

## Evaluation of a Web-based Online Grant Application Review Solution

Marius PETRIȘOR<sup>1</sup>, Dana GHIGA<sup>2\*</sup>, Marius MĂRUȘTERI<sup>1</sup>, Vladimir BACĂREA<sup>2</sup>, Tudor CĂLINICI<sup>3</sup>, Anca BACĂREA<sup>4</sup>, Dan SÎMPĂLEAN<sup>1</sup>, Peter OLAH<sup>1</sup>

<sup>1</sup> University of Medicine and Pharmacy Targu-Mures, Department of Medical Informatics and Biostatistics, Gh. Marinescu, 38, Targu-Mures

<sup>2</sup> University of Medicine and Pharmacy Targu-Mures, Department of Medical Scientific Research Methodology, Gh. Marinescu, 38, Targu-Mures.

<sup>3</sup> "Iuliu Hatieganu" University of Medicine and Pharmacy Cluj Napoca, Department of Medical Informatics and Biostatistics, Pasteur no. 6, 400012, Cluj – Napoca, Romania

<sup>4</sup> University of Medicine and Pharmacy Targu-Mures, Department of Pathophysiology, Gh. Marinescu, 38, Targu-Mures.

E-mails: [mariuspetrisor@gmail.com](mailto:mariuspetrisor@gmail.com); [valentinaghiga@gmail.com](mailto:valentinaghiga@gmail.com); [msmarusteri@yahoo.com](mailto:msmarusteri@yahoo.com); [bacarea@yahoo.com](mailto:bacarea@yahoo.com); [tcalinici@umfcluj.ro](mailto:tcalinici@umfcluj.ro); [dan\\_sampalean@yahoo.com](mailto:dan_sampalean@yahoo.com); [olah\\_peter@yahoo.com](mailto:olah_peter@yahoo.com);

\* Author to whom correspondence should be addressed; Tel.: 0040743-18-88-50, Email: [valentinaghiga@gmail.com](mailto:valentinaghiga@gmail.com)

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### Abstract

This paper focuses on the evaluation of a web-based application used in grant application evaluations, software developed in our university, and underlines the need for simple solutions, based on recent technology, specifically tailored to one's needs. We asked the reviewers to answer a short questionnaire, in order to assess their satisfaction with such a web-based grant application evaluation solution. All 20 reviewers accepted to answer the questionnaire, which contained 8 closed items (YES/NO answers) related to reviewer's previous experience in evaluating grant applications, previous use of such software solutions and his familiarity in using computer systems. The presented web-based application, evaluated by the users, shown a high level of acceptance and those respondents stated that they are willing to use such a solution in the future.

**Keywords:** Grant; Peer Review; Software; World Wide Web.

### Introduction

Grant application evaluation is a resource and time consuming activity. Despite its importance in research, there are very few scientific writings on grant application evaluation, as Mayo stated [1], even less on the software involved in this activity. Nowadays, there are available several commercial applications [2,3], but they focus primarily on grant management, rather than grant application evaluation process and using these solutions involves an extra expense for the institutions awarding the grant.

The peer-review process plays an important role in research [4], being used in grant applications evaluation, article submission and promotions of individuals within institutions. Its reliability has

been long debated, one of the topics being the gender bias [5,6]. Still, it seems that peer-review remains the most accepted way of evaluating science-related activities [7].

This paper focuses on the evaluation of a web-based application used in grant application evaluations, software developed in our university, and underlines the need for simple solutions, based on recent technology, specifically tailored to one's needs.

## Material and Method

The grant evaluation process consisted in sending the applications towards two reviewers that activate in the same field of activity. These reviewers would fill in a form that contains the evaluation criteria, granting points from 1 to 10. Thus, at the end, each application would have two scores, ranging from 1 to 100. If the difference between the evaluations is greater than 10 points, a panel evaluation will decide a final score; else, an average of the two would be taken into consideration for the final classification.

In order to achieve this, a need for a fast and secure manner of information exchange has arisen. We decided that the appropriate way of handling this is to create a web application starting from a set of specifications:

- A secure environment, since the data handled is quite sensitive
- Multiple user account types: administrator and reviewer accounts
- A customizable form that contains the grant application evaluation criteria with an intrinsic data input validation
- An alert system, based on email, in order to keep track of what is happening in the system
- A means to save a partially evaluated application, to validate or invalidate it.
- The possibility to export the data to a human readable form (such as an Excel worksheet)

The application was developed using PHP programming language, a MySQL database and an MCV (Model-View-Controller) PHP framework (CodeIgniter), in order to benefit from the advanced security and the ease of data manipulation provided by such a framework. For DOM (Document Object Model) manipulation we used the jQuery javascript library. The web application is hosted on one of the university's server. We made sure that enough CPU power and memory were allocated to the machine.

Web application's data flow, from the admin's point of view is represented in Figure 1. The steps involved are:

- Inputting grant applications into the system
- Creating reviewers' accounts
- Assigning grant applications to reviewers
- View/export the evaluations results

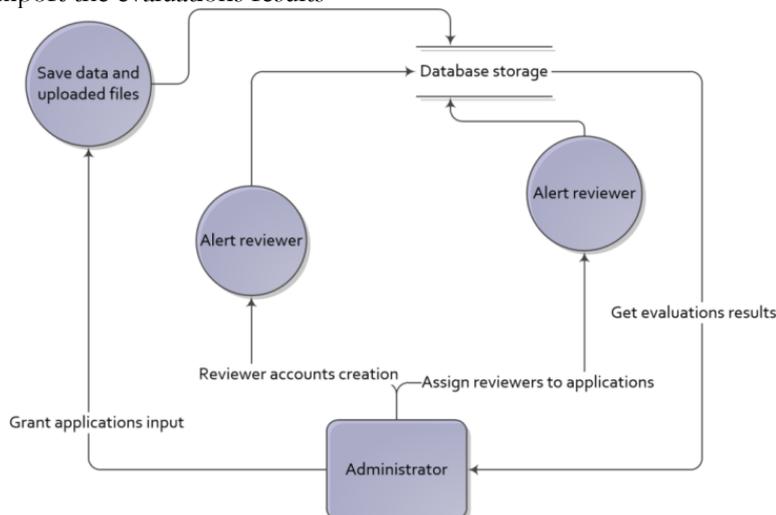


Figure 1. Dataflow diagram for the administrator user

A reviewer has access only to those applications that were assigned to him. He can view and download all the data and material on the grant applications. It is not mandatory to finish evaluating an application once he started it. The solution allows for intermediate stages to be saved. When the reviewer finishes evaluating an application, he must validate it. In this case the system reacts and informs the administrator that an evaluation has been submitted. Once an evaluation has been validated, it cannot be edited any longer. However, the reviewer can consult it, if some kind of comparison between the applications is needed. The process is represented in Figure 2.

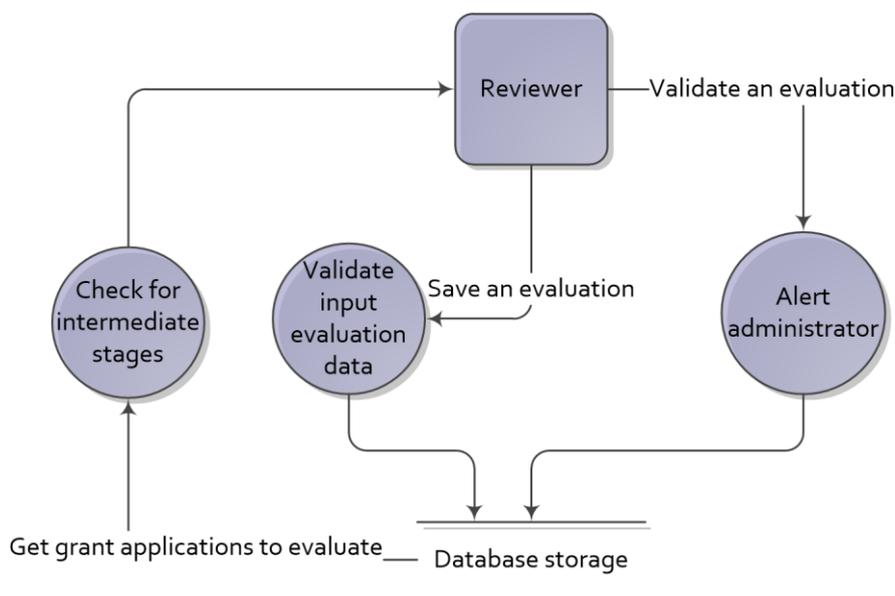


Figure 2. Dataflow diagram for the reviewer user

At the end of the grant applications evaluation period, we asked the reviewers to answer a short questionnaire, in order to assess their satisfaction with such a web-based grant application evaluation solution. All 20 reviewers accepted to answer the questionnaire, which contained 8 closed items (YES/NO answers) related to reviewer's previous experience in evaluating grant applications, previous use of such software solutions and his familiarity in using computer systems. The items were:

- Do you currently use a computer in your work?
- Have you ever been a reviewer for grant application?
- Have you ever used a software solution for grant application evaluation?
- Was the online format of the proposed software solution an attractive one?
- Does the design of the proposed software solution screens fulfill the purpose?
- Did the proposed software solution run without technical problems?
- Was it easy to fill up the online forms?
- Will you be willing to use such a software solution for grant application evaluation again?

Statistical analysis of questionnaire data covered proportions calculations and Fisher exact test in order to assess the significance variable associations [8]. For statistical analysis, we used EpiInfo, a free solution distributed by CDC.

## Results

Questionnaire responses are summarized in Table 1.

**Table 1.** Questionnaire data analysis result

Question	Yes		No	
	Frequency	Percent	Frequency	Percent
Do you currently use a computer in your work?	14	70.0%	6	30.0%
Have you ever been a reviewer for grant application?	17	85.0%	3	15.0%
Have you ever used a software solution for grant application evaluation?	4	20.0%	16	80.0%
Was the online format of the proposed software solution an attractive one?	16	80.0%	4	20.0%
Does the design of the proposed software solution screens fulfill the purpose?	16	80.0%	4	20.0%
Did the proposed software solution run without technical problems?	19	95.0%	1	5.0%
Was it easy to fill up the online forms?	16	80.0%	4	20.0%
Will you be willing to use such a software solution for grant application evaluation again?	17	85.5%	3	15.0%

We considered important to test for some differences between these proportions. Comparing the results from first question (“Do you currently use a computer in your work?”) to those from the last question (“Will you be willing to use such a software solution for grant application evaluation again?”), we found no significant association ( $p=0.201$ ).

Testing for differences between the results from the third question (“Have you ever used a software solution for grant application evaluation?”) and those from the last one (“Will you be willing to use such a software solution for grant application evaluation again?”), we did not find a significant difference ( $p=0.49$ ).

## Discussions

A previous study, focused on the acceptance level of informatics applied in medical research [9], showed no resistance to the computer use in this field. In our study, we found the same willingness to use an IT solution; only 3 respondents (15%) showed reluctance in using this kind of applications in the future. Two of those three persons do not use a computer regularly, so their resistance can be explained by their lack of familiarity with these systems.

Considering the questionnaire responses, we found that this kind of web-based grant application evaluation solution, developed “in-house”, are suitable to replace a high cost commercial application, that focus on grant management and progress tracking.

A study conducted by Cortellessa et al. [10] points toward the same practice of building a software solution in-house, where there are visible advantages over the commercial ones. An advantage a software application built in-house has over a commercial one, is that it is extremely customized for the local context and its specifications can be modified taking into the account the local environment.

## Conclusions

The presented web-based application evaluated by the users shown a high level of acceptance and those respondents stated that they are willing to use such a solution in the future.

Also, building the needed software applications in-house, proved to be a reliable choice, considering the university need.

## **Conflict of Interest**

The authors declare that they have no conflict of interest.

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