

# Monitoring as an Information, Diagnostic, Scientific, and Prognostic System

Razumovskiy E.A.

Russian State University of Physical Education, Sport,  
Youth and Tourism  
Moscow, Russia.  
evgazum@mail.ru

Mescheryakov A.V.

I.N. Ulyanov State Pedagogical University  
Ulyanovsk, Russia  
aleksei236632@yandex.ru

Nazarenko L.D.

I.N. Ulyanov State Pedagogical University  
Ulyanovsk, Russia  
ld\_nazarenko@mail.ru

**Abstract**—The uses of monitoring are extremely diverse. Numerous monitoring systems have some common characteristics, which makes it possible to talk about monitoring as an integral independent scientific and practical phenomenon, which is interdisciplinary in nature. Monitoring problems in all areas of its use are being solved simultaneously: at the level of their theoretical understanding and at the level of its practical implementation. The existence of a large number of different monitoring systems gives rise to the need for their certain ordering. We have attempted to classify existing monitoring systems on several grounds.

**Keywords**—*monitoring; control; management; system; classification*

## I. INTRODUCTION

The result of an extra-class, to the achievement of which, ultimately, the training process is directed, is inconceivable without constant comprehensive control over the state of the athlete's body. It should be born in mind that due to individual genotypically determined features in different phases of training, the state of the body can vary over a wide range, one of the facets of which is pathology. For athletes to achieve the maximum possible sports results, it is necessary to have objective information about the comprehensive preparedness of each athlete and the correction of his training process in accordance with his condition. An important role in this is played by the process of scientific and methodological support (NMO) for training athletes [3].

According to scientists [1, 2-4, 6, 7, 9-12], the management algorithm of highly qualified athletes training process should be built and based on:

- on the determination of individual pulse criteria for the intensity of the training load in accordance with the preparation period;

- on the determination of the nature of training and competitive loads based on the use of group average, standard and individual pulse criteria for the intensity of the load, determined in the conditions of training sessions according to the speed of movement and heart rate;
- on the analysis of load accounting data and the results of testing motor qualities;
- on the development of managerial decisions on the correction of training programs depending on the nature of the body's adaptation processes to physical activity.

Thus, it is possible to carry out effective management in the presence of information obtained during monitoring.

Monitoring is understood as an integrated system of regulated periodic observations, estimates and forecasts of changes in the state of an object with the aim of identifying negative changes and making recommendations for their elimination or weakening. The uses of monitoring are extremely diverse. The existence of a large number of different monitoring systems gives rise to the need for their certain ordering.

## II. LITERATURE REVIEW

Monitoring can be considered as an informational, diagnostic, scientific, forecasting system, the implementation of which is carried out as part of management activities [8]. In interdisciplinary (physical-sports) relations, monitoring refers to the activities of various sports organizations in monitoring the fulfillment by organizations of their obligations in practical activities. Monitoring mechanisms can be of a different nature: these include, for example, units of the ministry of sports, sports federations and associations, educational and scientific structures, etc [5, 13]. Within the

framework of sociology, monitoring can be used to solve various problems. For example, I.V. Bestuzhev-Lada considers monitoring as a means of ensuring the effective functioning of the forecasting system [8]. The forecasting system he presented is based on a systematic, specially organized survey of experts [5, 13]. At the same time, the author notes that forecasting does not come down to unconditional predictions, but aims to weigh in advance the possible consequences of decisions made using purely conditional predictions of a search and regulatory nature. The ongoing search for reserves to increase the performance of athletes and individuals whose activities take place in extreme conditions determines the relevance of applying special technologies [8, 14, 15].

### III. RESULTS

The monitoring result is a set of measured values of the parameters obtained at inextricably adjacent to each other time intervals during which the parameter values do not change significantly. Monitoring includes the following main practical areas:

- monitoring (control) of the object state;
- assessment of the facility actual condition;
- prediction of the object state as a result of possible impacts.

The development of a monitoring system is possible when determining from a variety of causal relationships certain indicators that emphasize the most important reflection of conditions and causes, inform about the stability of any indicators and the quality of their development.

The classification of monitoring systems for the dynamics of the athlete's body functions, which determine a high sports result, also involves observations (research and registration) based on assessment, analysis and examination methods for individual pedagogical and biological indicators and characteristics.

During monitoring information is collected and processed that can be used to inform the consumer (athlete, group, organization, team) as well as a feedback tool in order to implement projects, evaluate programs or develop strategies and tactics. It carries one or more of three organizational functions:

- reveals the state of critical or in a state of changing environmental phenomena in relation to which actions for the future will be developed;
- establishes relationships with his environment, providing feedback on previous successes and failures of a particular policy or program;
- establishes compliance with rules and contractual obligations.

The main stages of building a forecast: initial indicators, forecasting background, search development and building a “tree” of promising problems to be solved by controls, normative development based on a “goal tree” according to predetermined criteria, building a “tree of optimal solutions” [4, 5]. But, as soon as the decisions made are put into practice,

the forecasted situation begins to change. In addition, it changes objectively, under the influence of the forecast background factors. Since the object of research is moving into a new quality, for these reasons the “worked-out” forecast is not suitable for subsequent decisions, a new one is needed.

We have proposed additional monitoring principles (in italics):

1. Efficiency – should be expressed not so much in the receipt, processing of information, but in the efficiency of decision-making in critical situations.

2. Objectivity of information: information should reflect the real state of affairs

3. Relevance – relevance of the methods used to collect information to the monitoring objectives and means of its organization.

4. Adequacy – compliance of the means and methods used to obtain data with the goals and objectives of control.

5. Predictability – focus on the forecast, predict the future state of the studied object.

6. Scientific.

7. Consistency – validation verification of the expected relationship between the results of a particular methodology and indicators of other methods that measure similar characteristics.

8. Integrity – continuity of the triad monitoring-examination-management.

But at the same time, it is possible to talk about the monitoring-forecast-management triad, since examination is more a procedural concept.

9. Continuity – obligatory implementation of all stages of monitoring.

10. Comparability of data: the comparison is correct in the case of studying the same object on the basis of the same indicators.

11. Information transparency – a necessary condition for management effectiveness. All research and observation results should be accessible to managers (trainers, doctors, and athletes). Users must formulate their requirements when designing monitoring programs.

12. Priority of management – is a universal sign for monitoring in general, in the event that management will be considered in the broad sense of the word and will include the formation or impact on public consciousness.

Numerous monitoring systems have some common characteristics, which makes it possible to talk about monitoring as an integral independent scientific and practical phenomenon. Differences in the interpretation of the essence of monitoring, in the goal-setting and means of its implementation – reflect the specificity and level of monitoring problems development in each of its application areas.

### IV. CONCLUSION

The following conclusions can be drawn from the above review:

1. Monitoring objects are dynamic, are in constant development. They are subject to external influences, which

can cause unwanted changes in the operation of the facility and pose a danger to the user with monitoring information.

2. The implementation of monitoring involves the organization of the object continuous monitoring as possible. The measure of constancy is determined by the characteristics of the object and resource capabilities.

3. The organization of monitoring involves the selection of reasonable indicators.

4. Monitoring implies the presence of the main, or one of the forecasting stages of an object development (state change).

5. Each specific monitoring system is focused on a specific consumer. These may be: a specific governing body (s), separate (usually social and professional) groups, society as a whole.

6. Existing monitoring systems can be classified on a number of grounds. These include:

- scope of application;
- funds used to collect baseline information;
- potential users;
- measuring instruments;
- methods of disseminating information;
- implementation time;
- breadth of coverage.

Thus, monitoring problems in all spheres of its use are solved simultaneously both at the level of their theoretical understanding and at the level of its practical implementation.

We believe that a sufficient amount of time and effort will be required for a complex multicomponent complex of various areas of biomedical knowledge to take its rightful place in the formation of individual methods for achieving extra-class results. And the resulting data would clearly fit into the general concept of training highly qualified athletes.

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