS allows a synchronized interpretation of current planning documents (policy, objectives, rules, constraints).

Generally Strategic Policy Documents are reports describing a guidance for certain actions without a spatial location. In these documents the geographical description is vague in nature.

This property does not allow to assess the impact of these documents on environmental features and plans.

A sort of translation of policy statements in geographical elements has been developed.

The aim of this paper is on one hand to produce an integration of planning documents, on the other hand to compare planning system with spatialization of policy documents in order to increase the efficiency and the effectiveness of strategic action.

1 INTRODUCTION

For a long period planning activities have been unconsciously neglected generating a great pressure on the territory (Alberti et al. 1994). Especially during the last twenty years this scenario produced an increase of attention to natural resources in order that they can be used with wisdom and parsimony, with the consciousness that they are not inexhaustible and their capacity to regenerate themselves is much slower than our ability to destroy them. Planning activity therefore has become necessary and essential for every social decision (Alexander, 1992). During the last years agencies with planning competences have remarkably increased; accordingly local authorities are overregulated by a huge number of planning documents.

Administrative functions related to the government of the territory are attributed to elective institutions (e.g. municipalities, provinces, metropolitan areas, Regions), each with the respective competences. In the same way sectoral institutions (e.g. monuments and fine arts bureau, basin agency, consortium of communes in mountain areas, industrial development agency, national and regional parks) discipline the territory by means of plans with prescriptive potentiality, in most cases, greater than elective institutions. Actions of public agencies or private companies (e.g. national agency for electricity management, national agency for highway management, national agency for railway management, telecommunication companies), not referring directly to specific regions, can meaningfully modify main territorial features. Furthermore these interventions have to be coordinated with a high and differentiated number of plans. In a lot of cases a plan of an institution cannot be coherent with a plan of another institution, and some actions admitted by a plan can be forbidden by another. Nowadays technical instruments which allow to manage the presence of more plans on the same territory are practically absent. A theoretical-administrative and practical-managerial problem of adaptation and integration of the respective policy occurs.

Experimentation of new methods for territory management in order to resolve all conflicts generated by a huge number of planning documents is gaining remarkable interest between researchers, practitioners and public administrators. An overall interpretation of all in force plans (politics, objective, rules, constraints), through a new analysis tool, can highlight overlaps, compatibilities and conflicts of plans.

These three categories of plans mentioned above follow consolidated methods producing a certain number of maps with precise scales. Often planning documents have a part represented in cartographies, in a lot of cases more detailed, and another part in text documents describing maps, defining planning strategies and establishing rules in order to put the plan into practice.

Often, programming documents do not have relations with cartographic representation because, generally, they are a sort of guidance for political actions realized by means of program implementation. This paper

aims to establish a methodology of spatialization economic programming documents comparing them with the integration of planning documents.

2 DIFFERENT TYPOLOGIES OF PLAN

A plan defines criteria, rules, methodologies, general and specific objectives, verifying of internal and external coherence with other plans at different levels. Each type of plan carries out a precise function and it is developed following the directives determined from instruments at an upper level.

On the whole this type of hierarchy can be synthesized as follows:

- EU directives;
- National Plans;
- Interregional (territorial or sectoral) Plans;
- Regional (territorial or sectoral) Plans;
- Provincial (territorial or sectoral) Plans;
- Inter-municipality Plans;
- Urban Plans;
- Urban Design.

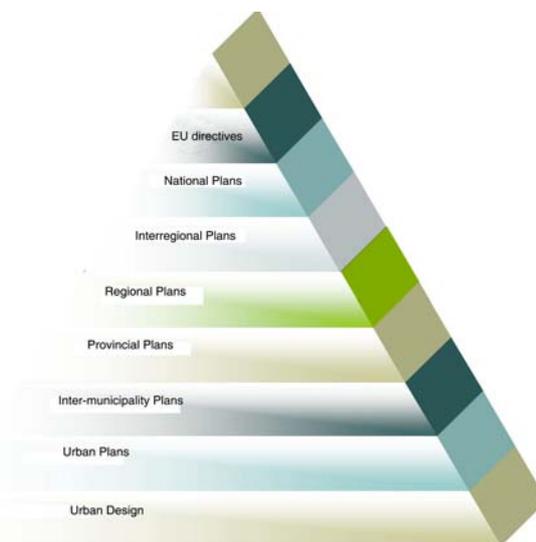


Fig.1 Plans Hierarchy.

Plan indications start from more general instruments reaching more specific ones (top-down); while as far as it is concerned, transformation needs plan indications to go from more specific instruments towards more general ones. This double flow obliges the municipalities, as the minimal planning unit, when acknowledged also by a single citizen proposal, to verify if transformation is allowed from an upper level plan.

In theory the indications included in the upper level plan ought to have deep analysis and the realization in the lower level. On the contrary, the lower level adapts itself, critically acknowledging the indication of the higher plan. In absence of agreement with the local authorities the National level preserves the power to localize interventions also in contrast with the local authorities decisions and their territorial plans.

Other kinds of plans are more partial and/or sectoral, considering parts of territory.

While on one hand the existence of a huge typology of plans can be considered of vital importance for correct planning and territory management, on the other hand a heterogeneous system of plans without any relation has been realized from various subjects.

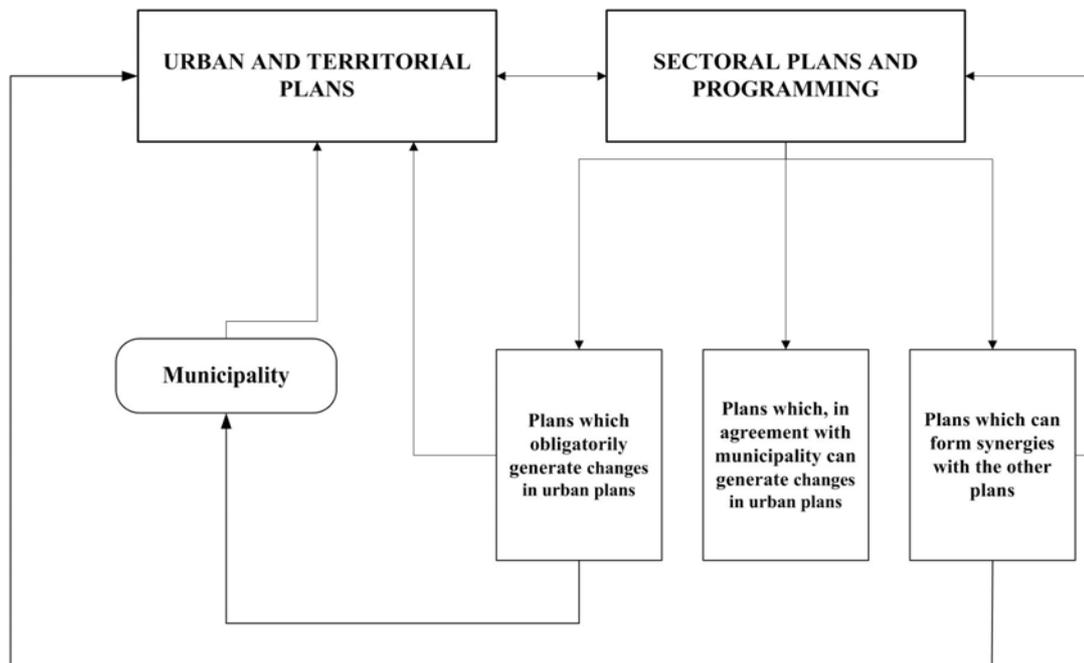


Fig.2 Main categories between plans and programs.

It is possible to distinguish three categories between plans and programs:

- Plans which obligatorily generate changes in urban plans (territorial, landscape, basin and parks plans);
- Plans which can generate changes in urban plans in agreement with the municipality (quarry, energetic, health, school and mobility plans);
- Plans which can form synergies with other plans (Urban renewal programs).

Italian planning system under certain aspects is a little confused because the various planning instruments are weakly coordinated.

Every the plan is not developed like a part of relation series which can find on the territory the coordination and multi-sectoral interdependences generating a remarkable increase of waste of natural resources, financial and social consequences.

Most of these plans provokes an enormous problem of coordination generating a gap in policies and process integration.

For instance, a transportation program which does not take into account preservation of natural heritage, forests and wildlife can solve some accessibility problems generating environmental fragmentation problems.

The first step of this work can be synthesized in the following points:

- summarizing the overall planning system;
- distinguishing plans elaborated from elective institutions from other plans;
- classifying plans according to implementation possibility;
- relating plans from hierarchical and functional points of view.

These four points synthesize the procedure to integrate the huge number of planning documents developed in different periods, with various purposes and different scales. Afterwards GIS implementation allows a synchronized interpretation of these documents (policy, objectives, rules, constraints).

3 PLANNING DOCUMENTS GIS IMPLEMENTATION

The first step in GIS implementation was the research of a semantic matching among all the concepts included in planning documents. Summarizing all legend items, 630 terms have been counted, most of them describing zones with the same feature (e.g. Historical centre, zone A, ancient centre, preserved cultural heritage zone, etc.).

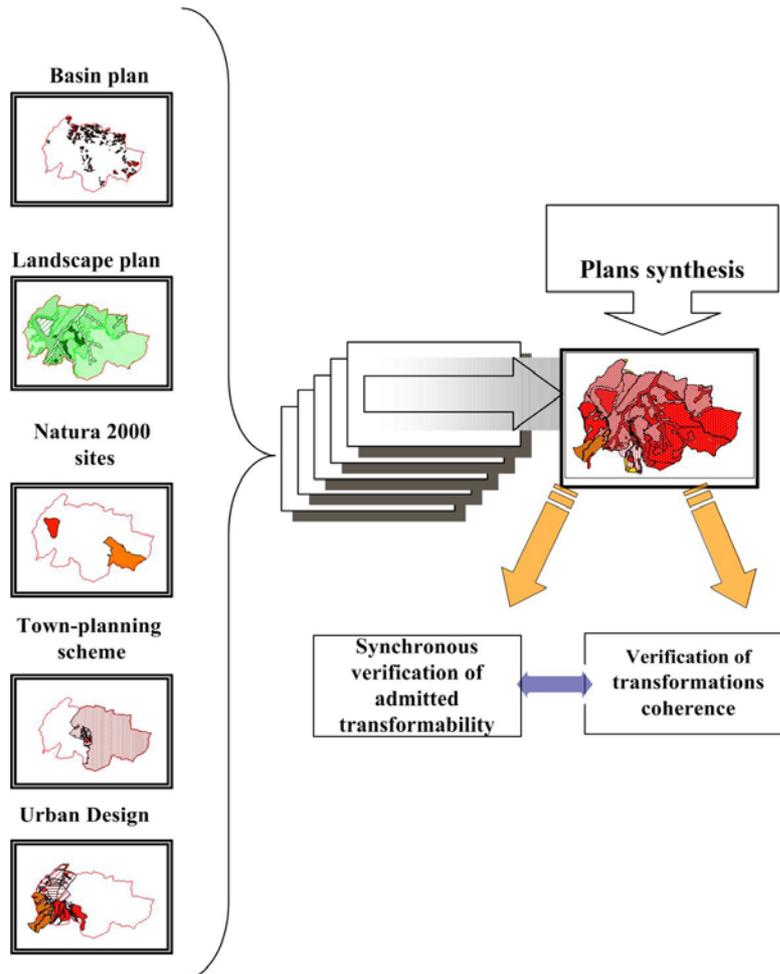


Fig.3 Scheme of plans synthesis

The problem of semantic matching has been faced using ontology; in this way integration of geographic information is based primarily on its meaning (Fonseca et al., 2000).

Implementation has been developed in a study case considering basin plans (from R4 high risk to R1 low risk), landscape plans (from A01 high value of wildness to A06 low value of wildness), nature 2000 sites, town planning schemes and urban design.

The simple entity relationship model does not fit urban planning documents management, because each zone has different features and consequently diverse attributes. Afterwards in the same attribute table more heterogeneous data are included which do not respect normal forms of databases. The more suitable model in GIS implementation of planning documents is an object-relational one, used in geodatabase. In this model the more useful property is the inheritance based on sub-class and super-class concepts. Sub-class entities are super-class specialization inheriting super-class attributes. In this way the super-class consists of the most common zone used in all planning documents and sub-class describes in a deeper way only one type of attributes referred just to one kind of zone.

In order to identify the incompatibility between plans topological rules have been applied to sub-classes.

The more used topological rule is: the polygons “must not overlap with”, in other words overlaps between the sub-classes of two feature classes with incompatible norms.

Topological rules matrix is organized in the following way:

- the names of the feature classes are inserted in the first row and the first column;
- the names of sub-classes related with every feature classes are inserted in the second row and the second column;
- a symbol has been reported in matrix cells, in cases where the topological rule is required to highlight incompatibility between the planning instruments;
- different colour of symbols indicates absolute incompatibility (red), or partial incompatibility (orange), a deep evaluation is required.

		Basin plan					Nature 2000	Landscape plan						
		R1	R2	R3	R4	AS		A01	A02	A03	A04	A05	A06	
town-planning scheme	Zone A (Historical Areas)													
	Zone B (consolidated Town)													
	Zone C developments zones)		■	■	■	■	■	■	■	■	■	■	■	
	Zone D (Industrial areas)		■	■	■	■	■	■	■	■	■	■	■	
	Zone E (Rural Areas)						■	■	■	■	■	■	■	
	Craft made areas		■	■	■	■	■	■	■	■	■	■	■	
	Depurator		■	■	■	■	■	■	■	■	■	■	■	
	Hamlet		■	■	■	■	■	■	■	■	■	■	■	
	Subsidized housing		■	■	■	■	■	■	■	■	■	■	■	
	Parking			■	■	■	■	■	■	■	■	■	■	
	Green areas			■	■	■		■	■	■	■	■	■	
	New Road network		■	■	■	■	■	■	■	■	■	■	■	
	Council-house building		■	■	■	■	■	■	■	■	■	■	■	
	Tourist areas		■	■	■	■	■	■	■	■	■	■	■	

Fig.4 Topological rules matrix

Next figure highlights a development zone (Zone C) completely within a high risk (R4) zone. Conflict is highlighted in table and on the map.

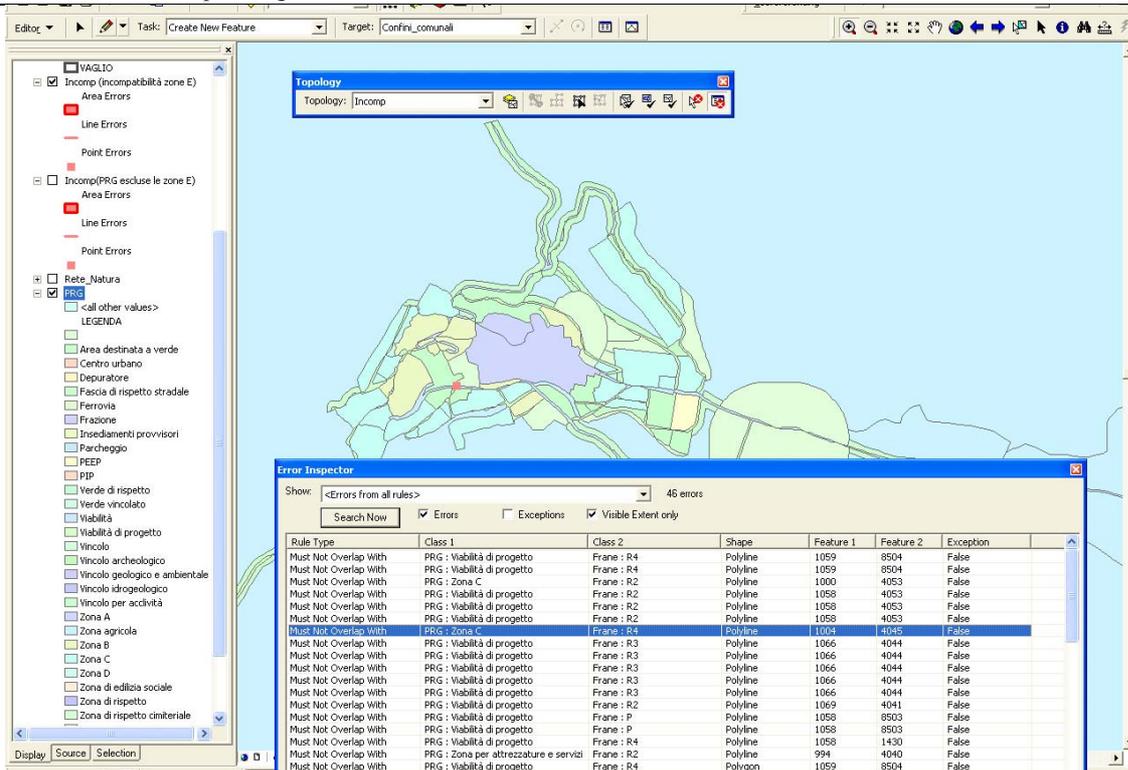


Fig.5 Conflict between plans

4 SPATIALIZATION OF POLICY DOCUMENTS

Generally Strategic Policy Documents are reports describing a guidance for certain actions without a spatial location. In these documents the geographical description is vague in nature. This property does not allow to assess the impact of these documents on environmental features and plans. Only in a few cases the intervention of programming documents is referred to geographical features; in almost all cases policies are based on statements.

A sort of translation of policy statements in geographical elements is necessary to develop.

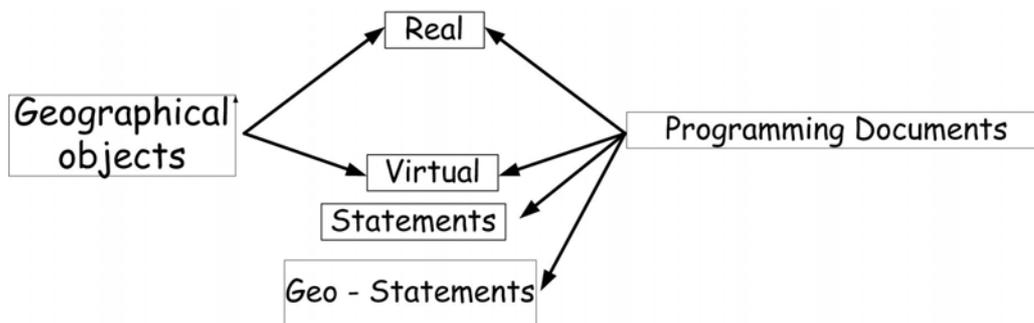


Fig.6 Programming documents and geographical information

A simple analysis of the ordinary and extraordinary actions of socio-economic programming was not enough to identify the exact intervention location. Inspections and interviews to local managers have been carried out in order to define local a intervention framework.

The preliminary studying of programming documents has been carried out with the objective to realize an effective synthesis of main contents, trying to homogenize information different in each document and with a different detail level.

On one hand this activity has allowed to carry out the first evaluation concerning the degree of coherence between actions and vocations, potentialities and specific expectations of territorial context; on the other hand it has allowed to verify the coherence between choices of socio-economic programming.

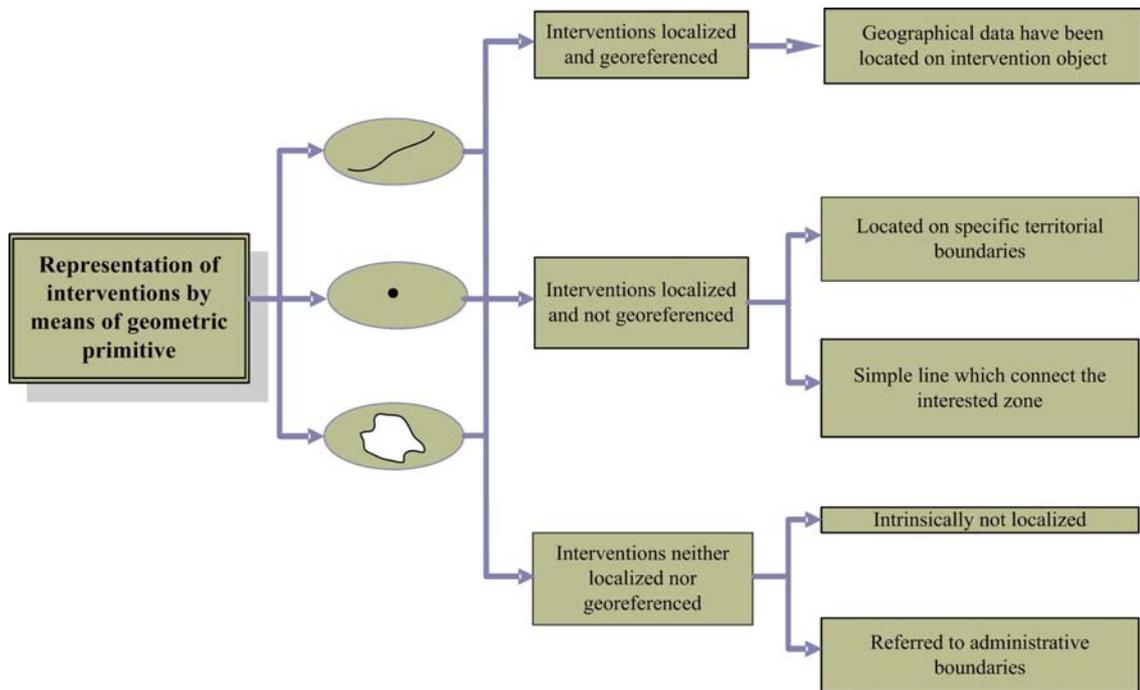
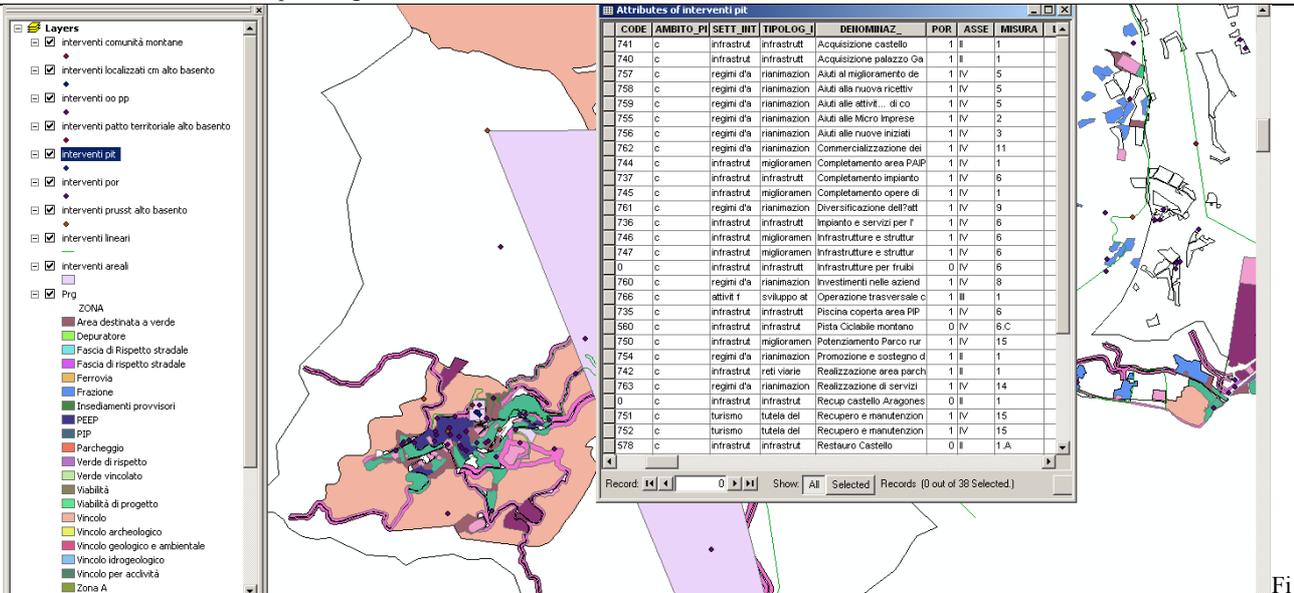


Fig.7 Programming documents and geographical information.

Representation of the interventions by means of geometric primitive has been faced in the following way:

- interventions localized and georeferenced: geographical data have been located on intervention object, or on the whole indications of infrastructures for mobility route;
- interventions localized and not georeferenced: geographical data have been located on specific territorial boundaries (e.g. downtowns, industrial areas, census zones), or in case of linear data with unknown path intervention they can be represented by a simple line which connects the interested zones;
- interventions neither localized nor georeferenced: geographical data do not fit these kind of interventions because they are intrinsically not localized (education programs) or in some cases can be referred to administrative boundaries (e.g. Regions, Provinces, Municipalities).
- Next figure shows an example of policy documents spatialization. All the interventions, with a lot of attributes (financing typology, amount, etc.), have been compared with planning documents.

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g.8 An example of policy documents spatialization compared with planning documents.

The main problem is that often planning of a local authority contradicts planning of another one, because some intervention admitted by a plan cannot be admitted by the others. For this reason a specific matrix of verification has been realized. This instrument of verification is essentially finalized to:

- estimate in a synchronous way the real possibilities of territory transformation;
- estimate congruency and interactions between territorial and sector al policy of plans.

The matrix is based on the principle of reducing intervention prescriptions in order to facilitate their management.

The matrix crosses interventions (admitted, not admitted or absent) with plan rules for each Aij Area.

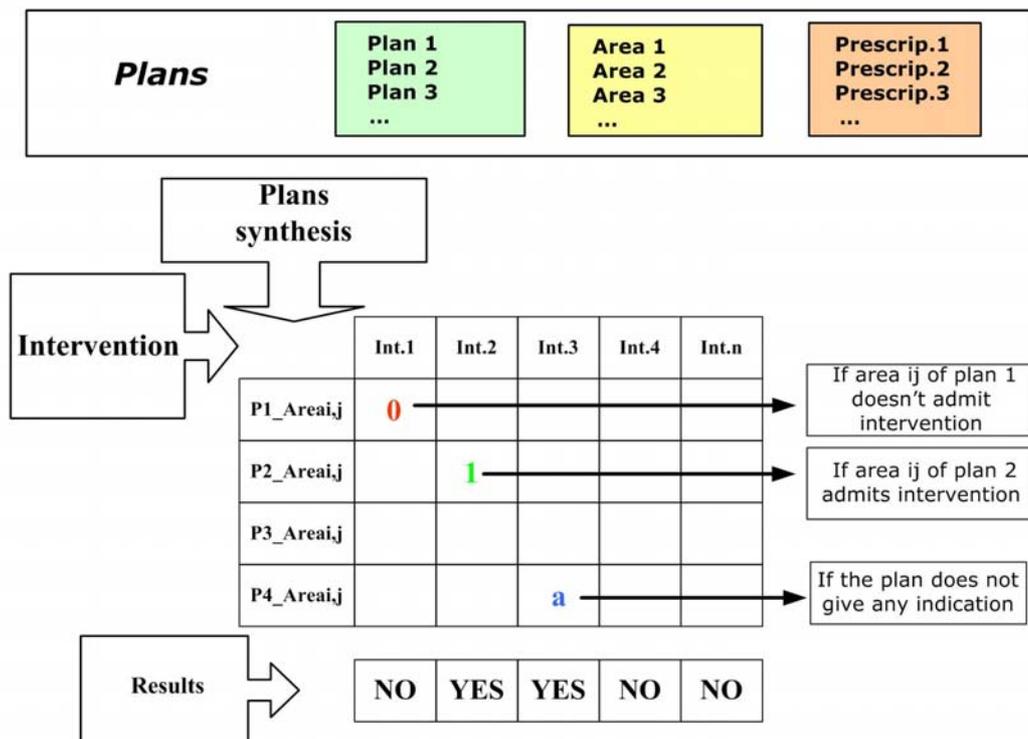


Fig.9 Scheme of transformations verification.

In a more detailed way:

- 1 if the norm in the Aij area of the Plan i admits intervention;
- 0 if the norm in the Aij area of the Plan i does not admit intervention;
- a if the norm in the Aij area of the Plan i does not give any indication;
- A if the Plan is absent.

The positive YES or negative NO result derives from automatic verification, column by column, of the presence of 0 at least in one cell. It means that one of the many coexistent plans on that portion of territory does not admit the chosen intervention.

Results highlight the real possibility of territory transformation concerning all in force plans underlining the conflicts. In fact, having previously classified the plans in hierarchical order, the matrix highlights which of the considered plans results not coherent with the prescription of upper level plans.

5 CONCLUSIONS

Spatialization process considerably improves programming efficiency and effectiveness, allowing an immediate examination. Figure 10 shows how it is possible to immediately verify if a program for road network improvement concerns areas with a low level of accessibility, or in the same way if a program for risk mitigation involves only zones with high risk level.

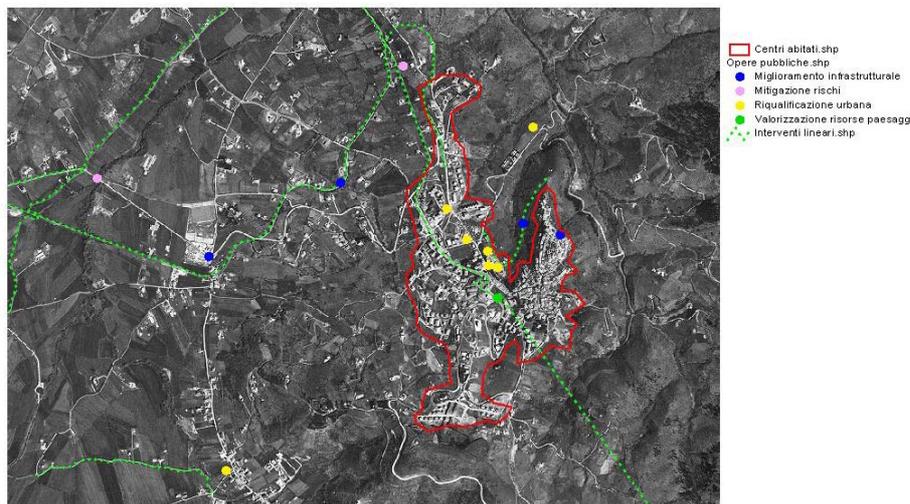


Fig.10 Spatialization verification.

The evolution of planning theory distinguishes planning processes in three main groups (Hall, 1992). The first one is based on the concept of Master plan, the second follows the system approach by McLoughlin (1969), the third is based on the idea of planning as a continuous participation in conflicts. The spatialization of policy documents for certain aspects can be viewed as a renewed rationality in planning processes.

In planning theory a general agreement exists in seven requirement of the rationality in the strategic planning:

1. a better knowledge in coherence of management objectives (the term strategic means consistent with general objectives system);
2. a better knowledge of resources in order to choose more appropriate and effective means in comparison with objectives;
3. a better knowledge of the complete effects of the decision;
4. a better knowledge of compatibility of decision with other decisions of the same decisional subject;
5. a better knowledge of compatibility of decision with other decisions of subjects which operate in the same field;

6. a better knowledge of costs and direct results involved in subject decision;
7. a better ability in estimating the relationships between the costs and results (agreed as effects in comparison with objectives).

In these seven statements the term knowledge appears more frequently. The possibility to analyze strategic documents also in geographical components have to be considered as a huge increase of knowledge. For instance the third statement in spatial term can allow a better external effects evaluation. Point four and five highlight coherence, compatibility, redundancy and duplication. Some assessment ambiguities can occur in analyzing strategic documents only considering the agency or organization which promotes them. Spatial aspects can highlight some redundancies generated from geographical proximity of some programs developed from different departments or local authorities.

Franco Archibugi (2000, 2002) in his planology theory states that a new approach to planning discipline needs an integration of physical and socio-economic planning. Often the overcoming of the system approach has led to the idea of plan as a set of constraints obstructing development. In recent times the demand of flexibility has grown, but Wenban-Smith (1987) considers flexibility in a range from spring steel to overcooked spaghetti. Stiffness is a useful tool to pursue the main plan objective, but many times planners exceeded with flexibility producing unspecified and unrecognizable plans.

From a certain point of view, the method adopted for the present work may overcome prejudices regarding the planning discipline, often observed.

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