A brief overview of the Information System for Science and Higher Education in Poland

Jarosław Protasiewicz, Marek Michajłowicz, Mikołaj Szypke
National Information Processing Institute, Warsaw, Poland

Keywords
information system; higher education and science; decision support system

1. Summary

The article is aimed to introduce the Information System for Science and Higher Education in Poland briefly. The system acquires data concerning universities and research institutions, analyzes these data, and supports decision-making processes of governmental bodies.

2. INTRODUCTION

The Information System for Science and Higher Education (POL-on) is the integrated and centralized information system [1], which supports the Ministry of Science and Higher Education as well as other Ministries and institutions related to science and higher education. Its primary task is to create a global database of scientific institutions, universities, and Polish science. Collected information supports the decision-making processes. Moreover, some data stored in the system are publicly available. Although the system is designed only for Poland, the cooperation with other countries may be established. We have to note that there are interesting and well-grounded international initiatives concerning scientific data like the CERIF data model supported by Current Research Information System [2], Open Access Infrastructure for Research in Europe [3], Digital Repository Infrastructure Vision for European Research [4], etc. The paper is structured as follows: Section 3 briefly explains how the data are collected, Section 4 discusses the primary business processes, and Section 5 shows some technical details. Finally, conclusions are presented.

3. DATA ACQUISITION AND VALIDATION

The Polish universities and research units are obliged by the law to provide various information and store it in the central system, i.e. POL-on. The information concerns their educational and scientific activities, namely students, researchers and academic teachers, academic degrees and titles, faculties and studies, diploma theses, projects, patents, publications, conferences, awards, laboratories and their equipment, properties, investments, etc. The data can be transferred to the system by using tools of mass import or may be manually entered via the web interfaces. However, the automatic import is available only for limited kinds of data, mainly information regarding students and researchers. Regardless of the method data delivery, all records are validated according to the rules based on the law and the best practices.

4. BUSINESS PROCESSES

The system contains data regarding almost all Polish universities and research units as well as their students and researchers. These data are necessary for the government to manage the area of higher education and science properly. Among many business processes that the POL-on supports, there are several that are especially important. These are, namely:

- verification of the granting of financial aid to students;
- supporting the division of public grant;
- controlling the quality of higher education and particularly suitable employment structure of academics teachers and researchers;
- monitoring the careers of graduates by using the administrative data;
- sharing public data – a practical implementation of the policy of open data/ government;
- Implementation of remote processes of financial and statistical reporting;

- evaluation of scientific research institutes;
- plagiarism detection of diploma theses.

The POL-on system provides the greatest resources of public records in the Polish administration [5].

5. TECHNICAL ARCHITECTURE

The POL -one was developed using a three-tier client-server architecture. The data are stored in a database, a lightweight container of web applications processes the data, whereas a browser presents data and allows to send requests to an application server. The application is implemented in Java using Spring framework, Hibernate, and Java Server Faces. The system is composed of several modules, which are responsible for the realization of particular processes. Moreover, there are five cooperating systems, which are tightly coupled with the main system (Figure 1).

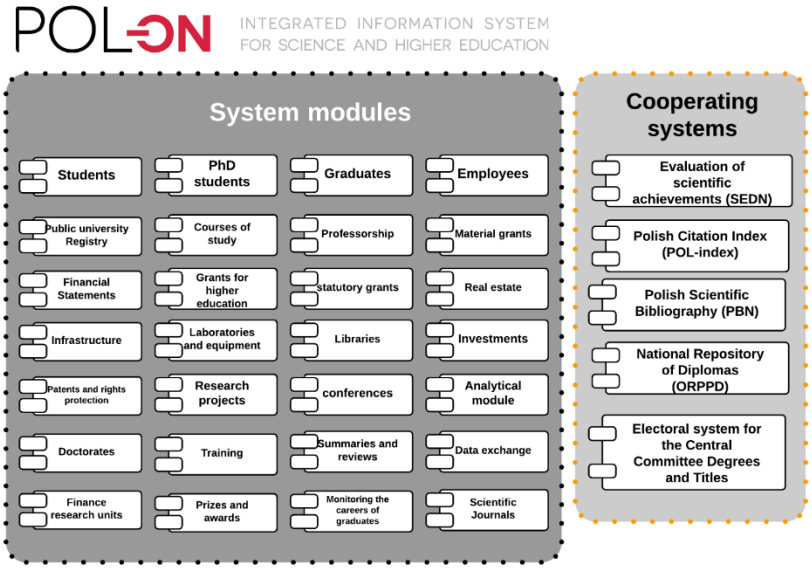

Figure 1. The architecture of the Information system for science and higher education (POL-on).

Current work is focused on design and implementation of RESTful API[6] to enable integration with IT systems of universities and research units. Currently over 20 microservices are deployed.

Further plans include API development and management[7] integration with other systems depicted on Figure 1 using Enterprise Service Bus and integration with National Service Bus (Krajowa Szyna Danych), a solution interchanging data between public domain's systems.

6. CONCLUSIONS

The project POL-on has been developed since 2011. Nowadays, it is the mature and fully deployed system; however, there are still ongoing modifications and improvements. The system significantly helped to manage the area of science and higher education in Poland. The further development may include integration with other Polish governmental systems as well as some European systems [2-4].

7. REFERENCES

[1] POL-on website (2015), https://polon.nauka.gov.pl

[2] euroCRIS website (2015), http://www.eurocris.org

[3] OpenAire website (2015), http://www.openaire.eu

[4] Driver website (2015), http://search.driver.research-infrastructures.eu

[5] https://danepubliczne.gov.pl/en

[6] Garriga M. et.al. (2015). RESTful service composition at a glance: A survey, *Journal of Network and Computer Applications, Volume 60, January 2016, Pages 32-53* [doi:10.1016/j.jnca.2015.11.020]

[7] Brajesh, D. Rajesh D. (2016) API Management, *Apress*

8. AUTHORS' BIOGRAPHIES

Jarosław Protasiewicz (Ph.D.) – he is an assistant professor at the National Information Processing Institute and the head of the Laboratory of Intelligent Systems. He received the Ph.D. degree in computer science at the Systems Research Institute of the Polish Academy of Sciences. His areas of interest include agile project management, software design and development, big data and map reduce, machine learning, bio-inspired algorithms. In the period 2011-2013 he was the project manager of the POL-on project.

E-mail: jaroslaw.protasiewicz@opi.org.pl

Marek Michajłowicz (MSc) – he received the Master degree in Sociology at Cardinal Stefan Wyszyński University in Warsaw and the Bachelor of Engineering (B.E.) in computer science at Warsaw School of Information Technology under the auspices of the Polish Academy of Sciences. He has several years of professional experience related to business and system analysis. Currently, he works as the project manager of the POL-on system in the National Information Processing Institute.

E-mail: marek.michajlowicz@opi.org.pl

Mikołaj Szypke (MSc) – Analyst/Designer at the National Information Processing Institute. He received the Master degree in computer science at Maria Curie-Skłodowska University in Lublin. He has over ten years of experience in system analysis and development. His professional interests are systems' integration and machine learning.

E-mail: mikolaj.szypke@opi.org.pl