THE SCIENTIFIC RESEARCH MANAGEMENT WITHIN A HIGHER EDUCATION INSTITUTION

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Abstract:
The higher education system and the scientific research must assure a solid education and lead to the development of fine intellectuals, and the globalization process. Scientific research management within higher education institutions is a challenge that would be optimally solved by using modern solutions offered by the information technologies. A software platform that is based upon a performant database system offers the possibilities to keep a clear evidence of all information related to the individual research activities, and also related to the research projects that the university is involved in.

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Every human activity is always characterized through factual entities, be them expressed numerically or by a non-numerical perception or observation. These entities are called *data*. By processing data through a generic means of alteration we obtain *information*. Information that derives from other information, on a rational basis, becomes *knowledge*.

Given this context, we can make the affirmation that the same data can present different utilities for different observers, depending on the level of previous knowledge and the observer's position relative to the object. In other words, a piece of information is valuable only if it can be used [Niţchi, Racoviţan, 2003].

After 1990 [Beyond], the data-information level was considered to be one of the primary levels in information and communication technologies (ICT) applied in economics. One of the secondary levels is that of information obtained from other information through ratiocination. This level is considered to be the *knowledge* level.

Watters was defining (1992) knowledge like the following: "The knowledge includes the ability of evaluating information for a specific purpose. Possessing knowledge or the ability to perform complex tasks presumes more than having a list of instructions or necessary information; the capability of manipulating information or tasks is mandatory".

We must mention the fact that knowledge cannot be obtained from any kind of data or information. Some information is already present within the receiver's knowledge, so it cannot generate new information. On the other hand, some information might not have any significance for the receiver because it is integrated within its knowledge. For example, a specialist who is not interested in computer science and considers he/she can work without the assistance of a computer will find the information within this course irrelevant and will not constitute any knowledge for him.

The educational system of a country is determinative for the level of that society and for our country to get in line with the European standards, to integrate into the

European Union it is mandatory to restructure the educational system and the scientific research system in order to obtain a superior quality for these.

The higher education system and the scientific research must assure a solid education and lead to the development of fine intellectuals, and the globalization process, by implementing the knowledge based information society, brings great challenges in the domain of science and knowledge development.

The information and knowledge society cannot be developed without research and investment projects, in the information and communication technologies domain as much as in education.

In universities the high level scientific research is a must, complementary to the teaching activity. The idea on which a successful high education system is based on is that the didactic activity is in connection with the scientific activity, as a university cannot "survive" only through didactic activity. In high level universities from developed countries a professor's activity is being evaluated twice a year and the main evaluation parameters are: citations, new courses introduced in the curricula, the percentage of updated courses, research grants etc. These are evaluation criterion that we will have to embrace.

A great challenge for the didactic stuff in a high education institution is the financing of research projects, and the participation in such projects, but especially managing such projects, has become a must in the evaluation process of the academic stuff in order to be promoted as an associate professor or a full professor.

The dynamics of the information society must be sustained by a quality education, by a proper legal frame, by a strong research field and not at last by the required material and financial means.

Overall, the general aiming of universities regarding scientific research would be the following:
- ➢ the improvement of the researchers' performances in order to increase the international visibility of the higher education institution;
- ➢ the development, from a quantitative and qualitative point of view, of the research infrastructure, that is needed in order to obtain performance research;
- ➢ the efficiency of the research management system by using information and communication technologies;
- ➢ developing some collaborations with other higher education institutions but also private enterprises, in order to develop some major research projects.

Universities represent the rocket launcher of future intellectuals which will take care of the proper functionality of the society using their highly acquired skills, and for them to be able to correspond to the requirements we must provide a high quality educational environment. This goal can be achieved only if the teachers are well-prepared regarding their didactic activity but also regarding their scientific research activities, which implicitly leads to improvement and completion of the didactic one. The scientific research will only become performing and efficient if in Romanian universities the several values will be developed: the concept of the well done thing, the free circulation of ideas, and, of course, the self confidence and optimism of the researchers.

Scientific research management within higher education institutions is a challenge that would be optimally solved by using modern solutions offered by the information technologies.

The scientific research management approached as a system contains the following interconnected subsystems: decision subsystem, information subsystem, methodological subsystem, organization subsystem (Figure 1).
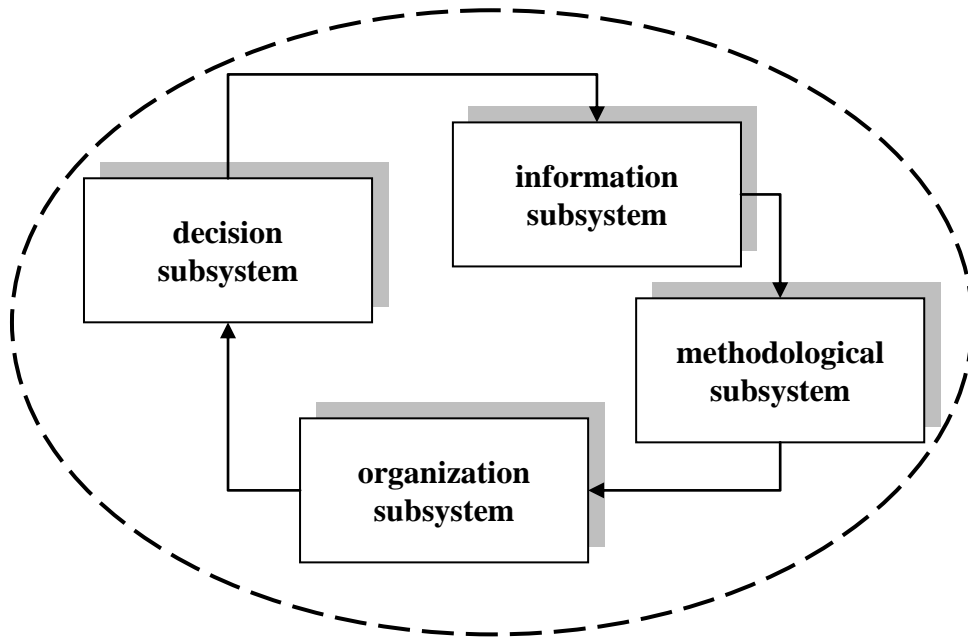
Figure 1. *The subsystems of the scientific research management system*

A software platform that is based upon a performant database system offers the possibilities to keep a clear evidence of all information related to the individual research activities, and also related to the research projects that the university is involved in. A major advantage of this platform will be that it is able to generate in real time reports related to each researcher, each department, each research center, and will allow the efficient and objective reporting on the institutional research status.
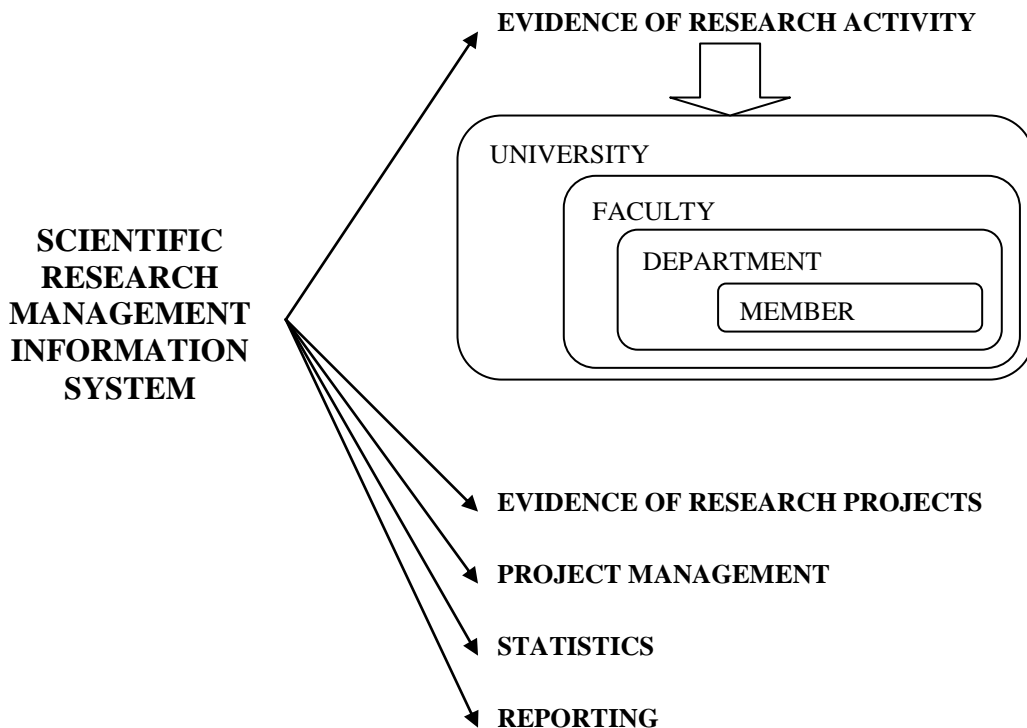

Figure 2. *Scientific research management information system tasks*

The system will be able to generate the periodical reports required by the financing parts of different research projects, and this will make the research team's

activity a lot easier, considering that most of the times the documentation and the reporting part of large research projects are pretty rough. This way we would have a correct evidence of the results of project or grant based research.

Considering the future development of a scientific research management information system at the "Tibiscus" University in Timisoara, it will have to fulfill the following tasks: evidence of research activity of each member of each department, evidence of research of each department, evidence of research of each faculty, evidence of the research projects developed within the university, project management features, statistics regarding the research, reporting regarding the research (Figure 2). The projected system is likely to be developed using Java technologies, Java Server Pages (JSP) and MySQL database management system. As it will have to work online, we will be using Apache Tomcat server and ICEfaces technology, which is a framework wrapper over JSP which brings web components to facilitate and improve the workflow. As the solution we intend to develop will aim to use the latest technologies, we will also use Spring Framework and Spring Security framework for authentication and authorization, and Hybernate framework to allow defining Java classes that are able to automatically communicate with the database system.

Implementing a scientific research management information system is quite a challenge and many institutions would chose to purchase one instead of putting down the effort to develop it, but we strongly consider that the above mentioned system would respond to our exact needs.

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