



LEARNING, APPLYING, MULTIPLYING BIG DATA ANALYTICS

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## **LAMBDA Deliverable 3.5**

### **Belgrade BDA School (Report 1)**

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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



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Institute Mihajlo Pupin ( <b>PUPIN</b> )	Co-ordinator	Serbia
Fraunhofer Institute for Intelligent Analysis and Information Systems ( <b>Fraunhofer/IAIS</b> )	Contractor	Germany
Institute for Computer Science - University of Bonn ( <b>UBO</b> )	Contractor	Germany
Department of Computer Science - University of Oxford ( <b>UOXF</b> )	Contractor	UK

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## Executive Summary

The LAMBDA Big Data Analytics Summer School was organized by the LAMBDA consortium partners Institute Mihajlo Pupin (PUPIN), Fraunhofer Institute for Intelligent Analysis and Information Systems (Fraunhofer/IAIS), Institute for Computer Science - University of Bonn (UBO) and Department of Computer Science - University of Oxford (UOXF). The event took place in Belgrade between June 17<sup>th</sup> and June 20<sup>th</sup>, 2019. Overall, more than 60 participants gathered at the PUPIN premises to exchange knowledge and expertise in Big Data technologies. The objective of the summer school was to give the PhD students and experts from Serbia and abroad and PUPIN researchers an opportunity to learn about the newest technologies and trends in this and related fields from respectable professors, as well as to hear about use cases from influential tech companies such as OntoText, SAS Institute, CISCO, Meltwater, and DeepReason.ai.

The program contained presentations by well-known international experts, members of the LAMBDA Advisory Board and the LAMBDA consortium. The topics of the keynotes and the lectures covered [Enterprise Knowledge Graphs](#), [Semantic Big Data Architectures](#), [Smart Data Analytics](#), and Big Data use cases from different domains.

The website of the summer school, <https://project-lambda.org/Summer-School-2019>, provides more details about the organization and topics discussed at the school.



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## Abbreviations and Acronyms

<b>BDA</b>	Big Data Analytics
<b>NoE</b>	Network of experts
<b>OERs</b>	Open Educational Resources
<b>PPT</b>	Power Point File format/extension (Microsoft)
<b>WP</b>	Work Package

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## 1. Introduction

The overall objectives of the LAMBDA (Learning, Applying, Multiplying Big Data Analytics, <http://www.project-lambda.org/>) project are to

- stimulate scientific excellence and innovation capacity, as well as to increase the research capacities and unlock the research potential of the “Mihajlo Pupin” institute (PUPIN),
- contribute to decreasing the existing European regional research and innovation disparity by fostering excellence in the Big Data ecosystem areas,
- contribute to European progress beyond the state of the art of related research and technology.

Therefore, one of the actions planned and conducted by the LAMBDA project in the first reporting period (until end of June 2019) was the organization of the Belgrade Big Data Analytics Summer School. The summer school was held in the PUPIN premises (part of the University of Belgrade) from the 17<sup>th</sup> to the 20<sup>th</sup> of June 2019.

Having a vision of providing a collaborative environment that enables the **exchange of skills and expertise** in Big Data technology among stakeholders from the Region, the LAMBDA consortium invited researchers / professors / PhD students and other professionals (see Figure 1 and statistics in Table 1) to attend the lectures given by renowned experts from the consortium and the LAMBDA Advisory Board. The Web site of the Summer School is <https://project-lambda.org/Summer-School-2019>.



Figure 1. BDA School participants - Group photo

Teachers / Speakers outside the consortium		Participants from West Balkan Countries	
Country	Number	Country	Number
Germany	2	Croatia	3
Bulgaria	1	Bosna and Herzegovina	2
Hungary	1	Montenegro	2
Romania	2	North Macedonia	2
Serbia	2		

Teachers / Speakers from the consortium		Participants from Serbia	
Country	Number	Organization	Number



Germany	3	PUPIN	22
UK / Germany	1	University of Niš	2
UK / Austria	1	University of Novi Sad	2
Italy	1	University Metropolitan	3
Serbia	2	University UNION	2
		Other Faculties from the University of Belgrade	3
		Other stakeholders (Banks, Government agencies, etc.)	5
<b>Total</b>	<b>16</b>	<b>Total</b>	<b>48</b>

*Table 1. Statistics on Teachers and Participants by country*

### 1.1 Relation to Other Deliverables

This Deliverable is related to

1. [Deliverable 1.2 External and intra-consortium e-collaboration tool](#) that describes the LAMBDA platform and services for information sharing, easier and more effective collaboration among consortium members, as well as stakeholders data-base management.
2. [Deliverable 2.2 Education and RTD Needs](#) that based on the identified needs of PUPIN staff and the stakeholders from Serbia and the Region proposes a detailed Education and RTD Plan, as well as a draft programme for the Belgrade BDA Schools in 2019.
3. [Deliverable 3.1 The 'Trainers' Network' Infrastructure](#) that describes the 'Train-the-Trainers' approach adopted by LAMBDA.
4. Deliverable 5.1 Stakeholders Database and Market Analysis that describes the private part of the LAMBDA platform and possibilities for storing stakeholders' data.

### 1.2 Target Audience

The following table defines the intended audience of the current deliverable:

Intended audience	Reasons for interest in this document
<b>Consortium partners</b>	To summarize the conducted activities and use as a basis for the preparing the next year Summer School
<b>Participants / Stakeholders</b>	To have on one place the information about the event with links to all relevant support documents (open resource lectures and PPT presentations from the Advisory Board Members, links to the private side of the portal), and evidence (pictures, Agenda, Information Pack)
<b>European Commission</b>	To review and assess this deliverable as a required report based on the grant agreement
<b>General public</b>	To be informed about the LAMBDA activities

*Table 2. Target audience for this deliverable*



### **1.3 Structure of the Deliverable**

This Deliverable is the third document delivered in WP3 framework and presents the following points:

- The Program of the LAMBDA Summers School 2019 (Section 2);
- The role of the LAMBDA Advisory Board and meetings organized so far (Section 3);
- A summary on
  - the activities on Day 1 (Research-Industry Forum, Section 4);
  - the activities on Day 2 (Section 5);
  - the activities on Day 3 (Section 6);
  - potential impact and adoption of LAMBDA lectures by PUPIN researchers and researchers from the region (Section 7);
  - communication within the BDA School Participants Group (Section 8);



## 2. Summer School Program

The 3-day event was scheduled as follows

- 1<sup>st</sup> day [LAMBDA Research-Industry Forum](#) - Keynotes + Presentations from Companies
- 2<sup>nd</sup> day Big Data Analytics Summer School - Invited Lectures and Lectures from LAMBDA partners (UBO, IAIS, UOXF, PUPIN)
- 3<sup>rd</sup> day Big Data Analytics Summer School - Lectures from LAMBDA partners (UBO, IAIS and UOXF)

The **LAMBDA Research-Industry Forum** was a one-day event organized together with the **Big Data Analytics Summer School** so that PhD students (participants of the School) have an opportunity to learn about the newest technologies and trends in this and related fields, as well as about use cases from the following companies: OntoText, SAS Institute, CISCO, Banca d'Italia, Meltwater, and DeepReason.ai. The event was opened by the Prof. Dr Ivanka Popović, Rector of the University of Belgrade (the left photo in the first row of Figure 2) and Prof. Dr Sanja Vraneš, Director General of the Mihajlo Pupin Institute (the right photo in the first row of Figure 2)<sup>1</sup>.



Figure 2. BDA School – Opening

<sup>1</sup> Presentation of the Institute Mihajlo Pupin, [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Partner\\_PUPIN.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Partner_PUPIN.pdf)



The registration of participants was organized in the PUPIN entrance hall, see bottom right photo in Figure 2.



## BDA SUMMER SCHOOL - DRAFT AGENDA

Institute Mihajlo Pupin  
Volgina 15, Belgrade, Serbia  
June 18-20, 2019

	1st Day	2nd Day	3rd Day
08.30	Registration	Registration	Registration
09.15 - 10.00	Introduction (Opening) PUPIN	Company presentation	<a href="#">Distributed Big Data Libraries</a>
10.05 - 10.50	<a href="#">Keynote (Sören Auer, TIB)</a>	Lecture - <a href="#">Maria Esther Vidal, TIB</a>	<a href="#">SAS Institute</a> - Company presentation
11.10 - 11.55	<a href="#">Keynote (Atanas Kiryakov, OntoText)</a>	<a href="#">Introduction to Big Data Architecture</a>	<a href="#">Distributed Semantic Analytics I</a>
12.00 - 12.30	Big Data Research at the West University of Timisoara, Romania	<a href="#">Distributed Big Data Frameworks</a>	<a href="#">Distributed Semantic Analytics II</a>
Lunch Break			
13.30 - 14.00	<a href="#">CISCO</a> - Company presentation	<a href="#">Big Data Solutions in Practical Use-cases</a>	(Closing) PUPIN
14.00 - 14.45	<a href="#">Introduction to Knowledge Graphs</a>	Data Analytics in Energy Sector - PUPIN	
14.50 - 15.35	<a href="#">Extraction for Knowledge Graphs</a>	Data Analytics in Energy Sector - PUPIN	
15.40 - 16.30	<a href="#">Reasoning in Knowledge Graphs</a>		
16.30	<a href="#">Meltwater</a> - Company presentation		
17.00	Networking with dinner buffet	Guided Tour – Belgrade Old Town	



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme, H2020-WIDESPREAD-2016-2017 Spreading Excellence and Widening Participation under grant agreement No 809965.

Figure 3. BDA School – three day Agenda

The 3-day Agenda, see Figure 3, can be downloaded from <https://project-lambda.org/sites/default/files/2019-06/BDA-Draft-Programme.pdf>, while the detailed Agenda was

integrated with the **Information pack for participants**, see [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Information\\_Pack\\_and\\_Agenda.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Information_Pack_and_Agenda.pdf).

### 3. The LAMBDA Advisory Board

In the proposal preparation phase, the LAMBDA Advisory Board was established from respectable experts who bring unique knowledge and skills from fields related to topics of interest for the LAMBDA project:

- Prof. Sören Auer, Ph.D., Director of the Technische Informationsbibliothek (TIB) – German National Library of Science and Professor of “Data Science and Digital Libraries” at Leibniz University Hannover
- Atanas Kiryakov, M.Sc., Executive Director of OntoText AD, Bulgaria
- Prof. László Kovács (M), Ph.D., Professor of Computer Science, Hungarian Academy of Sciences
- Prof. Maria Esther Vidal, Ph.D., Head of Scientific Data Management Research Group, German National Library for Science and Technology
- Prof. Daniel Pop, Ph.D., Senior Researcher at the West University of Timisoara, Romania
- Gabriel Iuhasz, Ph.D., Researcher at the West University of Timisoara, Romania

The LAMBDA Advisory Board organized its first meeting<sup>2</sup> on Monday, 17<sup>th</sup> of June 2019, one day before the opening of the Big Data School, see Figure 4.



Figure 4. LAMBDA Advisory Board Meeting on 17<sup>th</sup> June 2019

The advisory board had discussions on increasing the visibility of LAMBDA activities and bring more impact of objectives in the region. There has been suggestion on how PUPIN can get inspirations from initiatives about Big Data by excellent clusters of universities and organizations from other parts of Europe and apply it in the region

<sup>2</sup> <https://project-lambda.org/node/172>



In order to summarize the activities of the first two days of the School and prepare a message to be conveyed to the School participants at the Closing Session<sup>3</sup>, a second meeting was organized on 19<sup>th</sup> of June 2019.

The meetings were an opportunity for networking with the Advisory Board Members, as well as for planning the future collaboration, see Figure 5.



Figure 5. LAMBDA Advisory Board Meeting on 18<sup>th</sup> and 19<sup>th</sup> of June 2019

## 4. Research – Industry Forum (Day 1)

### 4.1 Keynotes and Presentations by Invitation

Members of the Advisory Board helped the LAMBDA consortium to complete the academic program of the summer school by giving keynotes (Prof. Sören Auer and Dr. Maria Esther Vidal)<sup>4</sup>, but also to introduce the possibilities of using the emerging technologies in practice, see keynote<sup>5</sup> from Atanas Kiryakov, the Executive Director of OntoText AD, see Figure 6.

Aiming at discussing research trends in Big Data<sup>6</sup>, Dr. Daniel Pop and Dr. Gabriel Iuhasz presented some recent results from recent EU projects running at the West University of Timisoara (UVT).

<sup>3</sup> [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Partner\\_PUPIN\\_Closing.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Partner_PUPIN_Closing.pdf)

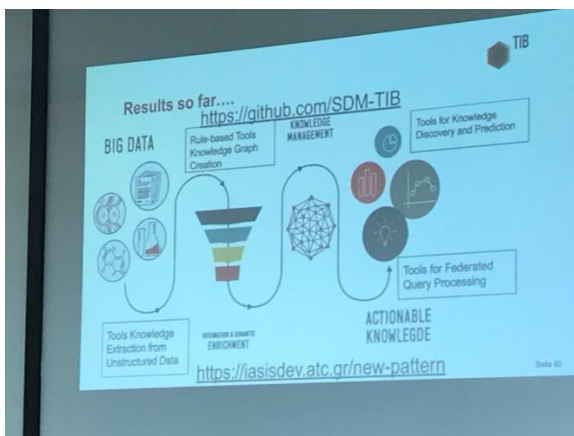
<sup>4</sup> <https://project-lambda.org/Summer-School-2019-Presentations>

<sup>5</sup> [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Keynote\\_2\\_OntoText.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Keynote_2_OntoText.pdf)

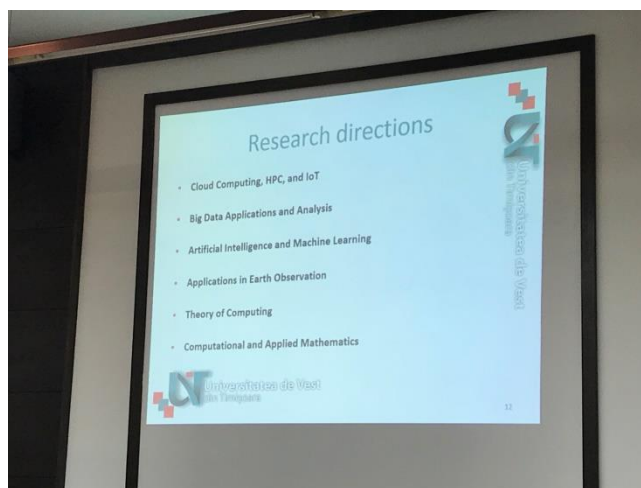
<sup>6</sup> [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Associated\\_Partner\\_UVT.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Associated_Partner_UVT.pdf)



Keynote by Prof. Sören Auer (WDAqua Demo)


Keynote by Prof. Maria Esther Vidal based on iASiS project<sup>7</sup>


Keynote by Atanas Kiryakov (Similarity Demo)



Research trends in Big Data by UVT (based on different EU projects)

Figure 6. Invited Speakers – Advisory Board Members

## 4.2 Company presentations by Invitation

Companies that supported the LAMBDA project from very beginning were invited to present their activities in Big Data domain, see Figure 7. Besides OntoText, the following companies have sent their representatives to BDA and there were talks given by

- CISCO Serbia, represented by Radenko Čitaković; and
- SAS Institute, Serbia, represented by Nikola Nikačević.

<sup>7</sup> <http://project-iasis.eu/>



CISCO Serbia, represented by Radenko Čitaković



SAS Institute, Serbia, represented by Nikola Nikačević.

*Figure 7. Invited Speakers – Company Presentations*

#### 4.3 Lectures by the University of Oxford (UOXF)

The LAMBDA consortium members and representatives from the University of Oxford were:

- Emanuel Sallinger, University of Oxford, TU Wien and DeepReason.ai
- Luigi Bellomarini, Banca d'Italia and University of Oxford
- Tim Furche, Meltwater and University of Oxford

The UOXF lectures about

- [Knowledge Graphs](#)
- [Reasoning in Knowledge Graphs](#)
- [Extraction for Knowledge Graphs](#)

are based on the experience gained in commercial projects conducted by UOXF spin-off companies Wrapidity (acquired by Meltwater) and DeepReason.ai. In addition, the work done at the Banca d'Italia was presented by Luigi Bellomarini, see Figure 8.

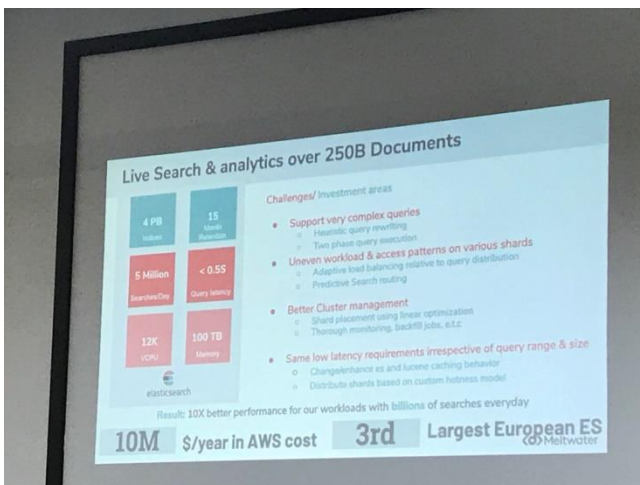




University of Oxford - [Knowledge Graphs](#) Definition



[Reasoning in Knowledge Graphs](#) at Banca d'Italia



Live Search and Analytics on Big Data Meltwater represented by Dr. Tim Furche at Meltwater



Figure 8. Lectures by the University of Oxford

## 5. BDA School (Day 2)

### 5.1 Lectures by the University of Bonn and Fraunhofer Institute

The LAMBDA consortium members and representatives from the University of Bonn (UBO) and Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS) were, see Figure 9:

- Damien Graux, Fraunhofer Institute for Intelligent Analysis and Information Systems<sup>8</sup>
- Hajira Jabeen, University of Bonn
- Sahar Vahdati, University of Bonn<sup>9</sup>



Figure 9. Lectures by the University of Bonn and IAIS

The UBO/IAIS lectures about

- [Big Data Architecture](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_1.pdf), see also [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_1.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_1.pdf)
- [Distributed Big Data Frameworks](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_2.pdf), see also [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_2.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_2.pdf)

<sup>8</sup> Presentation of the Fraunhofer Institute, [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Partner\\_IAIS.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Partner_IAIS.pdf)

<sup>9</sup> Presentation of the University of Bonn, [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Partner\\_UBO.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Partner_UBO.pdf)



- Big Data Solutions in Practical Use-cases , see also [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_3.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_3.pdf) and [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_3\\_Hands\\_on.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_3_Hands_on.pdf)

are based on recently finished and running EU projects Big Data Europe<sup>10</sup>, Industrial Data Space<sup>11</sup>, WDAqua (Question Answering ITN)<sup>12</sup> and others.

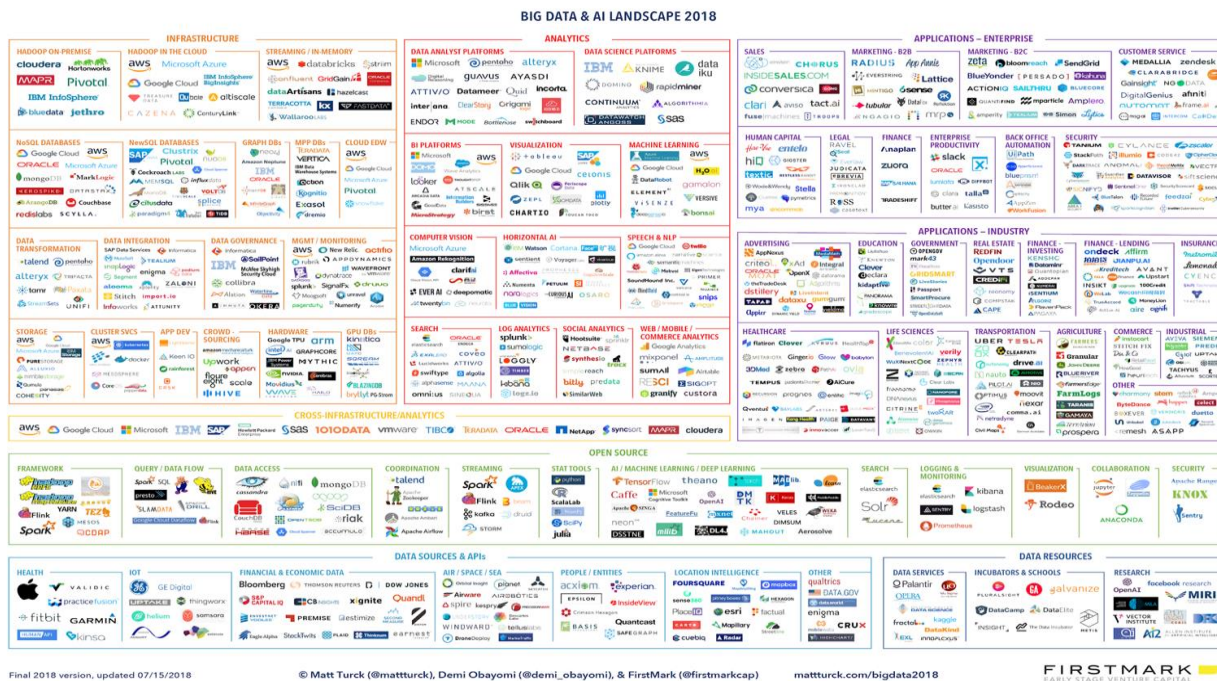


Figure 10. Lectures by the University of Bonn – Discussion on the Big Data Landscape

<sup>10</sup> <https://www.big-data-europe.eu/>

<sup>11</sup> <http://ids.semantic-interoperability.org/>

12 <https://wdaqua.eu/>

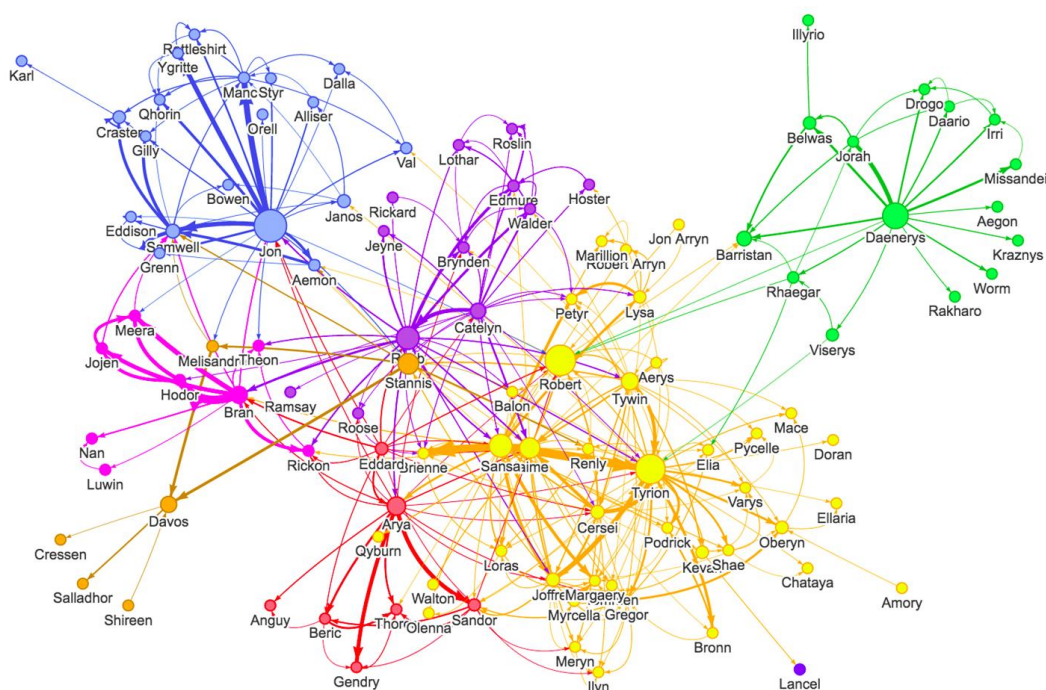


Figure 11. Lectures by the University of Bonn – Discussion on Graph Databases

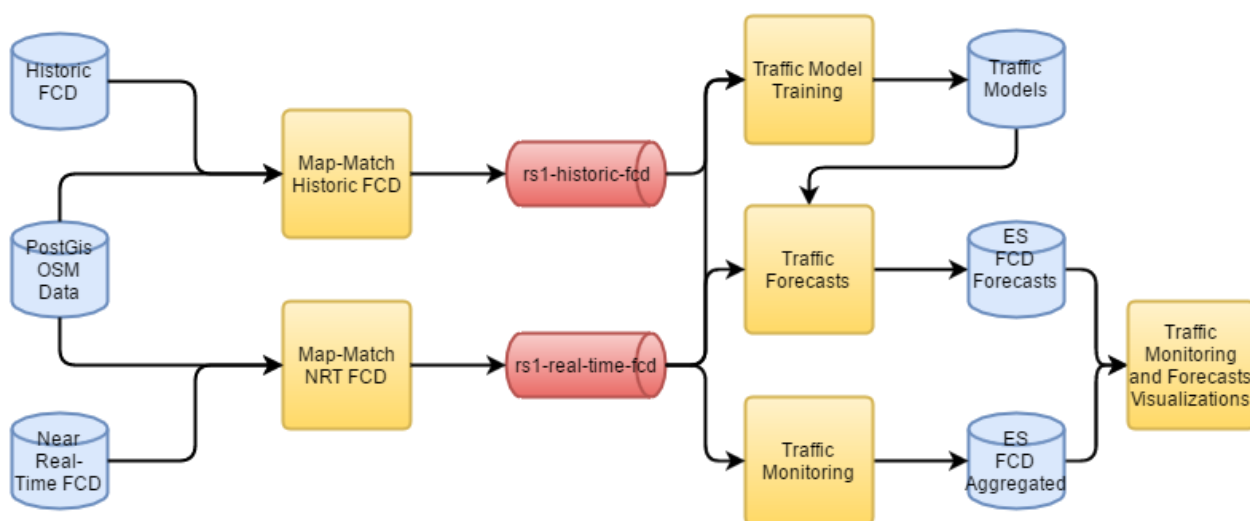


Figure 12. Lectures by the University of Bonn – Discussion on Big Data Solutions in Practice, Use case Architecture

## 5.2 Presentation of the recent results from the EU projects by PUPIN

Young researchers from the Institute Mihajlo Pupin, see Figure 13,

- Dea Pujić
- Marko Jelić

presented some results from running EU projects InBetween<sup>13</sup>, RESPOND<sup>14</sup> and REACT<sup>15</sup>, see [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Partner\\_PUPIN\\_Energy\\_Domain.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Partner_PUPIN_Energy_Domain.pdf)

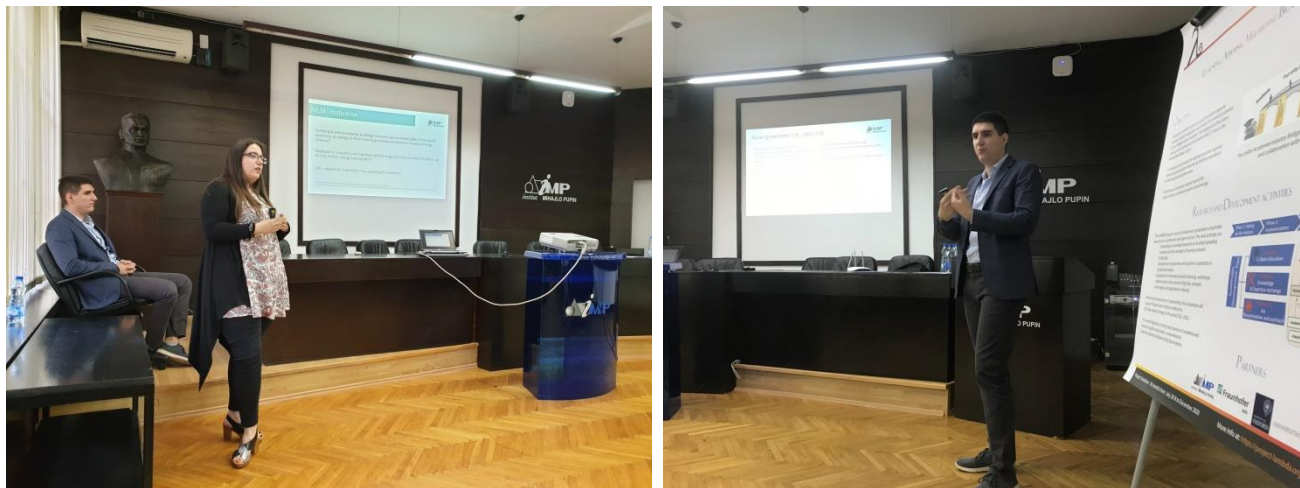


Figure 13. Presentations from young researchers from the Institute Mihajlo Pupin

## 6. BDA School (Day 3)

### 6.1 Lectures by the University of Bonn and Fraunhofer Institute

The UBO/IAIS lectures presented on the 3<sup>rd</sup> day of the School are

- [Distributed Big Data Libraries](#), see also [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_4.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_4.pdf)
- [Distributed Semantic Analytics I](#), see also [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_5.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_5.pdf)
- [Distributed Semantic Analytics II](#), see also [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_6.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_6.pdf) and [https://project-lambda.org/sites/default/files/2019-06/BDA\\_2019\\_Lecture\\_6\\_Tutorial.pdf](https://project-lambda.org/sites/default/files/2019-06/BDA_2019_Lecture_6_Tutorial.pdf)

### 6.2 Closing Session and Impressions from the BDA School 2019

The final session of the BDA School was devoted to presenting a summary of the LAMBDA activities in the first project year and discussing the overall goals of the project until the project end and beyond. Participants were asked again to login to the private part of the portal, provide

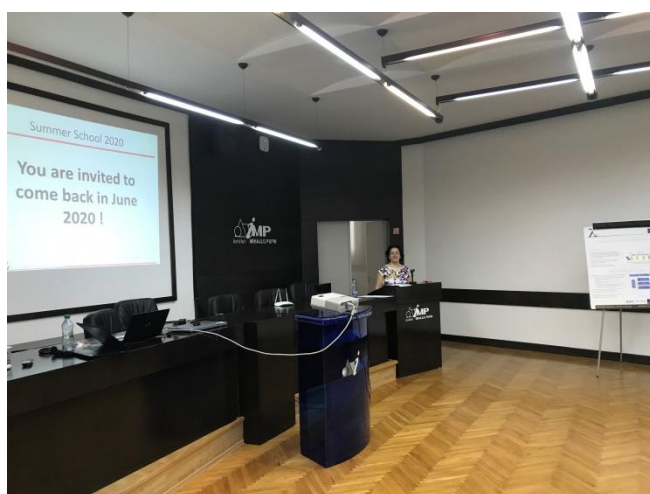
<sup>13</sup> <http://www.pupin.rs/en/research-and-development-projects/european-rd-projects/inbetween-ict-enabled-behavioral-change-towards-energy-efficient-lifestyles/>

<sup>14</sup> <http://www.pupin.rs/en/research-and-development-projects/european-rd-projects/respond-integrated-demand-response-solution-towards-energy-positive-neighbourhoods/>

<sup>15</sup> <http://www.pupin.rs/en/research-and-development-projects/european-rd-projects/react-renewable-energy-for-self-sustainable-island-communities/>



feedback on potential re-use of the LAMBDA outputs and suggestions for improvement in organization of the next year Summer School, see Figure 14.



## Summer School 2019 - Statistics

- [bda-school@mail.project-lambda.org](mailto:bda-school@mail.project-lambda.org)  
~ 50 members (PUPIN + Serbia + West Balkan)
- [Webinar-1](#) (25/04/2019)
- > 15 Speakers (Germany, Bulgaria, UK, Italy, Austria, Romania, Serbia)
- > 60 participants, > 20 different organizations

Figure 14. Closing Session

Table 3. Impressions from the BDA School 2019

Organization / Sector	Feedback collected
PUPIN student	<i>I would like to see the lectures presented at the School integrated in one of the master courses organized at the School of Electrical Engineering, for instance 'Data Mining and Semantic Web', 'Natural Language Processing' and other.</i>
PUPIN student	<i>The School was an excellent opportunity for networking with Professors from abroad and colleagues from the Region. I would like to present my research at the next Summer School if that fits your concept.</i>
Student from Serbia	<i>Lectures were excellent, as well as the whole atmosphere during the last 3 days. I think it will help me a lot in my future career ... Something that would be useful for the next year summer school is to have any preparatory material in advance. I would like to better prepare myself, and I am sure in that way the participants will make better use of the lectures.</i>
Student from Serbia	<i>The courses organized at the Electronic Engineering Faculty (AI, Knowledge Discovery, Data Warehouse) are related to the lectures presented at the School. What was interesting in the last 3 days were the Use Cases presented.</i>
Expert from public administration	<i>Once again I would like to thank the LAMBDA consortium for the invitation. For someone with my interests and duties, this was in every sense an extraordinary experience (Equally, the first, more general day, and the second day of a more technical nature). Probably all other participants, like me, are impatiently waiting for news from the consortium.</i>
Expert from Bank sector from Serbia	<i>I think that mentioned projects and Data analytics tools will be more useful to colleagues interested in the academic perspective to Data analytics and Big data in general, than to us who work in industry, but I believe that the information I get about them will be very important in the future.</i>



Professor from Serbia	<i>I like the statement 'Old is Gold'.</i>
Professor from Romania (from the Advisory Board)	<i>The 1st Lambda Summer School in Big Data Analytics was a great opportunity for us to meet people with similar or complementary research interests and it was a great opportunity for us to disseminate the on-going activities in our department. The LAMBDA lectures are good candidates to be reused as support material within the curricula of Big Data master program: Introduction to Big Data and Architectures, Distributed Big Data Frameworks, Big Data Solutions in Practice. The courses that may benefit are: Data Warehouses and Big Data Technologies.</i>
Professor from Hungary Romania (from the Advisory Board)	<i>After listening to PUPIN colleagues about energy optimisation I 'd like to connect PUPIN to our responsible colleagues and make plans for future collaboration.</i>
Professor from Germany (from the Advisory Board)	<i>I would like to see more interactions between the teachers and participants.</i>

## 7. Potential for Adoption of LAMBDA Lectures



Figure 15. BDA School participants from Serbia and the region



The Table below gives the Faculties/Universities that expressed their interest in adopting the LAMBDA outputs. The Feedback questionnaire<sup>16</sup> was distributed to participants of the School, see Figure 16. The results of the survey will be studied in detail in WP5 and will be reported in Deliverable 5.3 First Report on Stakeholder Engagement and Exploitation Activities.

*Table 4. Potential adoption of LAMBDA teaching materials at universities in Serbia and the Region*

Faculty / University	Country
<a href="#">School of Electrical Engineering - University of Belgrade</a>	Serbia
<a href="#">Faculty of Agriculture, The University of Novi Sad</a>	Serbia
<a href="#">Faculty of Sciences, The University of Novi Sad</a>	Serbia
<a href="#">Faculty of Electronic Engineering, The University of Niš</a>	Serbia
<a href="#">Faculty of Mechanical Engineering – University of Niš</a>	Serbia
<a href="#">Faculty of Transport and Traffic Engineering - University of Belgrade</a>	Serbia
<a href="#">School of Engineering Management , Union Nikola Tesla University</a>	Serbia
<a href="#">Faculty of Organization and Informatics , The University of Zagreb</a>	Croatia
<a href="#">Faculty of Computer Science &amp; Engineering, The Ss. Cyril and Methodius University</a>	North Macedonia
<a href="#">Faculty of Electrical Engineering, The University of Montenegro</a>	Montenegro
<a href="#">Faculty of Natural Sciences and Mathematics , The University of Tuzla</a>	Bosna and Herzegovina
<a href="#">Faculty for Information Technologies, Belgrade Metropolitan University</a>	Serbia

<sup>16</sup> <https://project-lambda.org/BDA-2019-Feedback>



## 1<sup>st</sup> Summer School

### Feedback Form

Organization / Country

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Organization Type (R&D Organization / Education / SME / Large-profit oriented / NGO)

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Please, mention possibilities for re-use of LAMBDA Lectures and responsible person

- Courses related to Data Analytics, AI, Big Data Architecture, Semantic Technologies, Big Data Analytics, Visualisation

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- Projects related to Data Analytics, AI, Big Data Architecture, Semantic Technologies, Big Data Analytics, Visualisation

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Please, mention other activities related to Big Data / Communities / Partnerships

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Thank you very much for your time and attention.



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Figure 16. Feedback Questionnaire

## 8. Communication within the BDA-School Participants Group

### 8.1 Preparatory Activities

In order to help the PUPIN staff and other invited participants to get familiar with the topics that would be discussed at the Big Data Analytics School, a Webinar was organized for stakeholder from education / government / business organizations, see Figure 17 or the following presentation<sup>17</sup>.



Figure 17. LAMBDA Webinar

### 8.2 The BDA-School mailing List

The [bda-school@mail.project-lambda.org](mailto:bda-school@mail.project-lambda.org) is one of the channels for informing the potential stakeholders about the activities of the LAMBDA team, see Figure 18.

<sup>17</sup> <https://project-lambda.org/sites/default/files/2019-05/Webinar-1.pdf>



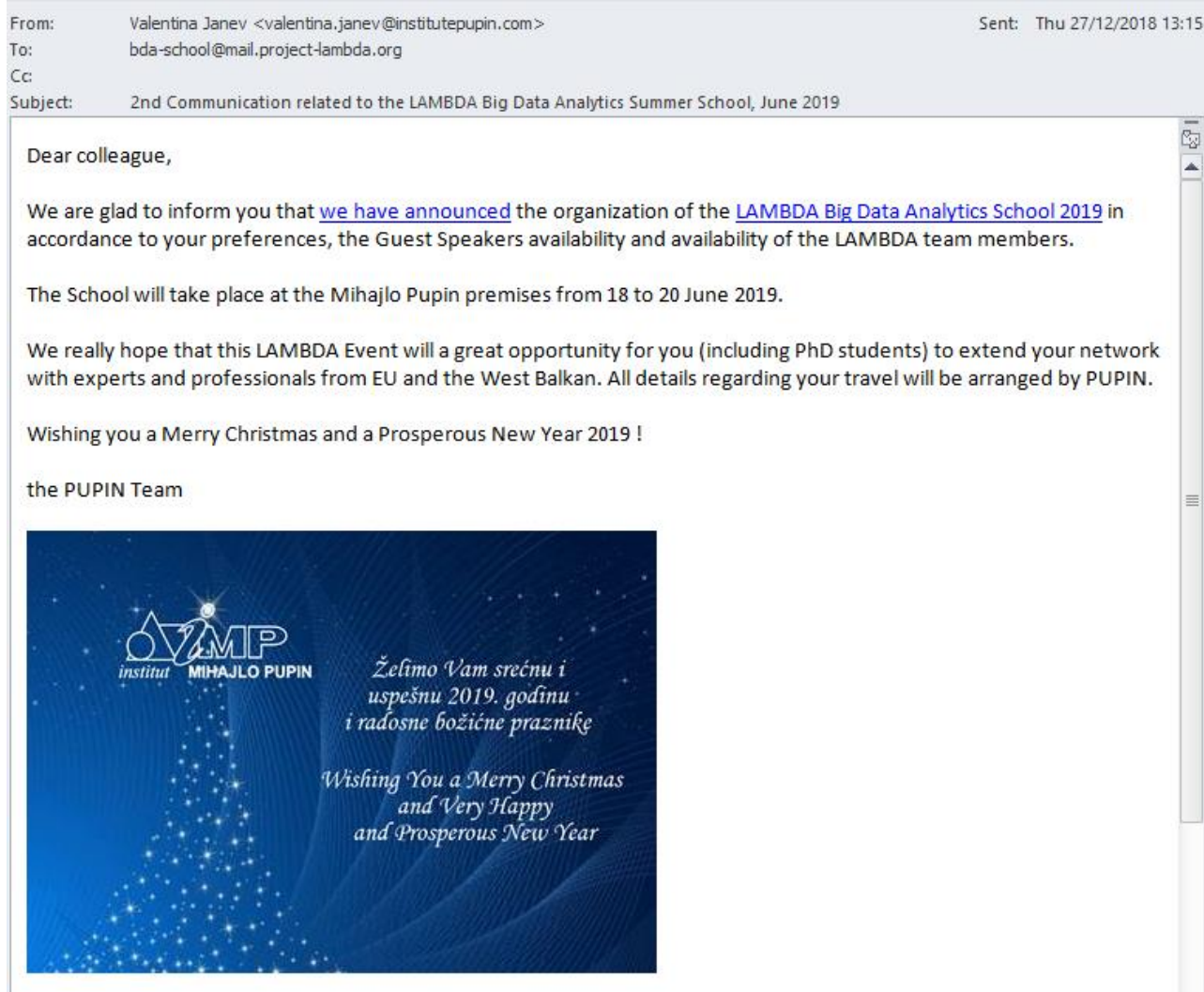
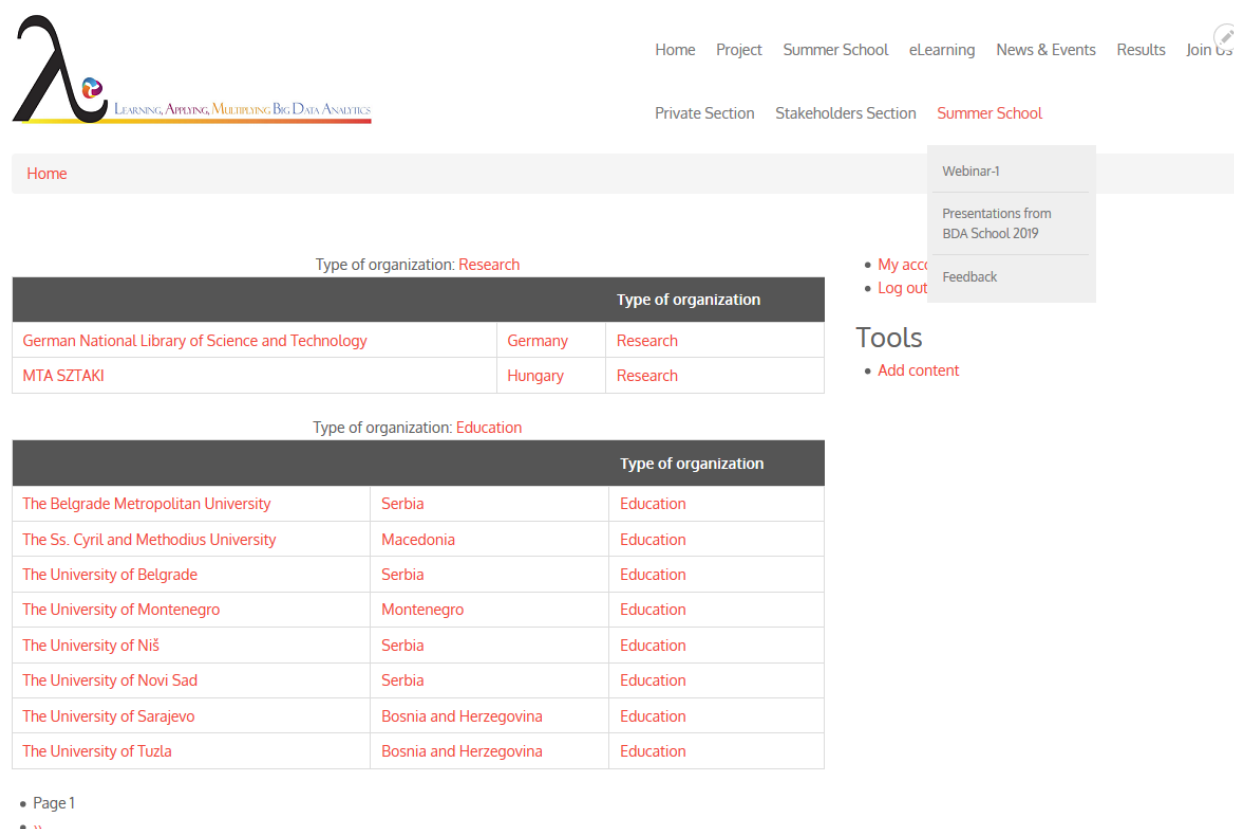


Figure 18. Communication via the BDA-School mailing list

### 8.3 LAMBDA Platform

For easier and more effective collaboration among consortium members (e.g facilitating joined paper and deliverable writing, version management, information sharing, stakeholders data-base management, etc) and with stakeholders, the LAMBDA platform was established in month 1 of the project, see Figure 19.



The screenshot shows the LAMBDA platform interface. At the top, there is a navigation bar with links: Home, Project, Summer School, eLearning, News & Events, Results, and Join Us. Below this, there is a secondary navigation bar with links: Private Section, Stakeholders Section, and Summer School. The main content area is divided into two sections: 'Type of organization: Research' and 'Type of organization: Education'. Each section contains a table with columns for organization name, country, and type of organization. The 'Research' section lists the German National Library of Science and Technology (Germany) and MTA SZTAKI (Hungary). The 'Education' section lists various universities including The Belgrade Metropolitan University, The Ss. Cyril and Methodius University, The University of Belgrade, The University of Montenegro, The University of Niš, The University of Novi Sad, The University of Sarajevo, and The University of Tuzla. On the right side, there is a sidebar with a 'Webinar-1' section, a 'Presentations from BDA School 2019' section, and a 'Tools' section with a 'Add content' link. At the bottom left, there is a 'Page 1' indicator.

Type of organization: Research		
Type of organization		
German National Library of Science and Technology	Germany	Research
MTA SZTAKI	Hungary	Research

Type of organization: Education		
Type of organization		
The Belgrade Metropolitan University	Serbia	Education
The Ss. Cyril and Methodius University	Macedonia	Education
The University of Belgrade	Serbia	Education
The University of Montenegro	Montenegro	Education
The University of Niš	Serbia	Education
The University of Novi Sad	Serbia	Education
The University of Sarajevo	Bosnia and Herzegovina	Education
The University of Tuzla	Bosnia and Herzegovina	Education

Figure 19. LAMBDA platform- contents at the private side

A Drupal-based platform by default offers three groups of users:

- Users who are not logged in, or *anonymous users*
- Users who are logged in, or *authenticated users* (Everybody with a valid e-mail address can register with the platform and become an authenticated user)
- *Administrative* user account that is automatically created with the installation.

Currently, 3 different user roles have been defined:

- *Partner*, full access to the private pages of the portal.
- *Associated Partner*, full access to the Stakeholder database (restricted) and contents in the Knowledge Repository.
- *Administrator*, for managing the whole content management system.

## 9. Conclusion

Overall, the experience gained from organizing the 1<sup>st</sup> Summer School in Big Data Analytics at the Institute Mihajlo Pupin is very positive. We see not only a clear benefit for the PUPIN employees but also for other participants at the School with heterogeneous educational background and professional level. The preparations for next year's summer school have already started and we anticipate the 2<sup>nd</sup> Summer School will take place in June 2020.