INCREASING PERFORMANCES OF EXPLOITATION TECHNOLOGIES USING DATA FROM A GEO-INFORMATIONAL MODEL

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Abstract: *The paper present a geo-informational model with data of a relevant degree of usefulness in mine monitor performances of exploitation technologies. This model could be generated in each mine and the data offered by it have a significant influence on the behaviour of machines, machinery and equipment in the extraction process.*

In underground coal extraction, identification of the content and characteristics of two principal types of processes is a significant concern. These are:

a). Physical – mechanical processes occurring in the seam and surrounding rocks (changes in the rock layers in the roof and floor, geotectonic, geo-mechanical elements, hydro-geological aspects, geodynamic regime, etc.).

b). Technological mining process (technologies ad performances, economic, management, social etc. elements related to mining).

In this context, the necessity of creating a general geo-informational model of physical and technical extraction process of useful substance is justified. The character of data commonly obtained in mines, their various collecting methods, storage, processing and obtaining information useful to decision makers contribute to the rationalization of using extraction technologies, and maximization of quantitative and qualitative results expected in mines, respectively.

At present, in the Jiu Valley mines for instance, various monitoring sub-systems for extraction are created and they prove to be operational. All these informational entities supply information to the board of directors of the mines, generating adequate decision support. All the more, the positive operational sides of these sub-systems could be methodically united. A new integrated operational system might be generated for the coalfield, but the practical scientific task is quantification of the network of the respective model, by which selected information be passed, of a relevant degree of usefulness (Fig. 1).

In the last 15 – 20 years, it is evident that the attention of extraction strategy builders and of practitioners has been redirected from "quantitative information" to "qualitative information". Having in view that modern information technologies offer a positive premise for complex technical, technological, economic etc. data collection from the extraction process, the volume of information possible to be collected being enormous, the concern for rationalization of search for useful information flows for decision makers, so that they might effectively convert the extraction programs at required performance parameters, is justified.

The latest literature in the field shows a higher difficulty in monitoring in the case of variation of physical and mechanical parameters of the seam and surrounding rocks. Unlike the constructive – functional parameters of mining equipment for instance, the geo – mining conditions can not be changed. At the most, they might be counteracted in the extraction process, by perfecting technologies that would become capable of technologically and technically crossing the formations containing the useful substance and the seam itself.

$S_b - S_1$; $S_b - S_2$, … *operational information subsystems;*
FM *information on physical and mechanical processes of the seam and surrounding rocks;*
TM *information on technological exploitation processes;*
G_R^U *relevant degree of usefulness of information*;
G_{NR}^U *irrelevant degree of usefulness of information;*
$[S_b - S_1]^{FM}(G_R^U)$; … *subsystem selected with information with relevant degree of usefulness (related to FM processes);*
$S_b - S_1]^{TM}(G_R^U)$; … *subsystem selected with information with irrelevant degree of usefulness (related to TM processes.)*

According to V.P. Potapov and B.V. Vlascenco (2001) following a monitoring of the geological situation of 150 mining perimeters for coal extraction, viewing a deposit of over 3 billion tons, in Kuzbass coalfield, fundamental significant data were obtained for drawing up more rational and economical exploitation decisions. An original electronic data storage version was created, in the form of a "geological hypertext", for decisional support in substantiating the selection of extraction technologies.

The concern for a possible creation of a geo-informational model for the Jiu Valley mines is entirely motivated in the modern informational context.

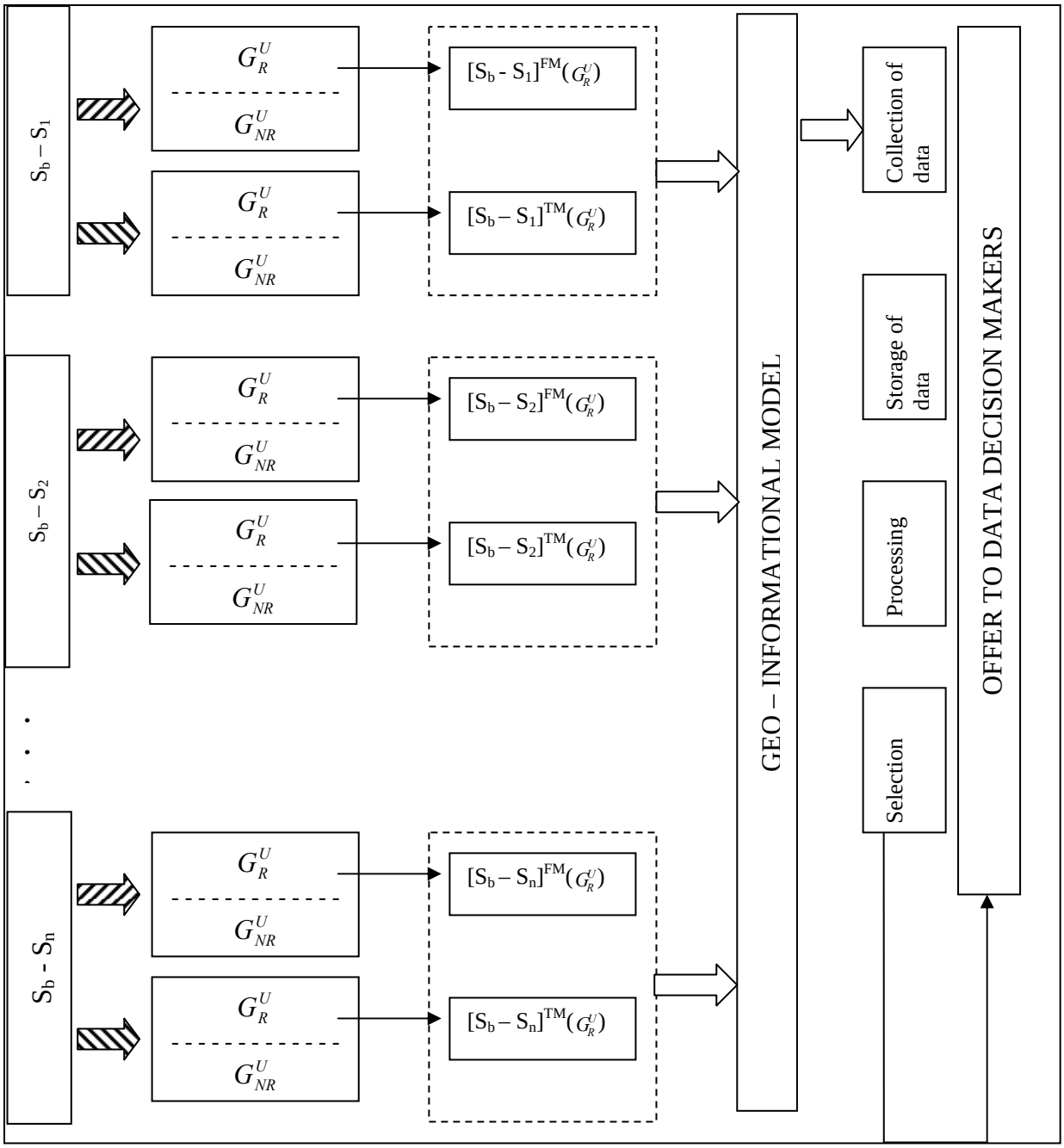

Fig. 1 Elements for generating a geo-informational model with data of relevant degree of usefulness in mines to monitor performances of exploitation technologies.

CONCLUSIONS

1. Identification of parameters, characteristics and content of data related to extraction process in coal mines is a common, necessary, objective concern of decision makers in the field. “Quantitative” information flows should be replaced with “qualitative” information flows.

2. Extraction monitoring subsystems should be reconsidered, by “technological personalization”, according to the specific attribute of each mine’s extraction characteristics.
3. It is possible to generate in each mine constitutive elements of geo-informational models, for the offer of data, useful for extraction rationalization by increasing technological extraction performances.
4. Monitoring and control of geological and mining data is rather difficult compared to similar technology related operations; nevertheless, they have a significant influence on the behavior of machines, machinery and equipment in the extraction process.

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