

INFORMATION AND TECHNOLOGICAL FLOW  
IN TERRITORIAL MANAGEMENT

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The investigating character system context and the complex objectives of the territorial management are presented; it is illustrated by Oltenia mining basin (MB). The integrated information flow (territorial-geographical) and automatic mapping in territorial monitoring (AMTM) facilitate to pass from intuitive to computer-assisted territorial management designings (CATMD). The technological flow of the territorial management designing, averaged by present-day space manifold functions (urban, rural, touristic, hydrographic, forestry), is a matrix-scheme for the limited, natural and modified resource management.

Key Words: GIS/LIS, Land Application, Thematic

SYSTEM ANALYSES (SA),  
REGIONAL APPROACH (RA)

This research objective is the territorial or social-space systems, covering Oltenia mining basin (test zones: Rovinari and Motiu). It is featured by an environment (natural and modified) which, besides soil, water, air and biota, also, includes natural resources, such as, coal. At its first system analysis (SA), we can see it is located at the cross of two main systems: an ecological system considering its environmental location (human action and decision-making) and a social one, considering the anthropic presence and influence (social values, needs and wishes). Hence, important social-space subsystems containing regional territorial system (RTS) constituent parts (see Figure 1) could be derived; such a RTS could delineate the mining basin (MB) perimeter.

This regional approach (RA) is meant to establish the information and technological flow carrying out: (a) constituent part identification; (b) structured model development; (c) making variants on behaviour, i.e. designing the future social-space subsystem state-of-art. From the very outset, we want to emphasize that the information support (aerial and/or space images) is meeting with the purpose mentioned above, containing information on "anatomy" (meaning the element, relation and object identifications), "physiology" (representing the interrelation means with other systems) and the territorial system

"behaviour" (presuming change study, that is, positive and negative process dynamics).

Obviously, analysing only the set of the territorial system interactions with its various functions, they appear to be proper to the regional industrial weight as against the open and underground coal mining (brown coal). So, in such a case, the system analysis is most favourable if the space approach is to be regionally. The RIS knowledge, including all constituent elements and its functions, is a sine qua non condition to improve the professional designer's skill, which he needs to "converse" with Nature, and last but not the least, with Society (the user).

THE COMPLEX OBJECTIVES AND  
TERRITORIAL MONITORING:  
AMTM INFORMATION FLOW

According to human interferences, ecosystems in the mining basin (see, for example, ecologic and economic subsystems) are not only natural and modified but also managed. Considering the so-called managed ecosystem (a social-space system, above all) or according to our classification, a space territorial management subsystem, we shall emphasize that the territorial management designing includes a lot of very complex distinct objectives: urban planning (UP), rural planning (RP), hydrographical management (HM), forestry management (FM), touristic management (TM), a.s.o. On the other hand, the territorial management designing objectives should take into account the complex land protecting (LP) objectives (biological, juridical): restoration, preservation, prevention, a.s.o.

Before or after the measurements should be made properly, both territorial management and protection are requiring a territorial monitoring at some established periods of time, because there are various and continuous events and functions within this RTS, especially arising from the space mining basin. Information land and geographical system (LIS/GIS) integrations, using photogrammetric and remote sensing procedures bring about a real-time or nearly real-time information flow. The integrated information flow and automatic mapping in territorial monitoring (AMTM) give the possibility to pass from the intuitive designing to the computer-assisted designing. The designer

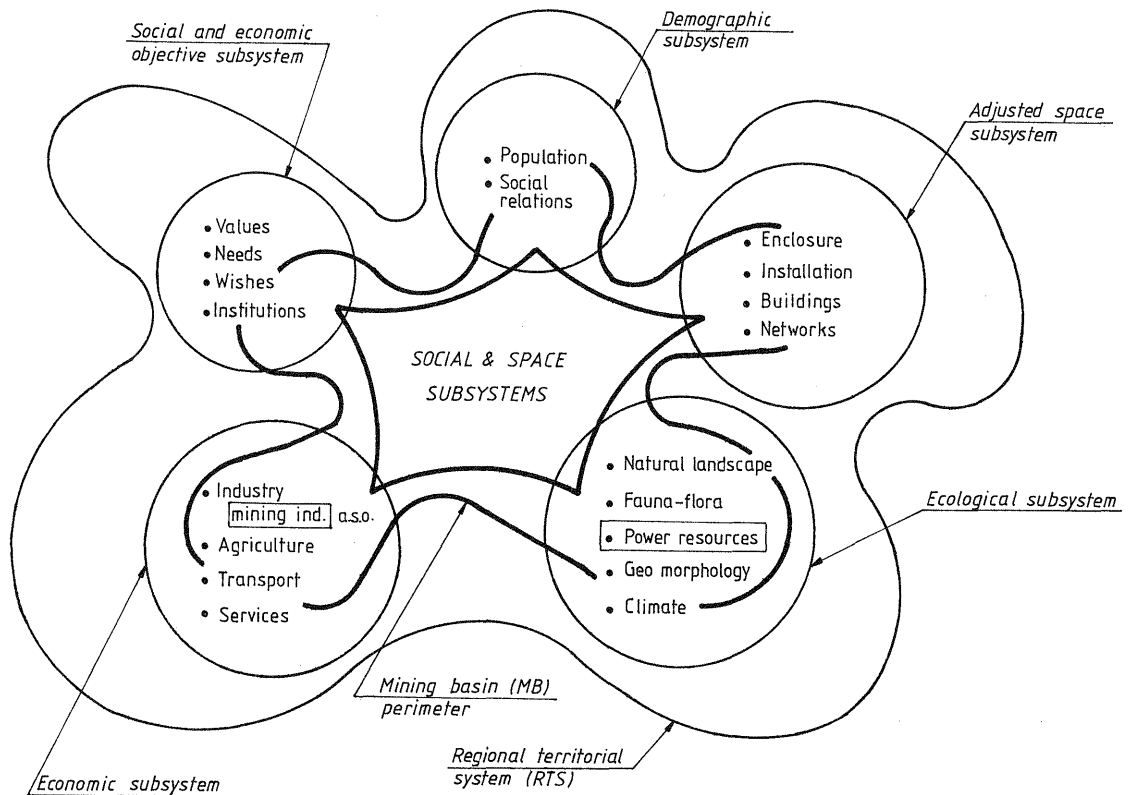


Figure 1. Constituent Parts of the Regional Territorial System (RTS)

makes intuitive mental images no longer. As against the classical procedure, SA rigorous scientific procedure is completely and simultaneously exploring RA aspects required to be integrated into the designing process.

The integrated information system development (ISD) LIS/GIS should undergo the following stages: (1) first of all, at a national level - documentation (supported by the National Geodetic and Cartographic Fund, and the National Geodetic and Cartographic Data and Information Bank); (2) at the mining basin level - data collection (using graphic and non-graphic data and information bases: LIS - general and special cadastres; GIS - geology, soil science, hydrology, climate, a.s.o.); (3) finally, at a regional level - data processing (LIS/GIS integrated data and information base development for: topology, identification, soil-underground, air, water, roads, a.s.o., having two graphic and non-graphic data and information files).

Final results of the information system implementation (ISI), at a regional level, are consisting of graphical information (one- and multi-thematic) derived from AMTM to be mapped on the cadastral-thematic maps (mining, urban, agricultural, forestry, a.s.o.), geo-thematic maps (geology, hydrology, climate, a.s.o.) and non-graphic information, as well (see the diagram in the Appendix 1).

#### MODELLING THEORY (MT) AND TERRITORIAL MANAGEMENT : CATMD TECHNOLOGICAL FLOW

Territorial Management is more and more known (Botez and Celac, 1980) as a main field of activity within the applied prospective matters, owing to its integrated long-sighted investigation feature.

Various social-space subsystem elements are "located" on the same territorial support; they are of various natures and stretches and, sometimes, are interfering each other in very strange involved ways.

So, based on a just assumed "radiography" the managed space structure within a territorial system can reveal the relationships among internal subsystem elements, among the different space territorial management subsystems (UP, RP, FM, a.s.o.), among them and environment - that one outside the MB perimeter (see Figure 2).

The large aerial-space image category includes, also, the model subcategory, as it will be shown below. To compile a "true model" (showing "that very day" occurrence within a territorial subsystem), including management variants proper to the territorial management objectives, modelling is carried out concurrently with the thematic designing.

Any space model representation should start with the land plane and/or three dimensional representation itself - the elevation land model (ELM) - knowing its dynamic

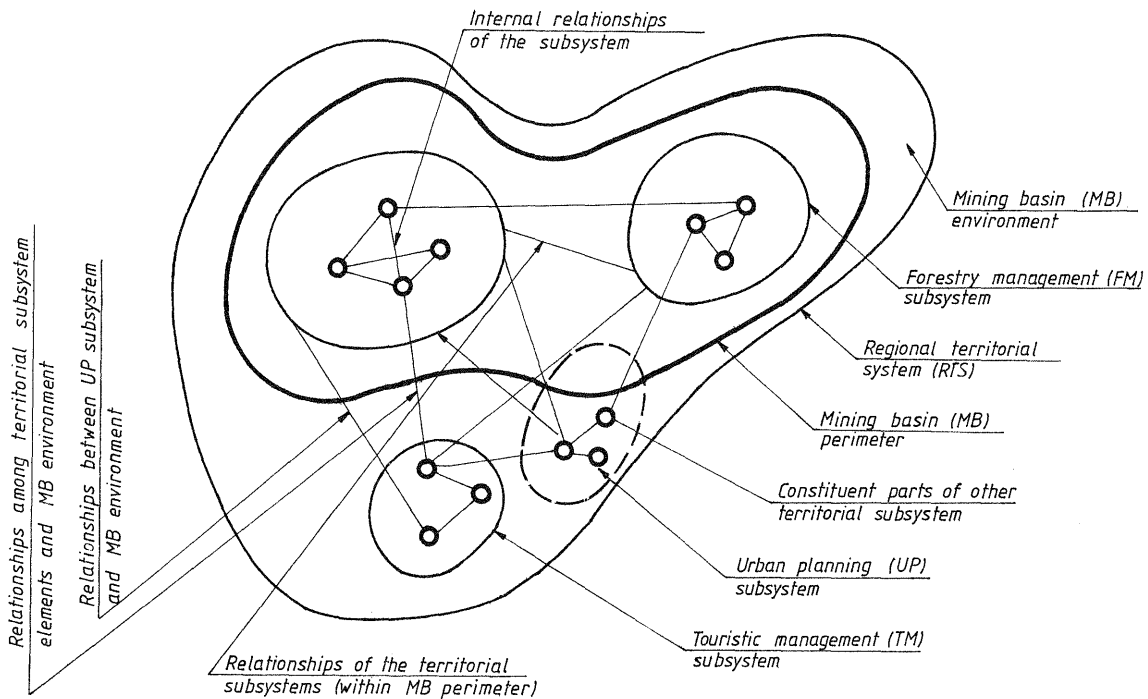


Figure 2. Territorial Management Structure

evolution ("up-to-date").

Finally, there is a (virtual) "assemblage" of the thematic digital representing models for the territorial subsystems, to obtain the best alternative sceneries proper to the territorial management, i.e. "complementary elements" of the territorial management designing objectives. Obviously, it is a prerequisite condition to investigate the dynamics and most likely state-of-art within the space territorial management subsystems during the decisions taken (among those which have been proposed) are to be implemented (and after they have been implemented), including. The techniques should be classified according to the matter specifications: (a) generating model elements; (b) identifying relationships among them; (c) describing the future system functions and behaviour. Some prognosis development (PD) studies making changes arising over the land evident (environmental processes and factors) and, generally, knowing the predictive regional planning (RP) function, after land cover (LC) had been previously established, have been accomplished.

Rigorous studies on future investigations (FI) are absolutely required by the territorial management designing. Past and present-day arguments (related to the classical logical rules) and future ones (related to the likely logical rules) are also needed, in our desire to know the future trends on space territorial management subsystem evolutions.

Undoubtly, the technological flow related

to computer-assisted territorial management designing (CATMD) arises from LIS/GIS integrated data and information base (graphic copies: cadastral-thematic digital and geo-thematic maps; non-graphic and synthesis data and information), special data and information bases on territorial management designing and special data and information bases on legal matters, as well.

Later on, the second stage based on both computing algorithms and programmes to process data in computer-assisted territorial management designing (CATMD), and other programmes (automatic drawing, area computation, highly technical, economic and juridical developments) takes place, to finally design the proper managements: urban planning (UP), rural planning (RP), hydrographical management (HM), forestry management (FM), touristic management (TM), a.s.o. The third AMTM technological flow stage is the automatic mapping for territorial management, considering the designed topographical configuration, when a variant is to be designed. After a great many sceneries had been experienced, the best variant to be implemented used data and analyses to apply the chosen territorial management designs on the ground (see diagram in Appendix 2).

#### SKETCH-MATRIX FOR RESOURCE MANAGEMENT OR AMTM/CATMD METHODOLOGICAL STRUCTURE

The lack of balance among the space-support and the existing social functions are mainly due to a prevailing industry location within an economic subsystem (open and un-

deground coal mining), nevertheless, proper to the mining basin related to our territorial system (Gorj District). We are located within an ab initio given and limited space together with the obvious unrecoverable resources. We are faced with concerns designing new functions compatible or proper to the damaged environment (thus, imposing some limits on defining and developing new functions). It is well known that such a "daily event" extending over a "selenian landscape", as it is that coal mining, does not confine itself to mere direct effects on the environment. Through their associated phenomena, the power branch has entailed striking changes related to the urban or rural networks, hydrographical and communication networks, usual agricultural development, as well as, the people's cultural habitat, over the whole region.

Within that dynamical context, large qualitative and quantitative changes, we have seen, should be also mentioned, just to recall the main concern of that applied prospective task.

The question "what is it ?" could not be answered without a ceaseless appeal to "what was it ?" and "what will it be ?". Obviously, the linkage among the past, present and future implies the space model representation of the managed territorial subsystem. Assumed as the wit "amplifiers", those models on various territorial management categories, based on an esta-

blished "space-time" ratio, have in view to make sets-up helping the judgement to go beyond the common analysis of the initial investigation object (space subsystem to be managed), thus, to conceive images on the anatomy, physiology and behaviour of the other space management subsystems within the territorial system.

Space poly-functions are, therefore, resulting in a sketch-matrix managing resources delineated by the space, the land economic requirements, power conditions and environmental protection. They are the main key concepts, which should be taken into account, when our monitoring and designing are envisaged.

Nowadays, designing "on separate parts" by individual specialists is no longer a valid solution (e.g. urban planning without any reference to the land management, hydrographical, forestry and/or touristic ones). a multi-disciplinary team assuring a "cooperative designing" is now under consideration.

The sketch-matrix concept is a two-dimensional methodological structure on the information and technological flow integrations : (1) LIS/GIS information (on line : primary sources - thematic products); (2) AMTM/CATMD technological (on column: automatic mapping in territorial monitoring - computer-assisted territorial management designing), to manage potential and existing resources of the mining basin within the

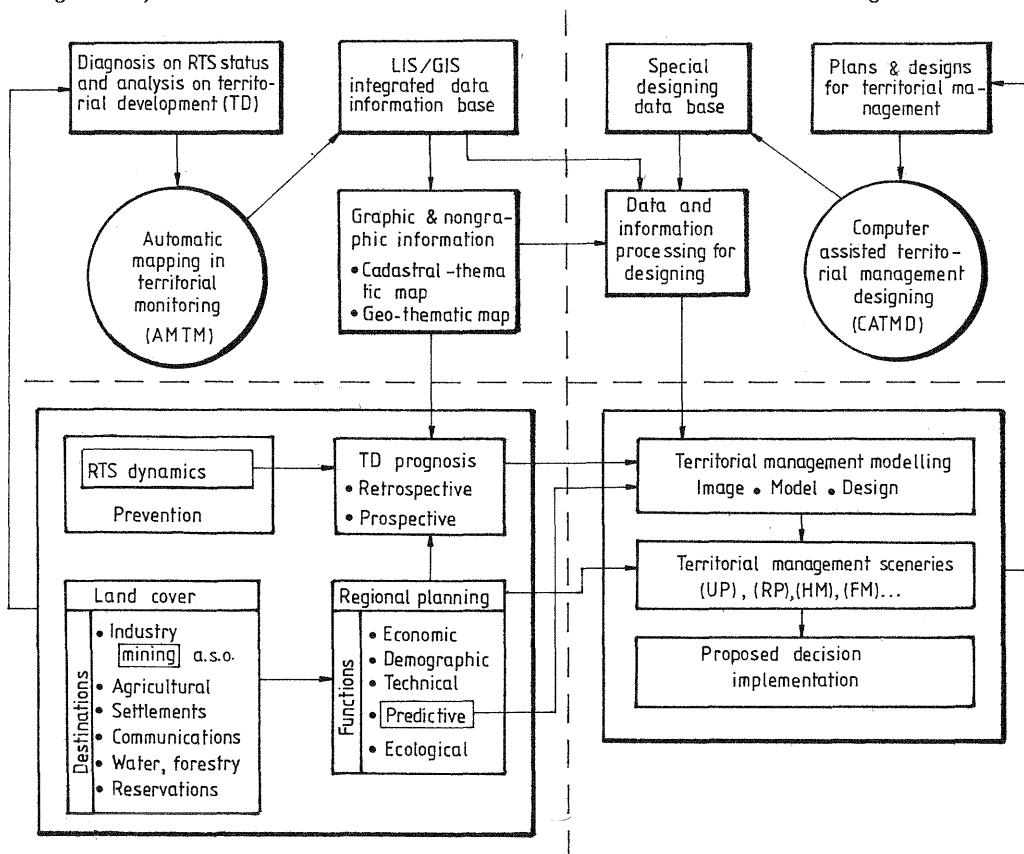


Figure 3. AMTM/CATMD Methodological Structure

RTS. At the same time, techniques and procedures in their suitable succession and joining up within AMTM/CATMD methodological structure are also given (see Figure 3).

#### PRELIMINARY CONCLUSIONS

This paper has an obvious heuristic character defining and integrating LIS/GIS information systems to monitor and manage various zones within an open and underground MB perimeter, which effects are to be seen over the whole RTS. At the same time, an unitary methodological structure, i.e. the so-called sketch-matrix on regional resource management has been accomplished; so, connections between AMTM information and CATMD technological flows have resulted. As the system analysis (SA), the modelling theory (MT) has also regarded the phenomenon regional territorial study to be full of promises: breaking up territorial management designing elements into their constituent parts and their subsequent re-arrangement within a configuration structured on objectives, means and resources. Some special conclusions on RTS monitoring and territorial management designing will be given below.

#### On Territorial Monitoring

(1) LIS/GIS integrated information system requires a cooperation among the geoscience branches. There will be actual conditions on inter- and multi-disciplinary development: satellite imagery and space photographs for macro sizes, aerial and terrestrial photographs for micro sizes. Aerial-space and terrestrial information supports entail very good results for the global/regional study on the environmental balance and status within MB and its adjoining zones. Analysis and prognosis on various social-space ecosystems/subsystems within a RTS could be both derived.

(2) It is compulsory to highly evaluate aerial and space image information, using processing procedures and equipment, to compile various scale thematic maps, with photographic, graphic and digital representations (the last one to be generalized, thus, passing from an experimental stage to an operational one).

(3) To assure a proper interrelation among the special-subject matters of the approached theme, a standard terminology should be established. This paper tries to make the first attempts.

#### On Territorial Management

(4) Undoubtly, it is useful to complete an alternative strategy on territorial management, based on the actual land features and their determinations.

(5) "Space coordination" should not be seen as a mere regional coordination (to transform the managed region into an "autarchic entity"), but as a land management ensemble with some prevailing activities possibly supplemented in or from other regions/districts.

(6) Handicraftsman's designing should be

replaced by an inter- and multi-disciplinary team in the territorial management designing. Besides the space system designers, system analysts should be also included.

Territorial management designing could be included into both the territorial development (TD) prognosis and the best territorial management sceneries, only if it had been conceived as a system, and the modelling theory had been used.

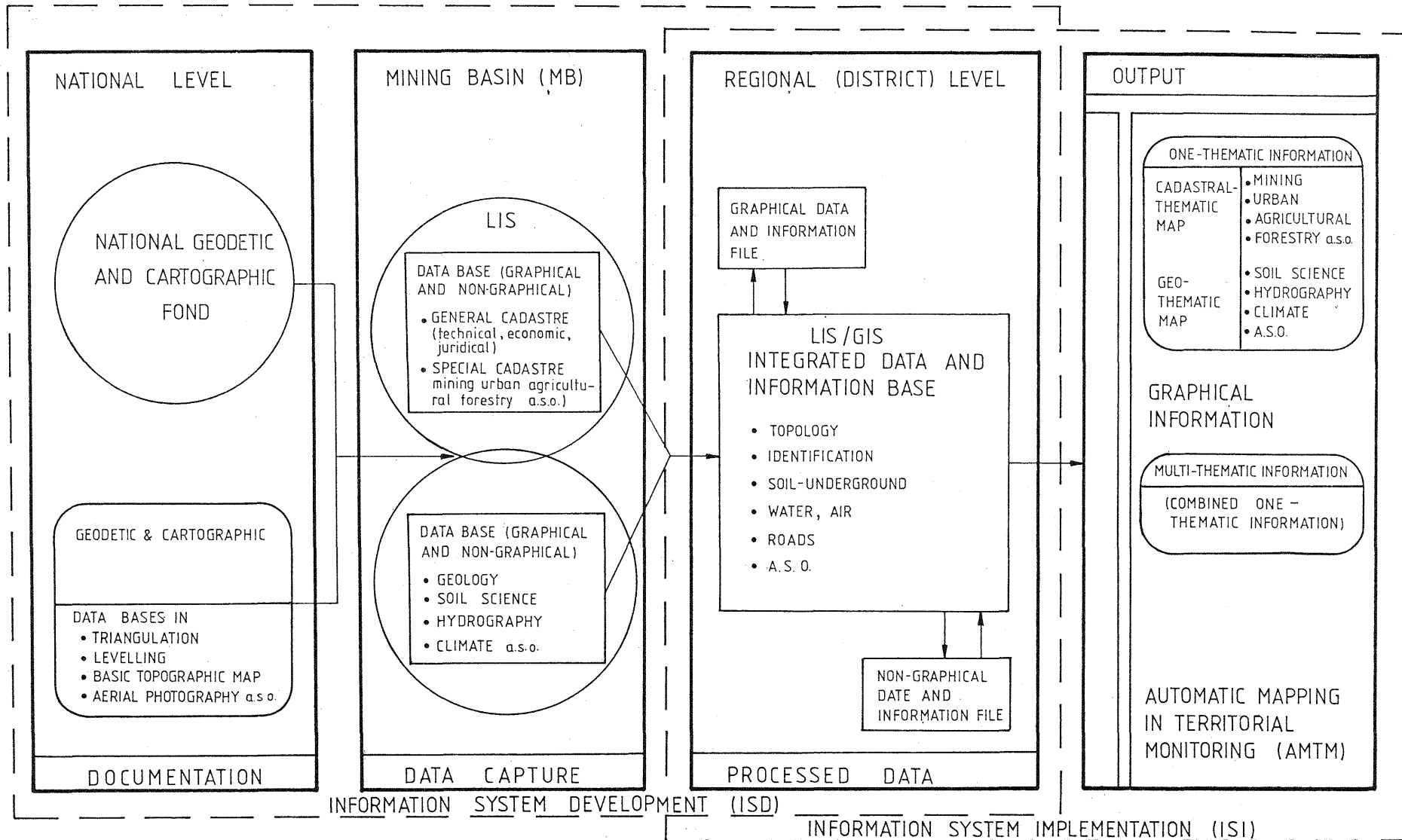
At last, as a general conclusion, we say once again "there is no harm to investigate aiming at some changes to be done", even if, as it is often endorsed, the natural conditions "should lay down" the regional geographical distribution of the economic activities, in our instance, an intensive open and underground coal mining.

Obviously, "there is a very harm" to keep on with that ever lasting prevailing economy - in fact, a paradox - which could further "convict" the natural environment (space-support) to know a tiagical selonian destiny.

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LIS/GIS Integrated Information Flowline  
and Automatic Mapping in Territorial Monitoring (AMTM)



Technological Flowline in Computer Assisted Territorial Management Designing (CATMD)

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