Improvement of Researcher Database System

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Abstract—*Most universities around the world must be accredited in order to assure and enhance the quality of education. Japanese universities also are under accreditation by the government as well. They must undergo certified evaluation and accreditation periodically, which is conducted by organizations certified by the Japanese Minister of Education. Accreditation committees evaluate every university based on the Standards for Evaluation and Accreditation by reviewing the self-assessment reports. That is why it is important for universities to pursuit their advantages and to create high quality self-assessment report. To present some advantages in the report, the university staffs have to obtain the evidences demonstrating some effects or outcomes. Our university has the "Researcher Database System" in which all faculties can store their activities. This system is used for not only accumulating but also self-assessment. Moreover, the data which are accumulated in this system are made public in the "Kyushu University Academic Staff Educational and Research Activities Database". In this paper, we describe the outline of "Researcher Database System" and its improvement.*

Keywords: Database, Big data, Web System, Institutional Research

1. Introduction

There are two major evaluations for National University Corporation in Japan. One is Certified Evaluation and Accreditation, and another is National University Corporation Evaluation.

The former is the mandatory evaluation process for universities. This evaluation is covering overall conditions of education and research conducted by certified evaluation and accreditation organizations. In Japan, all higher education institutions are obliged to assess their activities in order to assure and enhance the quality of the institution. These institutions also have to undergo certified evaluation and accreditation periodically. This evaluation is conducted by organizations certified by the Minister of Education, Culture, Sports, Science and Technology (MEXT). Certified Evaluation and Accreditation was introduced to contribute to the further development of Japanese higher education in 2004.

The latter is performance-based evaluation of national university corporations in respect of their attainment of their mid-term objectives, mid-term plans and annual plans for education, research and management.

- *Mid-term objectives* mean individual corporate objectives that Japanese national university corporations should achieve over a six-year period. These objectives are made public.
- *Mid-term plans* are developed by Japanese national university corporations in order to achieve their mid-term objectives. These plans are made public too.
- *Annual plans* are developed by Japanese national university corporations in order to achieve their mid-term plans.

The National University Corporation Evaluation Committee is entirely responsible for this evaluation. This committee was established within MEXT pursuant to the Cabinet Order of October 1, 2003.

In order to obtain good evaluation, we have to explain our conditions of education and research obviously. Moreover we have to gather enough evidences to explain them. We have some web systems to gather evidences. There is the "Researcher Database of Kyushu University" which is one of these systems. The data which are inputted from this system are made public partially in the "Academic Staff Educational and Research Activities Database". We have improved the "Researcher Database of Kyushu University".

In Section 2, we describe the "Researcher Database of Kyushu University". Then we explain the improvement of the system in Section 3, and compare the condition before improvement with the condition after improvement in Section 4. Finally, we summarize our results in Section 5.

2. Researcher Database of Kyushu University

In Kyushu University, the "Researcher Database of Kyushu University" is operating. This is the system which is operating in our university on the web. All teachers in our university can enter various data into the system. The system is operated by a top-down management style. In brief, all

teachers have to use the system. In this section, we explain this system.

2.1 Purpose

The "Researcher Database of Kyushu University" was created for self-assessment of all teachers in Kyushu University [1][2][3][4]. They can enter their educational and researching situations into the system. By entering various data into the system, the level of education and research for teachers is expected to be improved in our university. Then our university can achieve aims of our university and social missions.

The system is composed of data entered by teachers based on teachers' self-assessment. The major purposes of the system are as follows.

1) The data entered by teachers are sources to establish management policies or future plans.
2) Japanese national universities, including our university, must be conducted evaluation by third-party organizations. In order to report to the third-party organizations, the data entered by teachers are used as basic information or sources.
3) In our university, the teachers have to report their activities to our university every year. The data entered by using the system are also used to report them.
4) These data are made public. The activities of education, research, social cooperation, and international exchange are promoted by the public information. After we receive opinions and proposals against the public information from the world, we have to understand the requests from the world accurately.
5) We have to store the basic data related to educational and researching activities. We also have to survey these data.

2.2 Entering Data

All teacher in Kyushu University can and must enter their activities to the system. They have to enter their activities on their own responsibilities. Every department must decide whether the following descriptions should make public.

- Descriptions of defamation for other people
- Descriptions against facts
- Descriptions of injustices
- Descriptions against the aim of education and research

These departments, in which the teachers describe such things, have to urge the teachers to re-think these descriptions. All teachers have to make an effort to update descriptions they have already entered.

2.3 Data Application

We can take advantage of the data entered by teachers. We also have to obey the following things.

1) The data entered by teachers are never used except for the purposes mentioned in Section 2.1.

2) Some of the data, which are agreed to make public by the committee in our university, are made public in the "Academic Staff Educational and Research Activities Database" [5] operated by Kyushu University.
3) When someone would like to use the data based on the purposes shown in Section 2.1, he or she must be approved by the person in charge of the system.
4) When someone is approved of using the data, the fact must be reported to the committee.
5) The staffs who belong to Office of Institutional Research monitor the condition of using data.
6) When the data, which are made public in the "Academic Staff Educational and Research Activities Database", are provided to outsiders, the committee must approve it.
7) When making the data public or providing the data, we have to take care not to injure the specific individual right or profit.

2.4 Present Situation

In this section, we show the present situation on operating the "Researcher Database of Kyushu University".

2.4.1 Environment

This system is one of web systems and is working on a blade server. As we introduced a firewall, the network security is strong. The room where the server is placed is earthquake-proof. So the server is also protected physically.

This system is constructed by using Ruby. Ruby is one of object-oriented programming languages. Especially, we use Ruby on Rails which is an open source web application framework written in Ruby. We can customize the system freely because it is constructed by open source. The reason why we use the open source is that we have to develop the system. So, the system is working and is developing in parallel.

2.4.2 Restriction

All teachers can use this system on the Kyushu University network. But they can't use this system at the outside of Kyushu University. While we can enter the data of our presentations, papers, books, and so on, we can also enter the data of personal information such as students' names. The leak of personal information not only can cause bad reputation but also can lose confidences from the world.

We have to maintain this system. The way of maintenance is stricter than the way of using this system. In order to maintain this system, we can access this system using SSH port only from Office of Institutional Research, where we belong. We cooperate a certain programmer company. Even the programmers from the company can not access this system through SSH port except for our room.
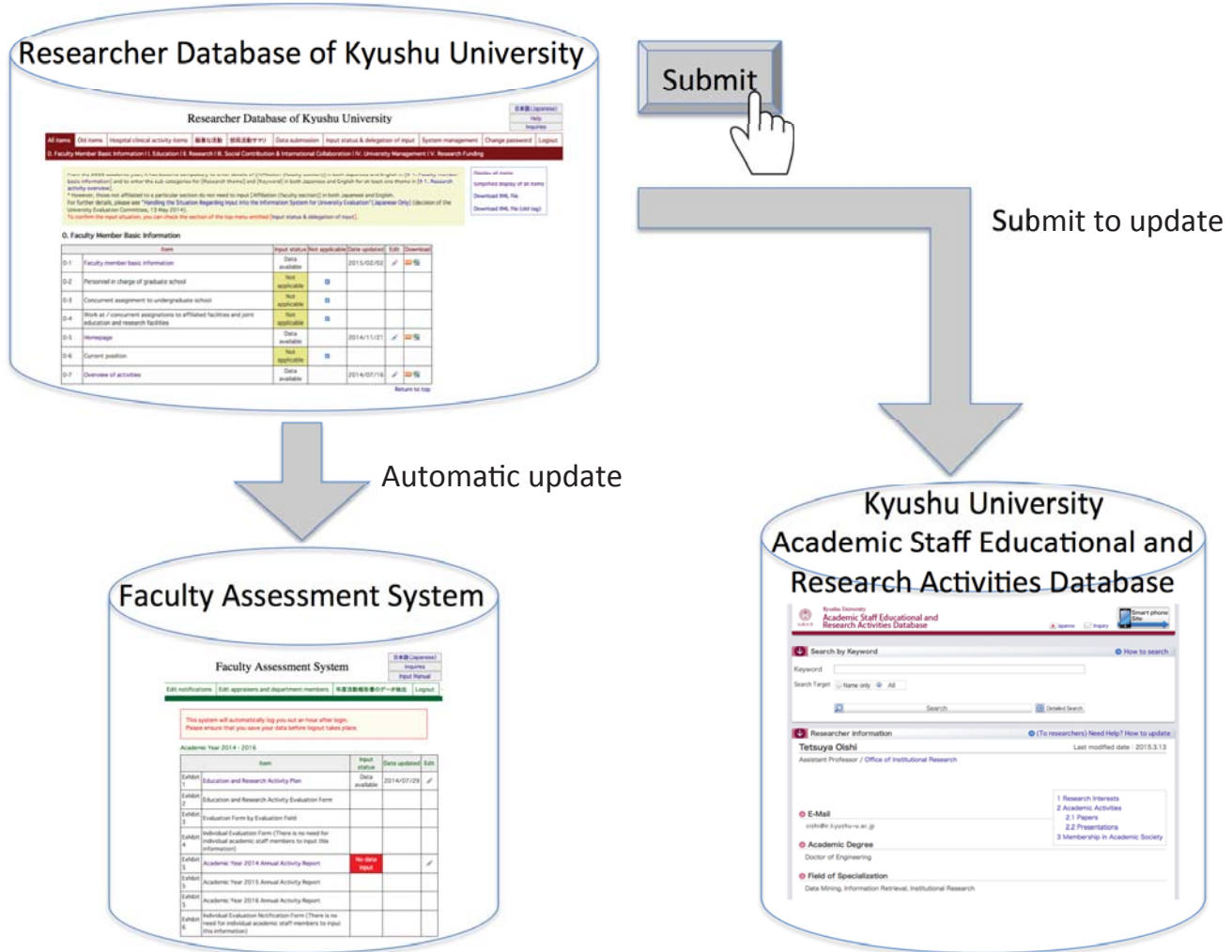
Fig. 1: The relation of three systems

We must protect the data the teachers entered. Moreover we must also prevent human errors. Then we introduced the very strong restriction.

2.4.3 Cooperation of Data to Outside

The data entered into this system are used in the "Faculty Assessment System" in Kyushu University. The data, for example, presentations, papers, books, and so on, can used in the "Faculty Assessment System". All teachers are assessed through "Faculty Assessment System" (Fig. 1).

We also have "Academic Staff Educational and Research Activities Database" system. This is the web system to make the teachers' information public. The teachers can decide whether they make each data public individually. Once they press the "submit" button, their information can be made public.

2.4.4 Cooperation of Data into Inside

We can use other data in order to enhance our data. In the system, we can enter the data of our papers. A paper data is composed of the title of paper, the authors' name, the authors' affiliations, the pages, and so on. It is very troublesome to enter these information. Then we use API provided by Thomson Reuter in order to enter these information automatically. At least, the bibliographic information is entered automatically.

However, the system can treat only text information such as the bibliographic information. Our university has own Library. The Library has repository system to store papers, books, and so on. We can relate the bibliographic information with its entity. This information of the entity not only is stored in the system but also is made public on "Academic Staff Educational and Research Activities Database".
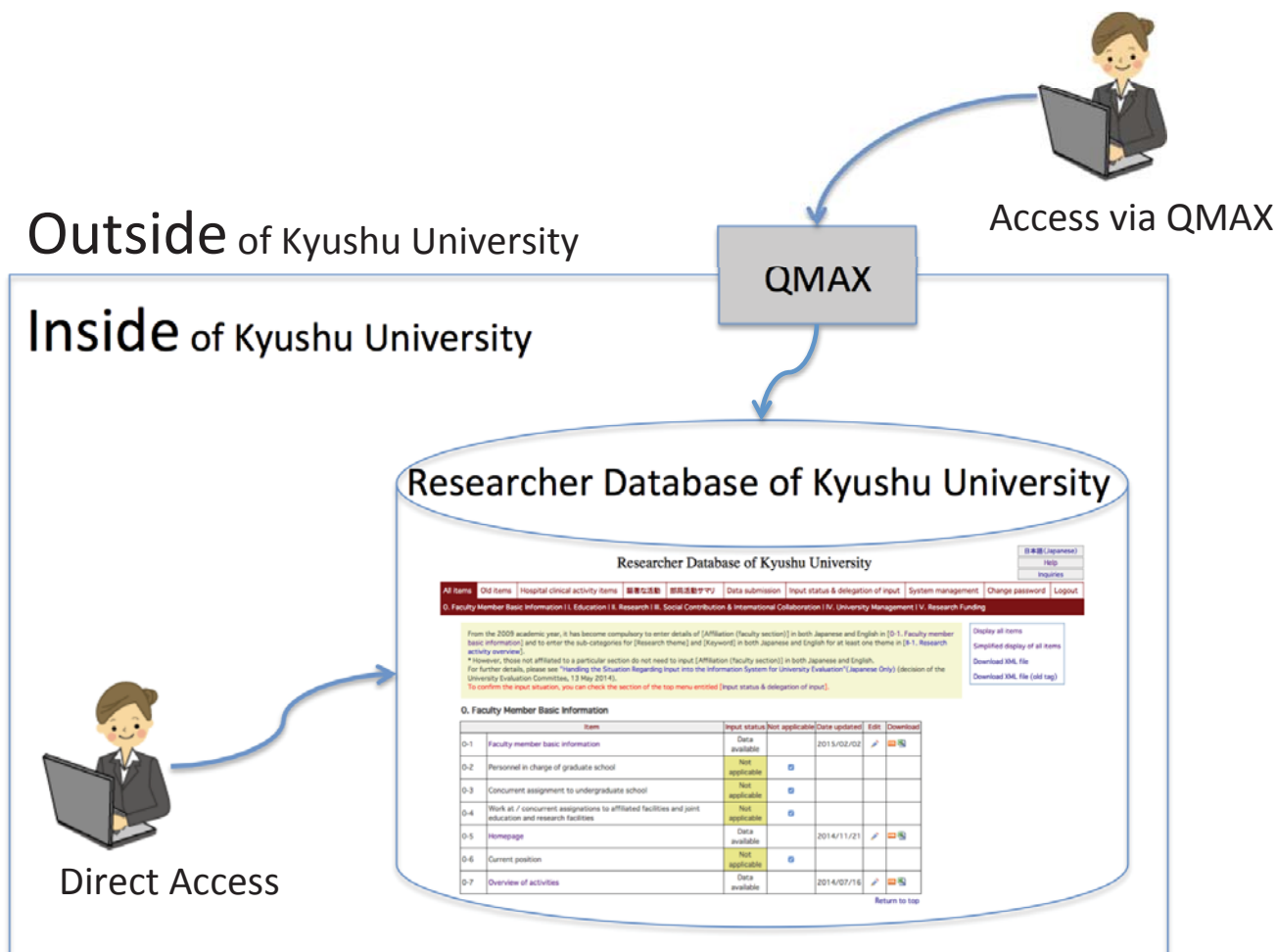
Fig. 2: Access to the system from inside or outside

2.4.5 Input Situation

All teacher not only can but also must enter the data. We have check the situations how many teachers have completed to enter the data. There are two points of view when checking input situation.

1) A teacher has to enter all items into the system.
2) A teacher has to enter at least one data a year.

If breaking the rule, the department where such teachers belong is imposed a penalty. To say concretely, the subsidy to the department is reduced.

3. Improvement

Considering the present situation, we have improved the system many times. In this section, we show some major improvements.

3.1 Access from Outside

Basically, the system is accessed in Kyushu University only. However, many teachers thought that they would like to enter many data from outside (Fig. 2). As we have to prohibit all teachers from entering personal information from outside, we have permitted them entering a part of data except for personal information. What the teacher can enter from outside are "Presentations at academic society meetings, etc.", "Original papers", "Books authored", "Review papers, critiques, commentaries, book reviews, reports, etc.", and so on.

In order to realize entering from outside securely, we used QMAX [6]. QMAX is the omission of "Kyushu University Matrix AuthN System". QMAX is a reverse web proxy type SSO (Single Sign On) system. All teachers have own IC staff card that has matrix of numbers. They can login the system by using the number from the matrix.

3.2 Searching Papers

The teachers can insert the bibliographic information of papers into the system. For example, the bibliographic information are as follows.
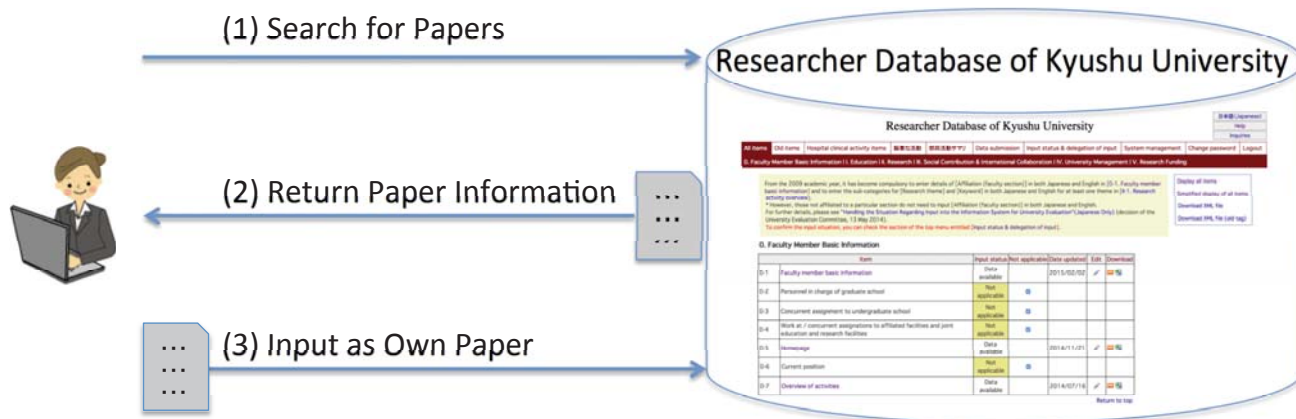
- Paper title

Fig. 3: Search for paper

- Authors' names
- Volume
- Number
- Starting page
- End page
- ISBN
- ISSN

The teacher can also insert other information except for the information listed above into the system, but it is very troublesome work. If there are the information we can use easily and automatically, we think that we can add information by using its information. So, as mentioned in Section 2.4.4, we decided to use the API provided by Thomson Reuter. The API can provide not only the major bibliographic information but also the other important information such as the number of citations.

If there are the information which have already been inserted into the system, we also think that we can use its information (Fig. 3). For example, we assume that a paper is written by two authors. If the first author have already inserted the bibliographic information of the paper into the system, it is useful for the second author to use the bibliographic information the first author wrote. In the system, the teachers can search papers which have been already stored and can insert bibliographic information into the system by using the information of the paper.

3.3 Authors' Names

All teacher can insert the basic information as a faculty member into the system. The teacher's name is included in the basic informations. The teacher can write his or her name freely, such as "Tetsuya Oishi", "Tetsuya OISHI", "T. Oishi", and so on.

The bibliographic information includes authors' names. In this system, the teacher can search other teacher as a author and include his or her name in the bibliographic information. In this case, the author's name to show is the string he or

she has already inserted into the system. I give an example using my name.

I suppose that I have already registered my name as "Tetsuya Oishi". If the other teacher would like to register my name as an author, my name is shown in the teacher's information as "Tetsuya Oishi". If I have already registered my name as "Tetsuya OISHI", my name shown in other teacher's bibliography also becomes "Tetsuya OISHI".

I show an example which are shown in Table 1. When creating a bibliographic information by using the example, it becomes as follows.

Tetsuya OISHI, Noriko Kuwano, Example of Title, Example of Journal, pp.51-58, 2015.7.

Then, I would like to show as follows.

Tetsuya OISHI, Noriko KUWANO, Example of Title, Example of Journal, pp.51-58, 2015.7.

The differences of these appearance are the underlined words. In order to show the bibliographic information as the second appearance, I have to ask the second author to change her name to capital letters.

Therefore, we improve the system that the teachers can change the authors' name in the bibliographic information instead of changing the appearance of each name. The improvement can contribute the teachers in various fields as follows.

- "Tetsuya Oishi": Generally, the names are appeared on the bibliographic information by using the style which the first letters are the capital letters.
- "Tetsuya OISHI": In other fields, while the first letter is the capital letter in the first name, all letters are the capital letters in the last name.
- "T. Oishi": There are the teachers who would like to use the name style which has an initial of the first name and all letters of the last name.

All teachers became to think that the bibliographic information is beautiful by the improvement.
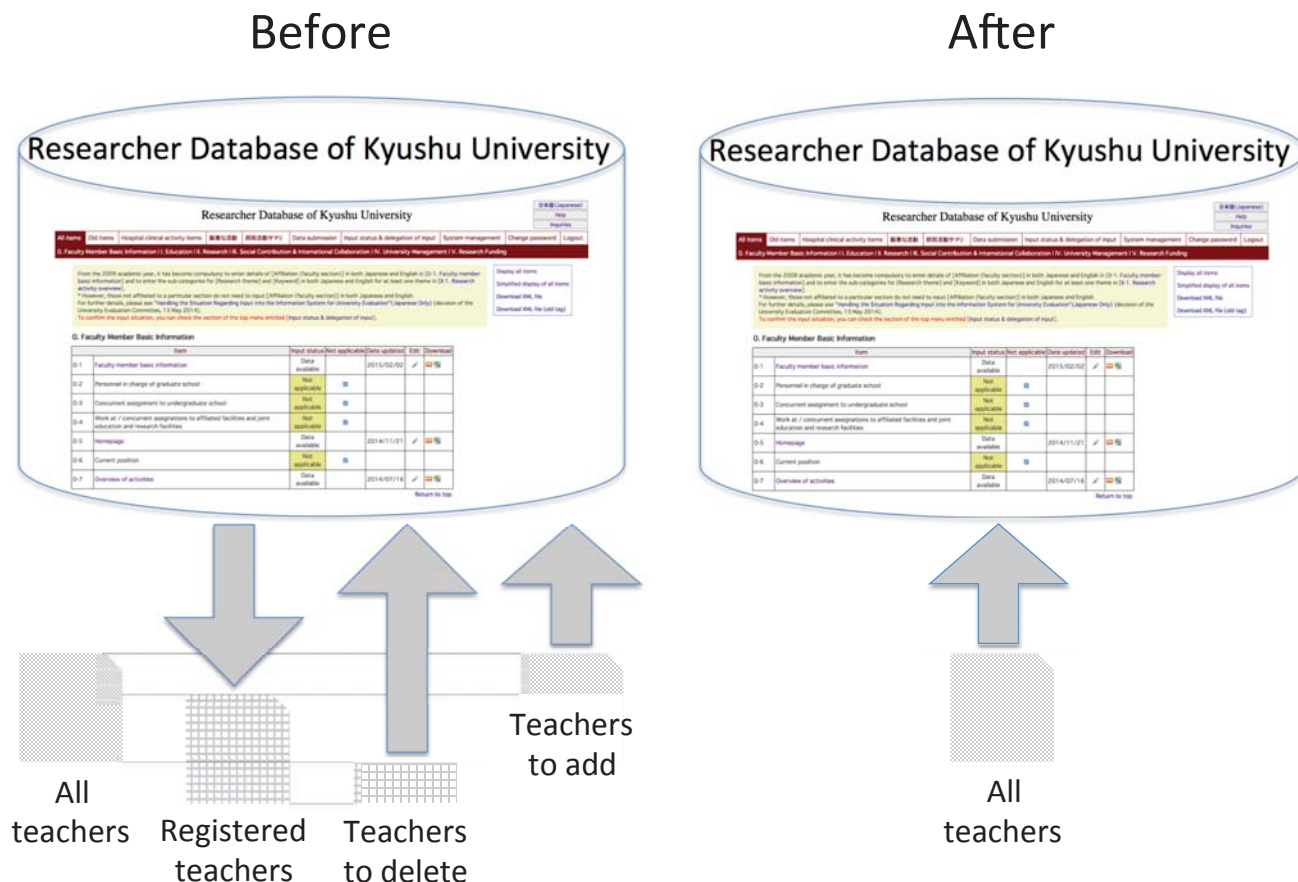
Before   # After

Fig. 4: Adding or Deleting Teachers

Table 1: A bibliographic information

Name of item	Contents
Paper title	Example of Title
Author 1	Tetsuya OISHI
Author 2	Noriko Kuwano
Journal	Example of Journal
Starting page	51
End page	58
Year of publishing	2015
Month of publishing	7

3.4 Adding or Deleting Teachers

In our university, while many teachers joined our university, many other teachers transferred the other university. Of course, while the former has to use the system, the latter has to become not to use the system. We also manage personal information per month.

Before improvement of the system, adding teachers was very troublesome work. We obtained the list of the teachers who belonged to our university. We compared the teachers who were included in the list with the teachers who were already registered in the system. While we deleted the teacher who were already registered in the system and who

were not included in the list, we added the teacher who were not registered in the system and who were included in the list. We had to select the teachers to delete or add by using a relational database management system. We had to have long hours to do it.

Then we improved the system to delete or add teachers automatically. First, we insert the list of the teachers, who belonged to our university, into the system. The list that is inserted into the system now is compared with the list that was inserted into the system last month. In short, it means that the system became to be able to automatically do the task we did manually. We have to have only a half hour to do it. Actually, after shortening the time to do the task that we add teachers, we can provide the account of the teacher immediately.

4. Comparison of before and after improvement

As mentioned above, we have improved many functions. In this section, we compare before and after improvement.
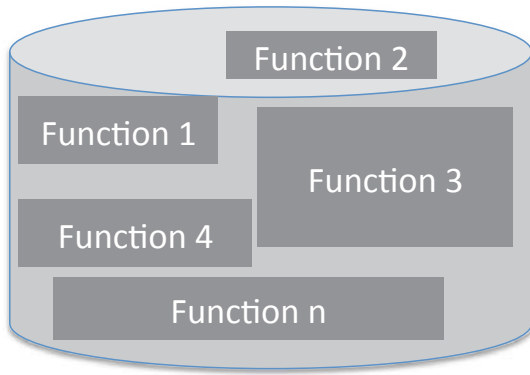
Now:
a patched system on old machine
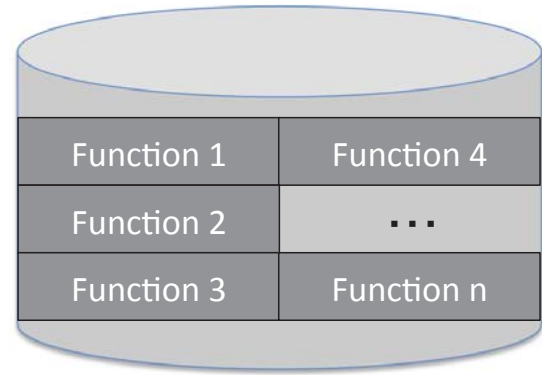
Replace:
a stable system on new machine

Fig. 5: Image of replace

4.1 Before Improvement

We had to deal with many complaints before improvement. We show the examples of complaints.

- The teachers who make many business trips would like to use the system from the destination. But they couldn't do it before improvement.
- There are too much items to be able to insert into the system. Especially, it is troublesome work to enter the information of papers.
- It is convenient to search authors from teachers in our university, but it is inconvenient not to write the authors' name freely.
- The teachers, who work in our university newly, would like to use the system immediately.

We had many trouble to solve, but we have already improved these functions as mentioned in Section 3.

4.2 After Improvement

As we have solved many problems, there become to be almost no complaints. Moreover, the duty to manage teachers' information is simplified. We think that almost all major problems are solved.

5. Summary

We have improved many functions in the Researcher Database System. Of course, there are minor improvements which we don't mention unfortunately. Until now, the system was in the developing phase. From now on, we have to operate the system certainly.

Then, we decided to replace the system with new one (Fig. 5). Actually, the machine, in which the system is working, is very old. Moreover, the system was created by patching many functions. Now, all functions are fixed.

The most important merit of replacing the system is that all teachers can use the system comfortably. Then all teachers can make their educational and research information public more easily. In 2016, the system will have replaced. We will make efforts to replace the system.

References

[1] Masao Mori, Toshie Tanaka, and Sachio Hirokawa, "A Document Authoring System for Credible Enterprise Reporting with Data Analysis from Data Warehouse", *SEMAPRO 2010, The Fourth International Conference on Advances in Semantic Processing*, Oct. 2010.

[2] Kensuke Baba, Masao Mori, and Eisuke Ito, "A Synergistic System of Institutional Repository and Researcher Database", *Proceedings of The Second International Conference on Advanced Service Computing*, Nov. 2011.

[3] Masao Mori, Toshie Tanaka, and Sachio Hirokawa, "A Progressive Data Warehouse of Institutional Research with Web API and Mashup Visualization", *Third International Conference on Computer Supported Education*, Sep. 2011.

[4] Masao Mori, Toshie Tanaka, and Kensuke Baba, "Connecting an Institutional Repository with a Researcher Database", *International Conference on Advanced Applied Informatics - IRIM*, Sep. 2012.

[5] Academic Staff Educational and Research Activities Database. [Online]. Available: http://hyoka.ofc.kyushu-u.ac.jp/search/index_e.html

[6] For Simple & Safety Information Systems, Single Sign-On Web Portal. [Online]. http://web.sso.kyushu-u.ac.jp/English