RAD-on: An integrated System of Services for Science - Online Elections for the Council of Scientific Excellence in Poland

Jarosław Protasiewicz, Sylwia Rosiak, Iwona Kucharska, Emil Podwysocki, Marta Niemczyk, Łukasz Błaszczyk, Marek Michajłowicz

National Information Processing Institute, Warsaw, Poland

Keywords
information system; online elections; services for science; open data; web services

1. Summary

In this study, we demonstrate an information service which supports online elections for the Council of Scientific Excellence in Poland. It is part of an Integrated System of Services for Science, RAD-on (Reports, Analysis, and Data). More specifically, we show the overall architecture of RAD-on, and the most compelling features of the service for use in online elections. The proposed e-voting system implements three phases, namely: (i) candidate nomination; (ii) electorate approval; and (iii) voting, which includes ballot distribution, voting, and result verification. This approach distinguishes itself from a typical e-voting system by paying more attention more carefully to automatic candidate nomination and voter acquisition. Moreover, we have designed processes in the system that strike a balance between security requirements and accessibility to voters. Finally, we present selected statistics from a real online election for the Council of Scientific Excellence in Poland, which took place recently. We hope that our approach, experiences, and the operational challenges which we encountered during this election, may help develop other e-voting solutions.

2. RAD-on: AN INTEGRATED SYSTEM OF SERVICES FOR SCIENCE

In November 2018, we launched a new project, the Integrated System of Services of Science – Stage II (Michajlowicz et al., 2018). The system[1] aims to integrate several separate databases on science and higher education, and provide public services based on the acquired data. By the end of 2020, we will have delivered five key components, namely: (i) Knowledge database; (ii) Sharing; (iii) Personal data – is composed of two services: the first assures that every person whose data is processed in our databases can access it; the second supports online elections for the Council of Scientific Excellence in Poland; (iv) Metadata, and (v) Editing (Figure 1).

3. ONLINE ELECTION PROCEDURES AND SCURITY

A new bill - the Constitution for Science - has been introduced in Poland, the main aim of which is to improve the quality of science and higher education. Amongst several crucial reforms, it introduces a new body, the Council of Scientific Excellence. The body's members are going to be selected in online elections to be ready for commencement of their duties in June 2019. Our current e-voting system supporting elections for the council of scientific excellence in Poland implements three phases, namely: (i) candidate nomination, (ii) electorate approval, and (iii) voting. Candidate nomination includes application preparation, verification of nominees, and the decision of the election committee. The initial list of electorate is based on our databases[2][3] of researchers and academic

[1] https://radon.opi.org.pl

[2] http:/nauka-polska.pl

[3] https://polon.nauka.gov.pl

teachers. Any person can check whether he or she appears on the list, and send an application to be added to the electorate, or to have data updated. The final electoral roll is published on the Internet approximately two weeks before the election takes place. The election lasts two weeks. Each voter receives a link via email to his or her personal voting card. The link is active either until he or she has voted or until the end of the election. The voter must provide some personal data in order to access the voting card. After successful verification, the voter can fill in the ballot and vote.

We designed the election service in such a way which preserves the balance between safety and accessibility. Based on other experiences, we had realised that it was impossible to design a system assuring complete security. Moreover, overly strict security procedures would discourage users from becoming a candidate or voter. We also do not think that the newest advances such as blockchain technology are appropriate for such a service, as the service must be as simple as possible, and users must be familiar with the technology used. Therefore, we applied simple technical solutions and relaxed the safety regime to make voting more accessible.

Our security precautions were as follows. Each voter received an e-mail containing a URL address with a unique token, allowing access to his or her voting card. Thus, the key was to have reliable email addresses of all people eligible to vote. That is why we published the initial list of voters, and they could apply for the update either to their employers or our own helpdesk. This registration was aimed to prevent anyone from impersonating another user by adding his or her own email to someone else's profile.

In order to vote, a voter had to have access to his or her email account. In addition, after activating the personal URL, it was necessary to provide some personal data. Only then could the voter fill in the ballot on a web page and submit his or her vote. In order to ensure voting privacy, we applied a blind signature to enclose a ballot, and we did not log which user voted for which candidate at any point in the process. Naturally the transmission between a client machine and the voting server was encrypted.

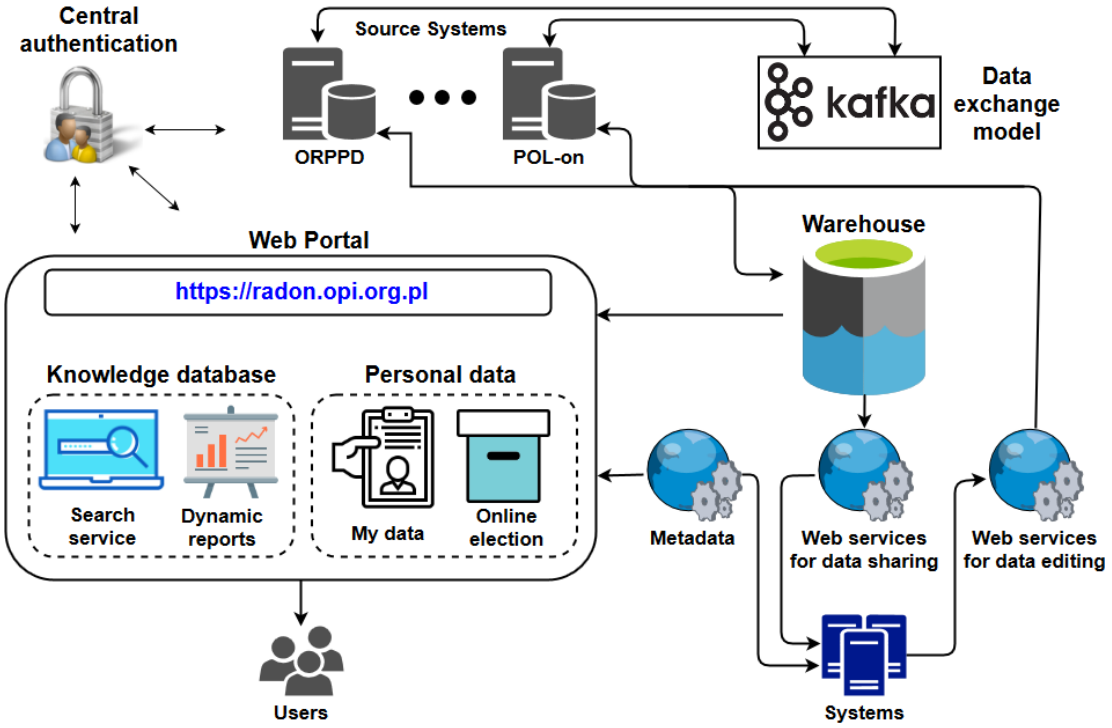

Figure 1. A simplified architecture of the Integrated System of Services for Science.

4. REFERENCES

Michajłowicz M., Niemczyk M., Protasiewicz J., Mroczkowska K. (2018). POL-on: The Information System of Science and Higher Education in Poland, In *EUNIS 2018 Congress Book of Proceedings*.

5. AUTHORS' BIOGRAPHIES

Jarosław Protasiewicz (PhD) is an assistant professor at the National Information Processing Institute and the head of the Laboratory of Intelligent Systems. He received a Ph.D. 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, machine learning, and bio-inspired algorithms.
Email: jaroslaw.protasiewicz@opi.org.pl

Sylwia Rosiak (MSc) is a business analyst at the National Information Processing Institute. She received a Masters degree in Management at the University of Warsaw and completed postgraduate studies in designing information systems at the Warsaw University of Technology.
Email: sylwia.rosiak@opi.org.pl

Iwona Kucharska (MSc) received a Masters degree in Computer Science and Econometrics at the University of Computer Science and Economics in Olsztyn. She completed postgraduate studies in Business Processes Engineering and Business Intelligence at the Warsaw University of Technology. She has many years of professional experience as a software tester and as a business analyst, endorsed by certificates. Currently she works as a software designer and business analyst in the National Information Processing Institute.
E-mail: iwona.kucharska@opi.org.pl

Emil Podwysocki (MSc) received a Master degree in Telecommunications Systems at the Technical University of Lodz. He has 10 years of professional experience related to ETL/ELT, data warehouses and Business Intelligence. His areas of interest include Oracle technology, Big Data, Business Intelligence and data visualizations. Currently, he works as a Database and Business Intelligence Team Leader in the National Information Processing Institute.
Email: emil.podwysocki@opi.org.pl
Profile: www.linkedin.com/in/emil-podwysocki

Marta Niemczyk (MSc) received a Masters degree in Mathematics at the University of Warsaw. She has many years of professional experience as a business and systems analyst, endorsed by certificates in methods of IT systems modelling. Currently she works as a software designer and business analyst in the National Information Processing Institute.
E-mail: marta.niemczyk@opi.org.pl

Łukasz Błaszczyk (MSc) is a product owner and business analyst at the National Information Processing Institute. He earned his Masters degree in Forest Information Technology at the University of Applied Sciences in Eberswalde and a master's degree in Forestry at Warsaw University of Life Sciences – SGGW. He finished postgraduate studies in business analysis at SGH Warsaw School of Economics. He has 11 years of experience in business and systems analysis.
Email: lukasz.blaszczyk@opi.org.pl

Marek Michajłowicz (MSc) is the Deputy Head of the Laboratory of Intelligent Systems. He received a Master degree in Sociology at Cardinal Stefan Wyszyński University in Warsaw and a 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 systems analysis. Since 2014 he has worked as the project manager of the POL-on system in the National Information Processing Institute. His areas of interest include agile project management, software design and development, big data and warehouses.

E- mail:marek.michajlowicz@opi.org.pl;
Profile: www.linkedin.com/in/marek-michajlowicz