EMUG

The 10th Meeting of the
„European MELCOR User Group“

Co-organised by Faculty of Electrical Engineering and Computing (FER)
University of Zagreb

In Support of the Cooperative Severe Accident Research Programme (CSARP)

will be held in
Zagreb, Croatia
25th – 27th April, 2018

With special thanks to EMUG's permanent stake holders:

United States Nuclear Regulatory Commission (US NRC)
Sandia National Laboratories (SNL)
Paul Scherrer Institut (PSI)

Announcement and Call for Presentations

Deadline for hotel reservation	5th April 2018
Deadline for registration to the meeting (including indication of presentation(s) title(s) and duration)	11th April 2018
Presentation(s) in Power Point or in PDF format	One week before the meeting

On-line information is available at
http://www.psi.ch/emug/

1. ORGANIZATION AND HOST

The 10th Meeting of the European MELCOR User Group will be held at the Faculty of Electrical Engineering and Computing (FER) in Zagreb on 25th to 27th April 2018.

The meeting will start in the morning on the 25th with a one-day workshop and continue with the two days meeting that should finish before 18:00 on the 27th. Final details and a draft agenda will be sent to registered participants before the meeting. A meeting room will also be available for any private discussions between organizations.

2. BACKGROUND OF THE MEETING

The MELCOR severe accident integral code is developed by Sandia National Laboratories (SNL) for the U.S. Nuclear Regulatory Commission (NRC) in the USA, and is provided to various European organizations through bilateral agreements under the 'Cooperative Severe Accident Research Program' "CSARP" between US-NRC and the European organizations. The code has been used for many reactor safety applications by these organizations. Some of these organizations also continuously assess the code with data available from Severe Accident Research programs. A few organizations have also developed models for certain critical issues, which appear in local versions of MELCOR for testing and with the goal of implementation in future releases from SNL.

The main interests in establishing the user group are to foster experience and information exchanges among the European organizations through organized annual meetings and to establish common needs on further model and correctional development of MELCOR. The first meeting of the EMUG hosted by PSI was held in December 2008. PSI is acting as coordinator of the group.

AIMS OF EUROPEAN MELCOR USER GROUP

- To provide a forum for the presentation and discussion of the experience gained by:
  - MELCOR assessment using integral and separate-effect tests leading to presentation of performance of models and related issues, including sensitivity to selected model parameters and model uncertainties,
  - Model development efforts,
  - Application of MELCOR for plant safety studies, including Level 2 PSA, which demonstrates strengths and weaknesses of MELCOR models in reproducing the individual severe accident phenomena, and interactions between them occurring in the nuclear part and balance of plant systems, and the effect of operator actions on the accident progression through user input as introduced in the code input models,
  - Use of code with different compilers and operating systems.
- Prioritization of user error correction and model development needs, to be transmitted to the code developers and the US NRC,
- To minimize the efforts required to obtain an adequate knowledge of optimum use of MELCOR, through sharing of experience,
- To support the gaining of MELCOR knowledge and experience, particularly concerning the younger and less experienced users.

3. SCOPE, CONTENT AND OUTLINE OF THE MEETING

The two days meeting is divided into three sections:

1. NRC and SNL Presentations

About half a day will be devoted to presentations from NRC/MELCOR developers. Each of the following four topics could be given by one presentation.

- NRC MELCOR Activities
  - Code applications
  - Code perspectives, possibility of distribution to international partners, status and future areas of CSARP program
  - New considerations of code development
- MELCOR input
  - New features of input conversion
  - New input capabilities in M1.8.6 and M2.1/2.2
- Current MELCOR development thrust areas
  - Quality assurance
    - Code assessment work and regression testing
    - Code distribution and issue management
  - New MELCOR Models – discussion of new modelling and experience using new models
  - Current code development
- Applications
  - MELCOR best practices
  - Guidance for plant applications

2. User Presentations

About one day and a half will be devoted to presentations from all of the European organizations. For those who would like to present their experience in plant applications of MELCOR 1.8.6 and MELCOR 2.1/2.2, the organizers of the meeting express their wish to see presentations not only on specific aspects of the plant applications evaluating safety aspects of the plants in interest but also the experience in use of the MELCOR models, input parameters, nodalization aspects which have certain bearing on the performance of the code, as well as the quality of the code estimates.

Presentations will be grouped into the following 4 sessions:

Group 1: User experience with nodalization regarding simulation of different issues with preference to focus on RCS, core and RN inventory and release modeling,

Group 2: Modelling features (early and late phase core degradation, corium pool formation, lower head behavior, RN release, SFP, etc), new modelling efforts and nuclear fusion application,

Group 3: Model development and assessment, integral assessment, sensitivity studies, code to code comparison (different MELCOR versions or comparison to other codes), plant applications (link to uncertainty analysis, PSA Level 2 and PSA Level 3, etc.),

Group 4: Post-processing of results (including possibility of sharing of tools developed by users), run time performance, and input conversion from MELCOR 1.8.6 → 2.1/2.2.

3. **Discussion of all participants**
    - Feedback from the participants – user suggestions to further code development (it could be included in presentation)
    - Organizational aspects: next meeting

Eventually, a panel session on an issue of interest of MELCOR modelling might be organized during the afternoon of the second day of the meeting.

4. PRACTICAL ARRANGEMENTS

Participants:

Participation at the meeting is open to experts of the European organizations actively using the MELCOR code in any of its versions or planning to joint CSARP*. The success of the meeting is very much dependent on the active participation of those present, especially by presentations on their own experience with the code.

**If you are not sure about your participation, please feel free to ask for further information. All the requests from non-CSARP members will be evaluated on a case-by-case basis.*

Registration:

All the participants should fill in the Meeting Registration Form that is attached to this document, including the title(s) of presentation(s), and send it before the 11th April, 2018 to:

E-mail: stefica.vlahovic@fer.hr

A registration fee will not be required. The participants bear the cost of travel and accommodation.
The **Conference Dinner** will be organized in the evening on **Thursday 26th** and it will be sponsored by organizers.
There is provision for organized lunch in Faculty's restaurant at the special price of **45 HRK (6 EUR) per lunch**. There is a lot of possibility to have lunch outside the university as it is suited in the heart of business center.

Passport and Visa:

Non-EU participants will need to have a valid passport to enter Croatia.

The Participants coming from all countries that require Croatian entry visa in which there is an Embassy or Consular Office of Republic of Croatia do need to apply for visas there. The Participants are advised to check for the Embassy or Consular Office of Republic of Croatia which covers their country.
In order to help, we will send the invitation letter (which is in Croatian and is obligatory document in order to issue a visa by the Embassy) to each individual participant, which should be sufficient documentation for their visa application. If you need a visa we kindly ask you to contact us for further information.

Arriving in Zagreb:

By plane

Zagreb has an international airport nearby (**Franjo Tuđman Airport**), just **16 km** from the centre.

Once you have reached the Zagreb's airport, you can take a **Croatia Airlines bus** that will drop you off at "**Lisinski Concert Hall Bus Station**" or at the "**Central Zagreb Bus Station"** near city centre. Airport bus fare is **30 HRK (4 EUR)** and departs daily every half-hour, the first one leaving at **7 AM** and the last at **8 PM**.

From airport bus stop "**Lisinski Concert Hall** " you can walk to **Hotel International** or to **Faculty of Electrical Engineering and Computing (FER) (5-10 minutes walk).**

You can also catch a taxi in front of the international arrivals but the bus is much cheaper.
Approximate cost for the **taxi** services from airport to city centre is around **200 HRK (25 Euros)**.

Detailed Croatia Airlines bus schedule can be found on the: www.zagreb-airport.hr/en .

By rail

If travelling by rail, Zagreb has direct railway links with all the neighboring countries.
Once you are at the **Central Railway Station**, you are actually in the heart of Zagreb, only a 10-minutes-walk from the main city square (Trg bana Jelačića).
Croatian Railways Ltd.: www.hzpp.hr/en .

By bus

Central Zagreb Bus Station (in Marin Držić Avenue) is situated in the vicinity of the Central Railway Station. Tram No. 5 will take you to the Faculty's building in 10 minutes.
Zagreb Bus Station: www.akz.hr/en .

Transport:

There are two ways of public transportation – trams (Figure 1) and buses. They operate all day (every few minutes) and night (every hour).
Tickets can be bought on newsstands (**4 HRK** for **30 min**, **10 HRK** for **90 min**). Make sure that you stamp your ticket once you board.
Daily tickets are available at a price of **30 HRK** (4 EUR) and there is also possibility to buy ticket for multiple days.

Zagreb Municipal Transit System (ZET): www.zet.hr .
Toll-free ZET number: +385 72 500 400

When entering a vehicle, the passengers are obliged to validate their single or daily ticket.

How to get to Faculty of Electrical Engineering and Computing (FER) by tram?

Trams No. **3, 5, 13** passing close to FER and just take of at the station **„Sveučilišna aleja"**.
If you arrive from Central Bus Station you should take tram No. 5 (Direction: Jarun) and take of at the station „Sveučilišna aleja".

Taxi service

Radio taxi: radiotaxizagreb.com/en/, (+385 1 1717)
Eko taxi: www.ekotaxi.hr/en/, (+385 1 8892 013)
Taxi Cammeo: cammeo.hr/en, (+385 1 1212)
You can also take **Uber**.

The Conference Venue:

Faculty of Electrical Engineering and Computing – FER (Figure 4)
Address: Unska 3, 10000 Zagreb, Croatia

The **workshop** will take place in the **TCR** on the ground floor or in the **Lab "D244"** on the second floor of D building depending on the number of participants. (Figure 5, Figure 6)

The **meeting** will take place in the "**Gray Hall**" on the ground floor of D building. An additional room will be available for any private discussions between organizations. (Figure 5)

Accommodation:

Participants are responsible for booking their accommodation in Zagreb. The hotel International is closest to the Faculty and we have negotiated special room booking rate for EMUG participants.

Hotel International****, www.hotel-international.hr/homepage
The hotel is located in the heart of business center, offers newly refurbished accommodation for business guests as well as guests who visit Zagreb as tourists.
Hotel is **less than 5 minutes** to FER (just across the street) (Figure 2, Figure 3).
A block of rooms (**35**) has been provided at a discount conference rate. The discount will be available until the **5th April, 2018** on the principle first come, first served. The cost for the accommodation is **73 EUR single** occupancy or **87 EUR double** occupancy per night (regular prices are doubled). The reservation can be cancelled **at least 48 hours** before arrival day free of charge. To get discounted, rate please enter *access key* **EMUG2018**.

Other recommended hotels (without discounted rate) are.

Hotel Westin*****, www.hotelwestinzagreb.com
Located between the city center and FER, time to travel by tram takes approx. 10-15 minutes or about 15-20 minutes by foot.
All rooms have broadband Internet connectivity - free of charge. Wellness center is free of charge.

Hotel Central ***, www.hotel-central.hr/en/
Located in the city center, 20 minutes walking to FER.
Rooms equipped with Internet (free of charge).

Hotel Palace****, palace.hr/en/

Hotel Dubrovnik****, hotel-dubrovnik.hr/

Panorama Zagreb Hotel****, www.panorama-zagreb.com/homepage

Art Hotel LIKE, http://www.arthotellike.hr/en/

Hotel Croatia***, www.hotel-croatia.com.hr/home.html

The Movie Hotel***, www.themoviehotel.com/

Currency exchange:

At airport there are several ATMs' outside international arrivals.

Croatian national monetary unit is **kuna (HRK) (1 EUR is approx. 7.5 kuna)**.

You can find all other exchange rates at www.hnb.hr/en/core-functions/monetary-policy/exchange-rate-list/exchange-rate-list

General information:

Time zone:	GMT + 1:00 hour
Daily mean temperature:	Average High / Low Temperature 15 / 4 °C (April)
Currency:	Kuna (HRK)
Electricity supply:	220 V AC, 50 Hz
Water:	Tap water is drinkable throughout the country (and City of Zagreb)
Internet/wi-fi:	Wi-fi access will be provided free of charge in the FER building for all participants.

Language:

All presentations and discussions will be in English.

Presentations:

Presentations (in MS power point or Acrobat pdf format), should be sent to stefica.vlahovic@fer.hr, at least one week before the meeting. The presentations will be uploaded with permission of the participants to the EMUG group website after the meeting.

For all additional information and organizational details please contact:

Prof.dr. **Davor Grgić**
E-mail: **davor.grgic@fer.hr**

Štefica Vlahović
E-mail: **stefica.vlahovic@fer.hr**

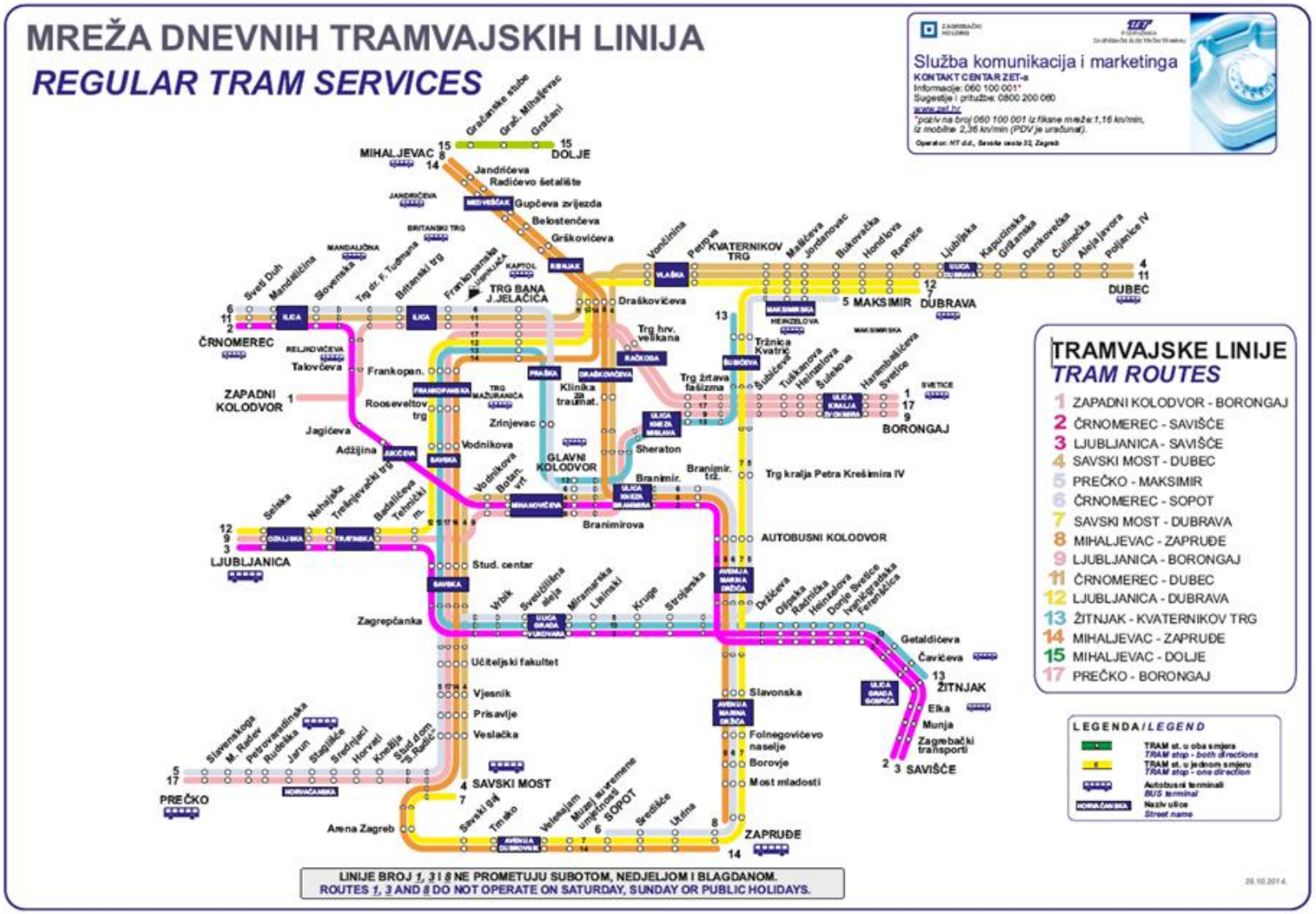

Figure 1: Regular tram services in Zagreb

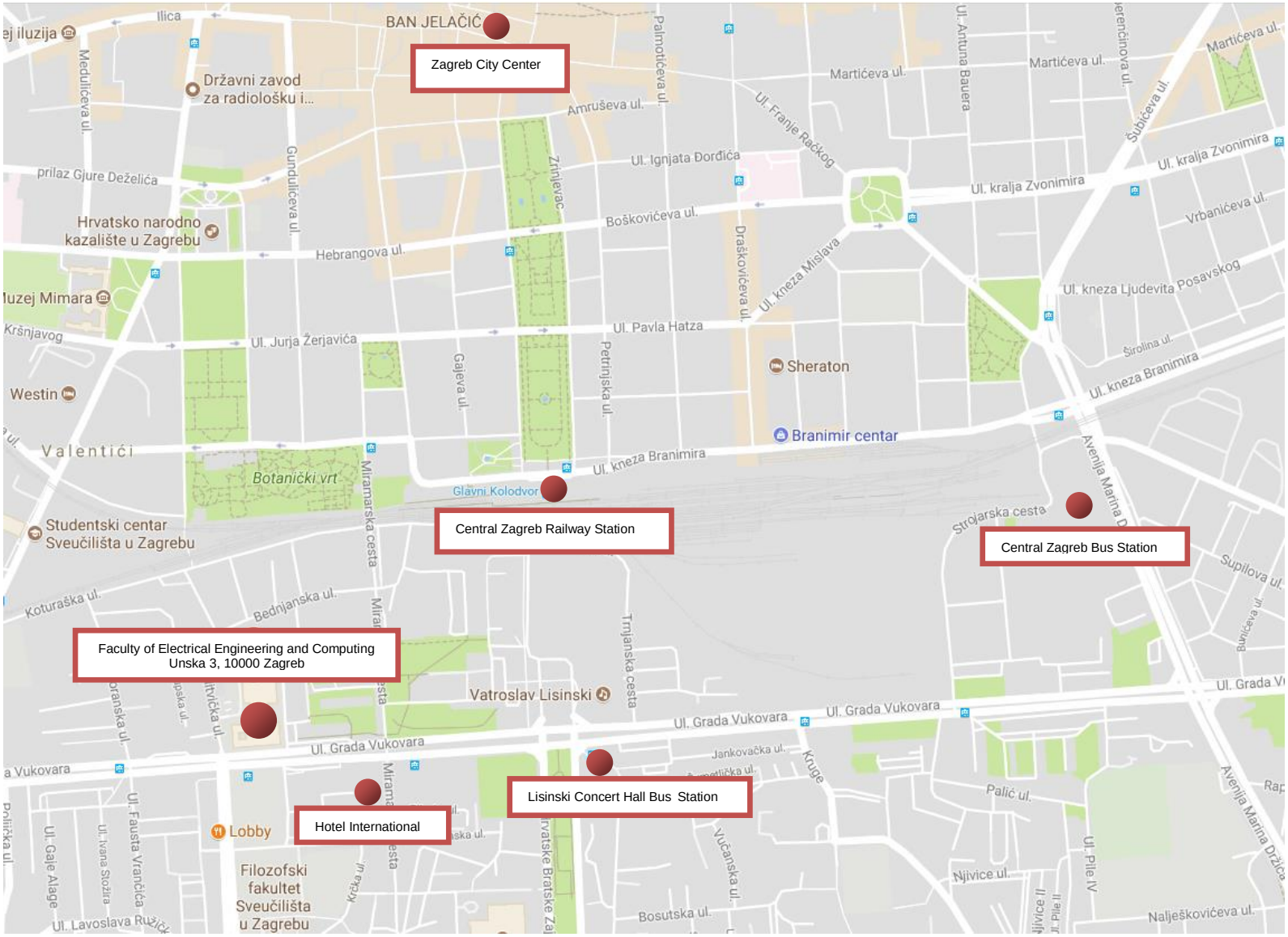

Figure 2: Distance between the Faculty and hotel International (map)

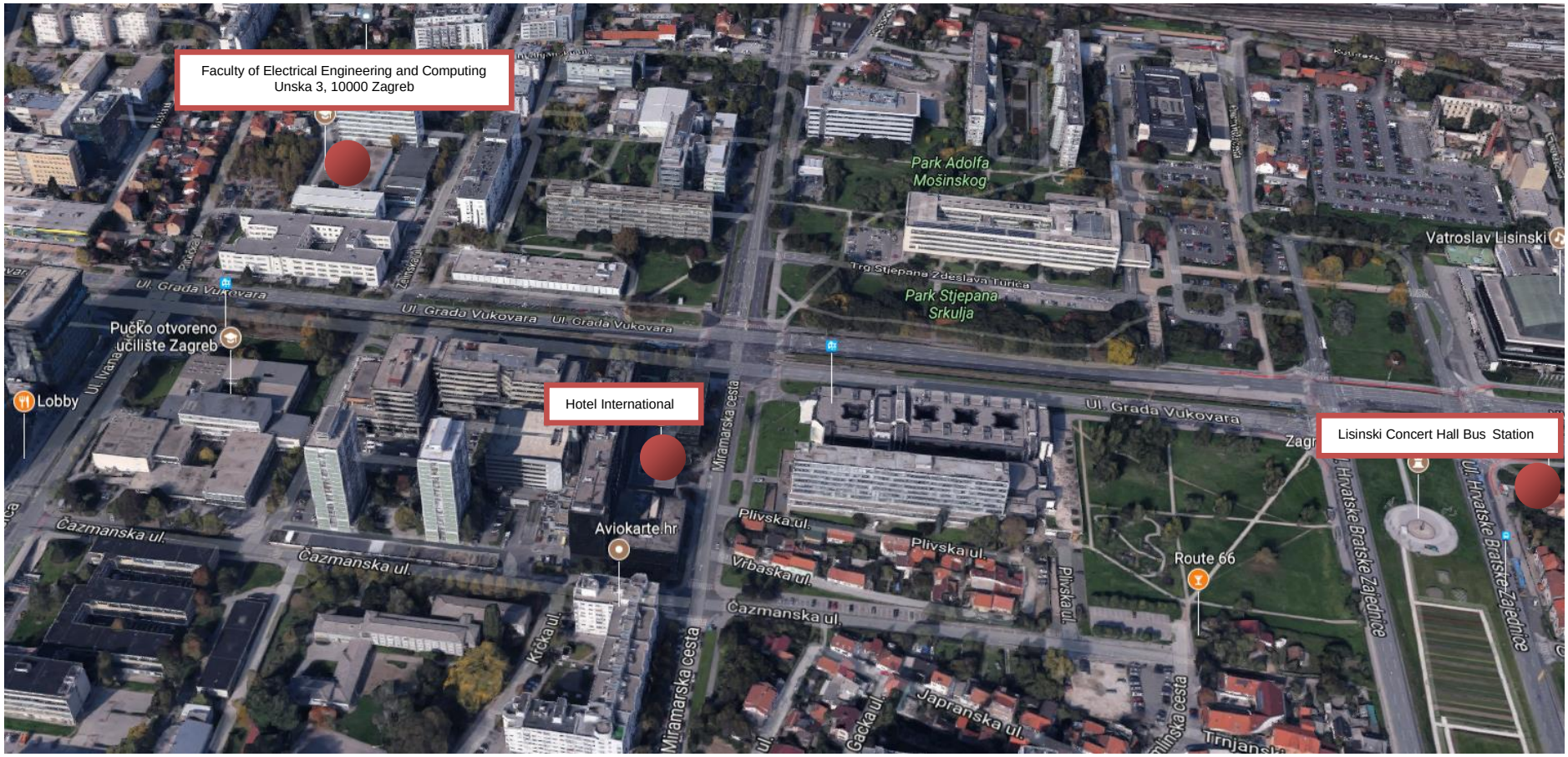

Figure 3: Distance between the Faculty and hotel International (aerial view)

Figure 4: Faculty of Electrical Engineering and Computing (FER) buildings

Ground Floor

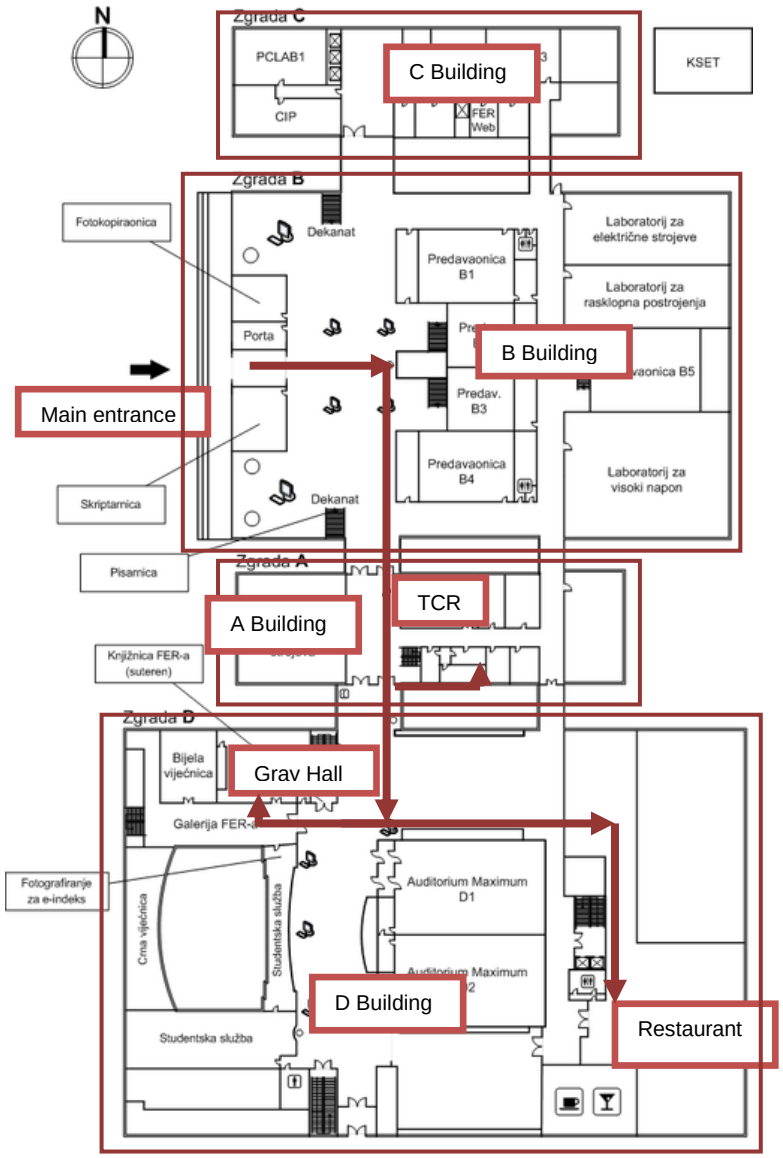

Figure 5: FER ground floor

2nd Floor, D Building

Figure 6: FER second floor

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Zagreb, Croatia
25th-27th April, 2018

Meeting Registration Form

Surname (Family name)[1]:

Given Name (s):

Title or Function:

Institution:

E-mail address:

Title (s) of the presentation (s):

Time needed for presentation[2]
(including 5 min for discussion):

Vegetarian food/other
requirements on food
(please specify):

To be sent by e-mail as soon as possible and in any case before 11th April, 2018 to:

E-mail: stefica.vlahovic@fer.hr

[1] (Please indicate whether Prof., Dr., Mr., Miss, Mrs.)

[2] If the time for presentation will have to be amended due to the schedule, the author will be informed.