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Handbook for trainers to prepare online or
hybrid railway laboratory sessions

This handbook was written under the scope of the IDEALCAREL project and is a part of the Intellectual Output Number 2. Hence, the backgrounds are explained in the main document. This handbook is a download via the IDEALCAREL homepage.

| Name | Organisation |
|------------------|--------------|
| Jörn Pachtl | TUBS |
| Simon Söser | TUBS |
| Kesting Volker | TUBS |
| Borna Abramović | UNIZG |
| Denis Šipuš | UNIZG |
| Martin Starčević | UNIZG |
| Jozef Gašparik | UNIZA |
| Jaroslav Mašek | UNIZA |
| Juraj Čamaj | UNIZA |
| Dušan Kamenický | ČVUT Praha |

Purpose of this handbook and definitions

This handbook should prepare trainers and lecturers for online or hybrid academic exercises. This document should support the preparation and also the exercise itself. A key issue for a successful online or remote exercise is the technical preparation, as technical problems or issues could delay or cancel the exercise.

Before the start of the exercise it is also a key issue that students have a basic knowledge of the functions of the used interlockings. This knowledge should be gained before the exercise. This should be done with an introduction lecture and individual work at the interlockings.

- Distance exercise:

An exercise what is hold entirely remotely e.g. online with a virtual railway laboratory or with laboratory where remote control is technical possible with no participants in the facility

- Hybrid exercise

An exercise what is hold with groups in the laboratory and with online groups that are participating remotely.

Training guidelines for an online and hybrid session

The objective of an exercise is to gain practical skills and support the understanding of the learned knowledge of the lecture. Online and hybrid lectures are a new concept in the railway sector. For that reasons it is necessary that the trainers and the participants are preparing themselves well before the exercise. Because the preparation is a key issue for the success of the exercise.

It also necessary that the trainers and the participants to familiarise themselves with the applications and equipment used. The necessary information should be prepared in advance by the trainer and the trainer should prepare himself well for the exercise. It has also to be considered how many trainers should supervise the exercise. It could be very useful to split the tasks of the technical and didactical support. In that case one trainers will focus in

For a successful exercise it is important to choose the right software tools in advance. This includes the simulation tool of the interlocking and also the communication platform. The choice of the simulation depends on the goals of the exercise and what tool will is available in the institution. This guidelines are written as generic as possible and not for and for a specific software tool, hence it can be applied for almost every simulation.

Communication:

Nowadays there are a lot of communications platforms for videoconferences on the market. For that reason it is necessary to choose the platform in advance and that the participants are familiar with the platform.

The communication between the trainer, technical supporters and the participants is essential for a successful exercise. So it is necessary that everybody who is involved in the exercise prepares themselves to handle the communication platform. This includes the use and the functions of the communication tool. Furthermore the participants have also to prepare their hardware for the use of the communication platform.

The following steps are suggestion for a systematic approach to explain the communication platform:

- Choose a communication platform in advance
- Make sure, that the participants are familiar with the platform.
- Describe the software and their function precisely
 - How to log in and use the audio and camera
 - Where is the chat and how does it work
 - If you'll work with bigger groups, then explain the break out rooms
- Inform the participants about the required hardware for the exercise

It is necessary that the participants understand the communication tool before the start of the exercise. This includes also the changes for checking audio- and video connection. The participants should check in advance also their function of their devices e.g. battery, headsets etc.

Two requirements are necessary for the used conference tool, this are screen sharing and remote control. The screen sharing is necessary for the participants, because if they have any difficulties by controlling the interlocking, then it is possible for the trainer to explain the problem. With the option of remote control it is possible for the trainer to show necessary steps or control options on the screen of the participant.

Technical preparation:

The technical preparation with the used software (to simulate the interlockings) is necessary, to secure a fluent exercise. If technical problems occur through the exercise a lot of time could be lost with solving the issues. If the a onside laboratory will be controlled remotely it is also a good advice to test the connections and prepare the devices of the participants

Generic steps in advance could be:

- For working on a network based simulation the participants, especially the host, it could be possible that participants need to know their IP-addresses and have to check the router settings, e.g. allowing port forwarding.
- Also a good advice about installation of the simulation software is needed e.g. with a short guideline written by the trainer
- For students who are not familiar with this issues, the trainer has to provide online assistance.
- All the issues should be checked before the online session starts
- Further steps based on the used software

The controlling of every software can be different, however this steps are generic, hence it is possible that the trainer follow this steps to prepare the participants for the exercise.

Preparation of the participants:

The participants should know the basic functions of the used software and it's interlockings before the exercise starts. Because the exercise should be a training of the connected railway operation and not about the basic functions of signaling principles. For the preparation first a common lecture concept can be used by explaining the software and basic functions by the trainers (hint: you can also use the generic introduction for controlling interlockings delivered by the IDEALCAREL project in IO3). Then the participants should work with the interlockings on a self-study base. This can be used in both hybrid and entire online concepts. The time of the self-study depends on the planned model of the exercise e.g. you can see use the template of the generic course developed in IO 3. In general it is necessary that the participants have understood the explained principles and basics of the interlockings to avoid basic questions which could delay the exercise.

Exercise:

The execution must support the objectives. So the whole concept of the exercise has to be checked by experts/trainers before the students will execute that training. So the trainer should check in advance:

- Is the timetable didactical useful?
- Are there all necessary movements covered that should be shown?

For the online exercise it is also necessary for the trainer to make sure that the participants understand the railway environment. So the trainer has to check in advance if the participants understand their actions on an electronic interlocking e.g. how does a signal aspect look at a signal or how look a Movement Authority in the DMI etc.

The used timetable depends on the knowledge of the students. For beginners the timetable should be designed with train movements, less shunting movements and no degraded mode operations. For more advanced students the timetable can be designed with train movements and more shunting processes and less degraded mode operations with small delays. For high advanced students the more degraded mode operations should be considered.

| Level of the students | Movements | Degraded mode operations |
|-----------------------|------------------------------|--------------------------|
| Beginners | Train movements | No |
| Advanced | Train and shunting movements | Less |
| High Advanced | Train and shunting movements | High |

Table 1 Operational concept for the exercise based on the experience of the students

The trainer should prepare the timetable of the exercise and chose the right level of the exercise in advance.

Debriefing of the exercise:

A debriefing after the exercise can provide feedback to the participants and analyse the lessons learned. Furthermore the strength and weakness of the railway operation can be analysed. Hence the trainer should take notes during the exercise and give feedback about the points that worked well and also about the mistakes.

The outcome of the Debriefing has to be remarked in the next version of the documentation and in the future of the next

The following questions can be an example/guideline of how structure a questionnaire can be prepared. This concept was also used during the IDEALCAREL project to get feedback from the students that participated in the test. Furthermore the same questions were asked to the trainers. Hence, it is also possible to use the questions for the self-assessment of the trainers to improve the exercise. The first question is about the place of study, this is only necessary if you work groups from different universities. However, the question could also be asked to determine the degree of education of the students, e.g. Bachelor or Master. The question 2 to 5 are question to rate the activities. 5 to 8 are simple yes or no answers and the last questions are open-ended questions to get broader feedback.

1. Current place of study:
2. How would you rate the activities of the introduction lecture? (1- worst – 5 best)
 - a. Lectures
 - b. Teaching and learning session
 - c. Teaching materials (e.g. handouts, slides)
 - d. I improved my knowledge
 - e. My satisfaction is
3. How would you rate the activities of the individual work days (08.12.2022)? (1- worst – 5 best)
 - a. Lectures
 - b. Teaching and learning session
 - c. Teaching materials (e.g. handouts, slides)
 - d. I improved my knowledge
 - e. I was happy with support my group received from supervisors
 - f. My satisfaction is
4. How would you rate the activities of the connected exercises (09.12.2022)? (1- worst – 5 best)
 - a. Lectures
 - b. Teaching and learning session
 - c. Teaching materials (e.g. handouts, slides)
 - d. I improved my knowledge
 - e. I was happy with support my group received from supervisors
 - f. My satisfaction is
5. The online testing helped me to improve my language skills. (Yes or No)
6. The online testing helped me to improve my communication skills. (Yes or No)
7. Teamwork helped me to understand better learning process. (Yes or No)
8. Teamwork helped me to understand other students better. (Yes or No)
9. Overall, what was good about online testing? (Open-ended question)
10. Overall, what was bad about online testing? (Open-ended question)