

Chapter 14

Theoretical and Technological Perspectives on Development of Information Monitoring System for Solving Complex Problems

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ABSTRACT

The authors propose an approach to addressing cross-sectoral integration and use of fragmented sectoral statistics within a single, thematically invariant monitoring system and a new concept of the complex infrastructure of the territory (CIT). For formalized representation of CIT, they proposed a four-level information and a mathematical model. The authors propose a method for integrating of same e-technologies (OLAP, data mining, and GIS technologies) for solving complex monitoring infrastructure and all problems in subject of state. The chapter discusses the perspective approach to addressing cross-sectoral integration and use of fragmented sectoral statistics within a single, thematically invariant monitoring system and a new concept of the complex infrastructure of the territory (CIT). For formalized representation of CIT proposed four-level information and a mathematical model. The authors propose a method for integrating of same e-technologies (OLAP, data mining, and GIS technologies) for solving complex monitoring infrastructure and all problems in subject of world state.

INTRODUCTION

The problem of operational control decision-making in various spheres of human activity started today on a new level of complexity. This is due, primarily, a continuous increase in the volume and dynamics of information flows, requiring a careful analysis on the part of decision maker's person (DMP). Obviously, the DMP need such software tools, which in a certain scale territorial coverage, would allow to

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effectively analyze and monitor controlled systems, taking into account current realities of the information society. We should not simply consider fact ology happening, but also have the means to perform the following control tasks:

1. Installation information links, dependencies and influences between different segments of built and natural environments, economic sectors and industries and definition channels through which these effects occur.
2. Construction of analytical sections and samples for any combination of thematic layers. The information space is multidimensional and to deal adequately with it entirely for further development of any local control decisions, often simply impossible and impractical. In this case, the DMP to provide reasonable means to solve the problems of expert abstraction, generalization, classification, and thereby minimize the maximum information space, which is considered a controlled process.
3. Find hidden trends, resonances and the relationships between various human processes (identifying high-order nonlinearities).
4. Automated report generation, visual and optimally saturated with useful information.
5. Provide analytical works very different specificity. And at the DMP should be able to build a picture of their individual subordinate infrastructures, which could include personal experience.

Thus, it is a formalized means for accumulating knowledge and control experience. The problem of operational control decision-making in various spheres of human activity started today on a new level of complexity. This is due, primarily, a continuous increase in the volume and dynamics of information flows, requiring a careful analysis on the part of decision maker's person (DMP). Obviously, the DMP need such software tools, which in a certain scale territorial coverage, would allow to effectively analyze and monitor controlled systems, taking into account current realities of the information society. We should not simply consider fact ology happening, but also have the means to perform the following control tasks:

1. Installation information links, dependencies and influences between different segments of built and natural environments, economic sectors and industries and definition channels through which these effects occur. Such a task can be called the problem of constructing a communicative space, followed by the ranking data communications on levels of efficiency.
2. Construction of analytical sections and samples for any combination of thematic layers. The information space is multidimensional and to deal adequately with it entirely for further development of any local control decisions, often simply impossible and impractical. In this case, the DMP to provide reasonable means to solve the problems of expert abstraction, generalization, classification, and thereby minimize the maximum information space, which is considered a controlled process. However, it should be borne in mind that in a resonant medium, excluding from consideration any irrelevant at first glance processes, there is a risk thereby misses important factors and patterns. One solution to this problem is the simultaneous construction of several analytical sections with different subjective points of view on the same process. Subsequent comparison of the results of analysis and decisions increases the probability of finding the system-laws.
3. Find hidden trends, resonances and the relationships between various human processes (identifying high-order nonlinearities). The possession of such relationships will allow controllers to develop of solutions, which in some cases will effectively achieve its goals for sufficiently soft reaction control object (this is due to invisibility of control actions and their low intensity).

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