



# Development of Computer Information System Based on Scientific Research Project Management

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**Abstract.** In the context of information technology era, digital and systematic research management can better improve research capacity building. This paper analyzes the current situation of research project management in research institutions, problems and the process of designing the use of information technology to solve them, and designs and develops a research project management system applicable to research institutions. The system is managed by categorized users so that researchers and managers can grasp research project data information in a hierarchical and real-time manner; it provides convenient automated functions for research and management personnel to process projects and funds using computerized means, which significantly improves the efficiency of research project and fund management.

**Keywords:** Scientific research management · Information system · Scientific research project management · Research fund management

## 1 Introduction

Computer information system is a man-machine system composed of computers and their related and supporting equipment and facilities, which collects, processes, stores, transmits and retrieves information according to certain application objectives and rules. The use of computer information systems to enhance the management of research projects is one of the main technical skills of information management and information system professionals. With the continuous improvement of the quality of research managers and the rapid development of computer technology, the computerized management of research projects has become an essential means. Build a set of research project management system suitable for scientific research organizations, in order to make the level of research project management and work efficiency greatly improved, so as to promote the research management work to the next level.

## 2 Needs of Research Organizations for a Research Project Management System

As the state attaches importance to scientific research, the number of projects on scientific research topics has also increased rapidly, and scientific research organizations have encountered many difficulties in project management.

- (1) **Time-consuming management of research grant reimbursement and other tasks under the traditional model.** The long-standing problem with the traditional model is that it is time-consuming, laborious, and inaccurate for researchers to manage research grants manually by themselves. Researchers' main focus should be on learning and research activities, but often they need to spend a certain amount of energy to record, organize and check the use of funds.
- (2) **Multiple management leads to data asymmetry between the financial department and the research management department, the information and data are used independently of each other.** And the research management department pays more attention to the management of project establishment and budget adjustment, while the financial department pays attention to the management of the truthfulness and reasonableness of the fund expenditures. Financial research funding data is not publicly available. In order to verify the accuracy of funding data between the two systems, financial funding administrators must export funding details and account summary data subject by subject and distribute them to each subject group. With the increase in the number of scientific research projects, regular manual feedback from finance on the use of funds for scientific research topics is becoming more and more time-consuming, and the frequency of financial funding feedback will become less and less frequent.
- (3) Research funding data timeliness of the bottom of the financial funding data and researchers record data originally have tax and other inconsistencies, coupled with the lag of financial feedback data, to a certain extent, may result in the use of funds deviation or even over-expenditures, manual operation of the uncertainty caused by the deviation is getting bigger and bigger. In addition, due to manual management, it is difficult for the research management department to manage funds. The research management department has no real-time access to the management status of project funds, etc., and is unable to be informed of any problems in a timely manner.

## 3 Development of Scientific Research Management Computer System

### 3.1 System Development Goals

The above problems can be solved by means of information technology, and a "research project management system" can be established for research institutions to achieve informationization of research project management and automation of funding data processing.

- (1) **Realize the digitization of scientific research management.** First of all, we need to digitize research data and information, including research project contracts, documents and funding data. Researchers and managers can find and manage document data online, saving time in searching for paper files and improving work efficiency.
- (2) **The most important work in research management is the management of research projects and results.** By constructing a management system, we can realize the access and analysis functions of the project database and the result database, and we must also realize the authority management of hierarchical classification in order to control the access scope of different personnel
- (3) **Real-time feedback of funding dynamics is an important part of research project management.** By viewing the current funding status in real time, it can save researchers and managers a lot of time in funding management.. “Scientific research project management system” can be web site B / S structure in the form of architecture, in order to achieve the user at any time and any place through the network access to the system, through the browser login access to realize the different users of the project management and project funding management, the whole system is simple and efficient, to achieve the scientific research management work of the network and real-time.

### 3.2 System Development and Design

Research project management is mainly the management of research projects and funds. The management of research projects mainly includes the basic information of project name, start and end time, source, project team members, budget, project status, etc. and the management of project files; the management of funds refers to the data of project fund arrival, detailed data of project reimbursement, account summary data, and balance data. To build the “research management system”, we need to include the “project database” and “funding database”. The “project database” needs to build “project table”, project attachment document table, project budget table and other data tables; the “funding database” involves the financial system data. The financial system will periodically push the funding data to the intermediate repository for the “research management system” to access the funding data.

### 3.3 Realization of System Function

The system first needs to establish the research project database, which contains the basic information of the projects, so that the relevant personnel can browse the projects and find and count the project data by different ways. Then, on the basis of the project database, the management of project funds is realized, including the management of data such as project fund budget and project fund execution. At the same time, the system can provide different data for people with different authority, such as research project administrators to enter project data; project team leaders to view their own project funds usage; supervisors to view the summary and detailed data of funds usage; ordinary users to browse the project profile of the subject (Fig. 1).

The project development starts with the database design. The above database is developed and designed using SQL database, which involves the database design of

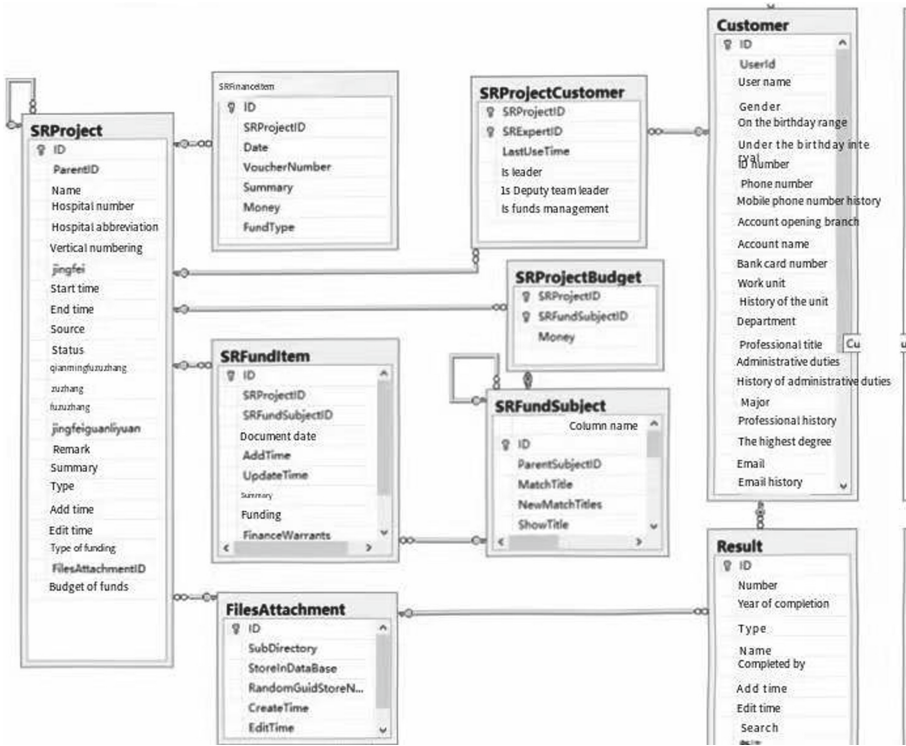


Fig. 1. Database design of scientific research project management system

research project table, project attachment table, funding classification table, funding budget table, funding detail table, user table, project result table, etc. It basically contains the data content required for the function. The system development mainly includes the implementation of the following functions:

(1) **Account Management.**

The system provides different account permissions for ordinary users, project leaders, administrators, etc. Ordinary users can view the “results library”, “project library” and information on the projects they have participated in; the head of the project team can view the information on the use of funds for their own projects; administrators can view the basic information on all the projects, statistical information and information on the use of funds.

(2) **Project management function.**

Basic project information, including name, number, abbreviation, responsible person, source, total funding, start and end time, status, members, attachments and other information. Need to provide project add, delete, modify, view function, different authority account restriction function.

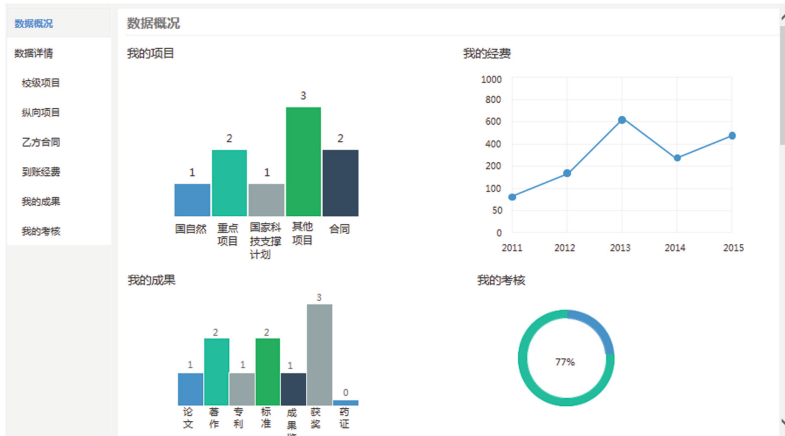


Fig. 2. Data statistics interface

### (3) Fund management function.

In the system, you can check the budget status of the project category, the details of the spent funds and the remaining funds, and alert the user to the overspending situation, etc.

### (4) Management function of scientific research results.

Provide the functions of adding, modifying, deleting and viewing project results. Including the function of registering results for ordinary users and the function of reviewing and managing results for administrators.

The development and implementation of system functions is based on Windows platform, using Microsoft Visual Studio development tools, using C# language, Linq language, ASP.NET MVC2 Web architecture and .Net Framework 4.0 framework development. The unified Windows development platform and framework are relatively mature, easy to develop and maintain, and convenient to develop. The whole system has been developed, tested, improved, tried and formally put into use after more than one year. Some problems and improvements were encountered during project development, e.g., project budgets. In project management, there is a requirement to split a large project into several sub-projects and to manage funds and summarize the management requirements separately, and it is necessary to improve the system functionality to control funds for the sub-projects and the total project separately (Fig. 2).

## 4 Conclusion

The development of the scientific research management system has achieved the set goals and has become a reliable tool for scientific research management. After using this system, researchers can accurately grasp the use, surplus and overspending of project funds, and can also view project files and results information online; research managers can grasp all project data information and fund use information online in real time;

ordinary users can query the public information of projects and results online. By relying on this system tool, we can basically realize the informationization and automation of scientific research project management, which greatly improves the efficiency and reliability of scientific research management.

**Project.** 2021 Humanities and Social Science Research Project of Education Department of Jilin Province: “Research on Innovation of teachers’ scientific Research Evaluation in Vocational Colleges--A Case study of Jilin Province” (Number:JJKH20220905SK); Science and technology service and innovation team in Jilin Communications Polytechnic (Number:JYPYTD 2022-2-6)

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