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

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The National Information Processing Institute, Warsaw, Poland

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We design and develop advanced IT systems to support decision-making processes, conduct research in the fields of machine learning, artificial intelligence, big data, and methods of software production.

Big Data & Databases
We utilise databases as well as big data technologies to persist and process data.

Intelligent Algorithms
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Software as a Service
Our information systems offer services that suit to consumers needs.
Throughout this presentation ...

01 RAD-on

02 Goals

03 Election

04 Results
RAD-on: Reports, Analyses, Data

Central authentication

Source Systems

ORPPD

POL-on

kafka

Data exchange model

Web Portal

https://radon.opi.org.pl

Knowledge database

Search service

Dynamic reports

Personal data

My data

Online election

Users

Warehouse

Metadata

Web services for data sharing

Systems

Web services for data editing

Metadata

Systems
Establish candidates and voters
Ensure safety and unambiguity
Ensure availability and usability
Perform elections and publish results
Main processes of online election

1. Nomination of candidates
2. Approval of voters
3. Voting

Publication of election results
Election - Nomination of candidates

Application preparation

Verification of nominees

Decision of the election committee
Results - selected statistics of candidates

477
Total number of candidates

Number of candidates by degrees

- PhD with "habilitation": 115
- Professor: 362

Number of candidates

March 2019 | 02 | 05 | 08 | 11 | 14 | 17 | 20 | 23 | 26 | 29 | 01 | 04

Date

0
100
200
300
400
500
600

Number of candidates
Election - Approval of voters

Initial list of electorate

Verification of voters

Publication of the electoral roll
Results - selected statistics of voters

28,721
Number of people eligible to vote

Number of people eligible to vote by degrees

- PhD with "habilitation": 9,685
- Professor: 3
- Others: 19,033

Number of people eligible to vote by age

- 60 and more: 11,776
- Under 40: 8,061
- Under 50: 877
- Under 60: 8,007
Election - Voting

Balotts sending → Voting

PESEL or identity number, date and county of issue

Encryption (blind signature)

End of voting

More than one candidate with the same number of votes

Notify of elected candidates

Successful candidate rejects

Publish election results

Body members elected

Drawings and withdraws
Election - Balance between security and availability

- Each voter receives an e-mail containing a URL address with a unique token, allowing access to his or her voting card.

- 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.

- A blind signature is applied to enclose a ballot - it ensures voting privacy.

- A service does not log which user voted for which candidate at any point in the process.

- The transmission between a client machine and the voting server is encrypted.
The cumulative turnout of voters in succeeding days on the elections

The number of voters voting in each day of the elections
## Results - selected statistics of votes

<table>
<thead>
<tr>
<th></th>
<th>Number of voters</th>
<th>Valid votes</th>
<th>Number of eligible to vote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>17 274</strong></td>
<td></td>
<td><strong>44 383</strong></td>
<td><strong>28 721</strong></td>
</tr>
</tbody>
</table>

Each voter can vote in one or two disciplines.

**Voter turnout [%]**

![Meter indicating voter turnout](image-url)
1. The e-voting service was designed to support online elections for the council of! scientific excellence in Poland in 2019.

2. Three phases of online voting: (i) candidate nomination; (ii) voter verification; and (iii) voting, which includes ballot distribution and verification of results.

3. The architecture and processes of the service focused on accessibility for users to the same extent as the security of voting to involve as many people.

4. Challenges:
   - Possible one case of unauthorised access to a ballot;
   - Verification of nominees should be more automated than it was.

5. The election was successful – the results were announced on 24th May 2019. The scientific council was elected.

Conclusions
Thank you for your attention

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