

Best practices learned from the online defenses at Fysikum during VT20

The Technical division at Fysikum has developed a Zoom-based solution where dissertation thesis defenses can be carried out either partially or entirely remotely. The first-out online dissertation at Fysikum was held on March 18, the very next day after Stockholm University has switched to online distance learning.

In overall, the transition to digital defenses was working very well, and no major technical problems and stability issues appeared during more than a dozen of PhD and licentiate defenses. In addition, several positive side effects were noticed that may motivate to continue with this form of defense even after the current restrictions will be lifted. In particular, the digital defenses enable a wider audience of remote interested researchers to attend the defense where traveling to Stockholm would otherwise not be motivated. Members of the committee and the opponent can be selected more flexible without considerations on practicalities as travel budget and travel times, and last but not least, environmental and financial aspects with reduced traveling.

Here we summarize some best practices which were acquired between the pioneering day and the last defense held in June.

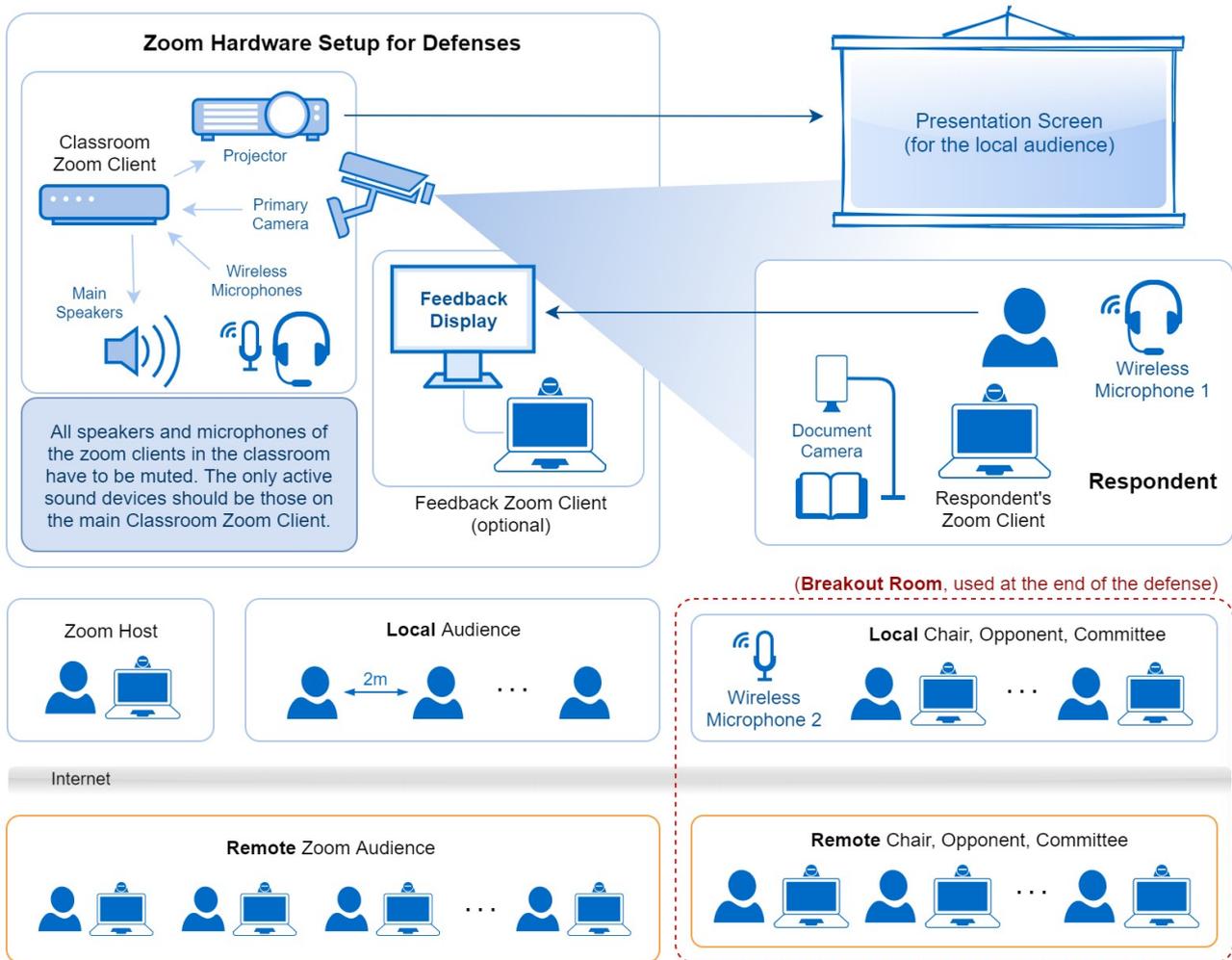
Classroom Setup

A schematic diagram of the adopted solution is shown in Figure 1. In this scenario, only the respondent and the Zoom host must physically be present in the classroom during the defense. The opponent, the supervisor, the grading committee, and the chairperson, which all actively participate as the panel audience, can either be local or remote. Since defenses are public events, a general audience is also given an opportunity to attend remotely (in addition to the limited opportunity to participate physically, depending on the current regulations and the size of the classroom).

At the end, the thesis committee deliberation will be done in a private Breakout Room. The chairperson, the opponent, the student's supervisor, and all the committee members should have their computers ready at that time, even if they are physically present. Namely, during the deliberation, the local panel have to leave the classroom physically (and go to some private room), not to be heard when discussing in the breakout room.

This setup has several advantages:

- Cost effective as simple, often existing hardware can be used. A 5-year old SU-workstation completed with a wireless microphone is sufficient.
- As only the zoom client presents a quick seamless switching between respondents and opponents slides, different video streams and and document camera us automatically handled by the zoom client.
- A single audio source avoids sound interference.
- The Zoom meeting and the hardware can be operated by technical assistants in the background removing stress from respondent and chairperson.



Hardware Setup

There are three compulsory components:

- The Zoom host computer controls the Zoom meeting. It approves participants, sets up the breakout room for the Committee, and may steer the spotlight video, mute participants etc.
- The classroom Zoom client joins the Zoom meeting. The client presents its audio and video signal to the classroom, and captures both the audio signals from the wireless microphones and the video signal from the rear PTZ camera.
- The respondent's computer only shares the slides into the Zoom meeting.

An optional feedback client may be used to improve communication of the respondent with remote participants.

Audio

Audio is often the most critical part of a successful video conference. Only the main Zoom client is allowed to have the audio enabled in the classroom; the sound is heard through its loudspeakers, and picked up by its two wireless microphones where one is reserved for the respondent while the other is shared among the local panel audience. To suppress echo or audio feedback, all other speakers and microphones must be switched off in the classroom.

Video

The main Zoom client broadcasts the video from the primary camera. The camera is located at the back and captures the front of the classroom with the respondent (and the eventual panel audience). It is remotely controlled by the Zoom host. A good practice is to set up the camera with three predefined views: (1) a wide view to the complete room, (2) a narrower view on the opponent/committee and the respondent, and (3) a view focused on the respondent.

Presentation Screen

The display output from the classroom Zoom computer is projected on the front screen. The screen shows the presentations to the local audience, and the overall progress of the Zoom meeting. Namely, the respondent and the opponent act as any other Zoom participant, sharing the presentations via Zoom.

Feedback Display

Since the main screen is behind the respondent, any face-to-face Q&A discussion is impaired. Besides, the respondent needs to look at the primary camera deliberately when addressing the remote Zoom audience; this might be challenging, especially if the classroom is empty. Therefore, it is good to have a feedback Zoom client installed, which is a computer with a large monitor standing right below the primary camera. The respondent will then instinctively look at this feedback display with a small subtended angle to the primary camera.

Document Camera

A high-quality Epson document camera is used as a whiteboard during Q&A. The camera is connected either to the host's or respondent's computer. The host can also use a remote control to zoom in/out and auto-focus the view (if the respondent forgets to do so, which often happens under the stress). Finally, the document camera can be employed to show particular equations and figures from the thesis; this is much faster than going through the PDF in the presentation mode.

Zoom Host

The host's task is to moderate the meeting and suppress any disruption. The public should be able to see and hear the defense, but not share presentations or send sound. The chairperson (or one of the committee members) should act as a co-host, in case the host's computer stops working.

Zoom meeting setup options

In order to balance between an as open defence with public audience and protect against Zoom bombing, the meeting does not require an extra password, invitation or similar, but every participant joins the waiting room and is approved manually by the host. In case of many participants with suspicious or inappropriate names join they are prevented from joining the meeting. In contrast to a live stream only, the public audience is able to ask questions.

The defences are scheduled in advance. For simplicity, the same meeting ID is used for all defences at Fysikum, i.e. the defence is set up as a recurring meeting with all Fysikum technical staff as co-host enabling them to start the meeting. It should be noted that the one setting up the meeting must

not start another Zoom meeting during an ongoing defence, but may join Zoom meetings started by others.

Before the Meeting

E-mail addresses and telephone numbers should be prepared in advance to all participants in case something does not work, and they need to be contacted using other means of communication.

The order of succession should also be established, in case the opponent or some of the committee members disconnects and cannot rejoin the meeting.

The Fysikum's administration will usually prepare the scene one hour before the defense (bringing up flowers, SU banners, and water for the respondent and the opponent). One hour is also enough time for the Zoom host to connect cables, test the equipment, and start the meeting.

The committee and defending student should meet 15-30 min before the official start time to fix any audio, visual, or connectivity issues and to test the breakout room. The respondent, opponent, committee and chairperson must be able to communicate with each other two-way including picture and sound. The public audience should be able to see and hear the public defense and ask questions.

Practicing

When one schedules a defense, it is a good policy to inform the people involved in the next-in-line defense. Then, the future respondents (and their committee members) can use the time before the defense for practicing. This way one creates a pipeline where future respondents get acquainted with the procedure before their actual defense. (They are also welcome to stay during the defense and see how the procedure works until the end.)

Meeting

A thesis defense comprise the following moments:

- Introduction by the chairperson
- Public presentation by the opponent
- Public presentation by the student
- Opponent and student Q&A
- Thesis committee and student Q&A
- Public Q&A
- Thesis committee deliberation in a breakout room
- Public announcement
- Relaxing part (congrats, unofficial chat with the public, etc.)

Microphones

One wireless microphone (headset) is reserved for the respondent while the other (handheld) is shared among the local panel audience. There are mainly two issues with the microphones: batteries and germs. First, there should be a set of new batteries prepared before the meeting. Second, the

microphones should be disinfected before the meeting. Moreover, when changing hands, the handheld microphone must be accompanied with disinfection tissues. In case the opponent is physically present, one can use a lab stand to fix the handheld microphone.

Public Q&A

The remote public audience is given the opportunity to ask questions either via the chat function or in Q&A format. The chairperson should inform the public that, to establish an order, they have to raise a hand, or write in the chat that they wish to ask a question.

Breakout Room

After the public Q&A, the thesis committee deliberation will be done in a private Breakout Room. The chairperson, the opponent, the student's supervisor, and all the committee members should have their computers ready at that time, even if they are physically present. During the deliberation, the local panel have to leave the classroom physically.

Public announcement

When all the participants leave the breakout room, the chairperson gives the public announcement, and congratulations and celebrations can continue in the Zoom meeting.

Fixed Equipment List

- Fixed power sockets (extension cables etc. are not allowed in classrooms due to fire regulations).
- Projector and loudspeaker, in small rooms the built-in loudspeakers may be the best choice.
- Classroom client, e.g., Intel NUC, with wireless keyboard and mouse installed on the roof close to the projector.
- Fixed internet connection for the classroom client.
- PTZ camera, e.g., Logitech PTZ Pro 2
- Wireless audio equipment

Movable Equipment List

Beside the equipment which is permanently installed in the classroom, one needs:

- an Epson ELPDC21 document camera (should be booked well in advance)
- 3m long USB cable for the document camera
- the wireless microphones with spare batteries
- the disinfection tissues for the microphones
- a lab stand for the handheld microphone
- (optional) a laptop or computer with a large feedback display