Workshop on Delivering Live Online Courses

Experiences from GCS

15 January 2021

Dr. Volker Weinberg

LRZ

Dr. Rolf Rabenseifner

HLRS

Gauss Centre for Supercomputing

- GCS combines **the three national supercomputing centres** High-Performance Computing Center Stuttgart (HLRS), Jülich Supercomputing Centre (JSC), and Leibniz Supercomputing Centre of the Bavarian Academy of Sciences and Humanities (LRZ) into **Germany's leading supercomputing institution**.

GCS
Gauss Centre for Supercomputing

- The main **mission** for GCS is fostering scientific discovery through use of high-performance computing (HPC) and the sustained development of computer-aided scientific research in Germany and Europe. This is achieved by **providing HPC expertise, services, training and support, as well as state-of-the art HPC resources**.

GCS as PRACE Training Centre

GCS belongs to the 14 **PRACE Training Centres** that started in 2012-2017-2020:

- *Barcelona Supercomputing Center (Spain)*
- *CINECA Consorzio Interuniversitario (Italy)*
- *CSC – IT Center for Science Ltd (Finland)*
- *EPCC at the University of Edinburgh (UK)*
- *Gauss Centre for Supercomputing (Germany)*
- *Maison de la Simulation (France)*
- *GRNET – Greek Research and Technology Network (Greece)*
- *ICHEC – Irish Centre for High-End Computing (Ireland)*
- *IT4I – National Supercomputing Center VSB Technical University of Ostrava (Czech Republic)*
- *SURFsara (The Netherlands)*
- *TU Wien – VSC Research Center (Austria)*
- *University ANTWERPEN – VSC & CÉCI (Belgium)*
- *University of Ljubljana – HPC Center Slovenia (Slovenia)*
- *Swedish National Infrastructure for Computing (SNIC) (Sweden)*

Mission: Serve as **European hubs and key drivers of advanced high-quality training** for researchers working in the computational sciences.

GCS Newsflash: During Pandemic-Related Remote Working, GCS Centres Embrace Expanding E-Learning Offerings

https://tinyurl.com/gcs-article

Challenges

- **No previous experience** with online training at GCS (except for MOOCs by HLRS).
- **No plans** for online training in 2020.
- Selection of an **adequate video conferencing tool for online courses** which allows to **preserve the interactive nature of in-person courses** as much as possible with support for e.g.
  - Polls,
  - Instant Feedback,
  - Breakout Sessions.
- **Pedagogical review** and **improvement/restructuring of class room concepts** for online training:
  - Enhancement of interactivity,
  - Smaller units with alternation of theory and practice,
  - Adaptation of the training material and especially the exercises.
- Significantly **higher need for teaching/assisting personnel** during an online course.

Evaluation of Video Conference Tools for Online Courses

- LRZ Video Conference Solution
  - Jitsi Meet: https://meet.jit.si/
- DFN Video Conference Solutions
  - Pepix: https://www.pexip.com/
  - Adobe Connect: https://www.adobe.com/de/products/adobeconnect.html
- Webex: https://www.webex.com
- ZOOM: https://zoom.us/

Evaluation of Video Conference Tools for Online Courses

- Strong collaboration with VSC, TU Wien during the evaluation.
- ZOOM was by far the **best performer in terms of functionality, connectivity, reliability and quality of service**.
- ZOOM is explicitly **recommended by the PRACE** online training coordinator for PRACE online training and will also be used in the future PRACE training cluster.
- **Preferred tool** of all our external lecturers.
- **Problem**: European Court of Justice declared the „Privacy Shield“ agreement, which allowed GDPR compliant data transfer from the EU to the USA, invalid in its ruling of 16 July 2020 → currently evaluation of an on-premise solution.

Advantages of ZOOM

- Support for **breakout sessions** to host hands-on sessions and exercises in small subgroups.
- **Instant feedback**: feedback icons such as raising hands, "yes/no" voting.
- 1:1 and 1:n **chat**
- **Polls**, i.e. small surveys
- **Annotations**
- **File sharing**
- **Remote Control**
- **Recording** as audio and video

Best Practice 1: Time Format

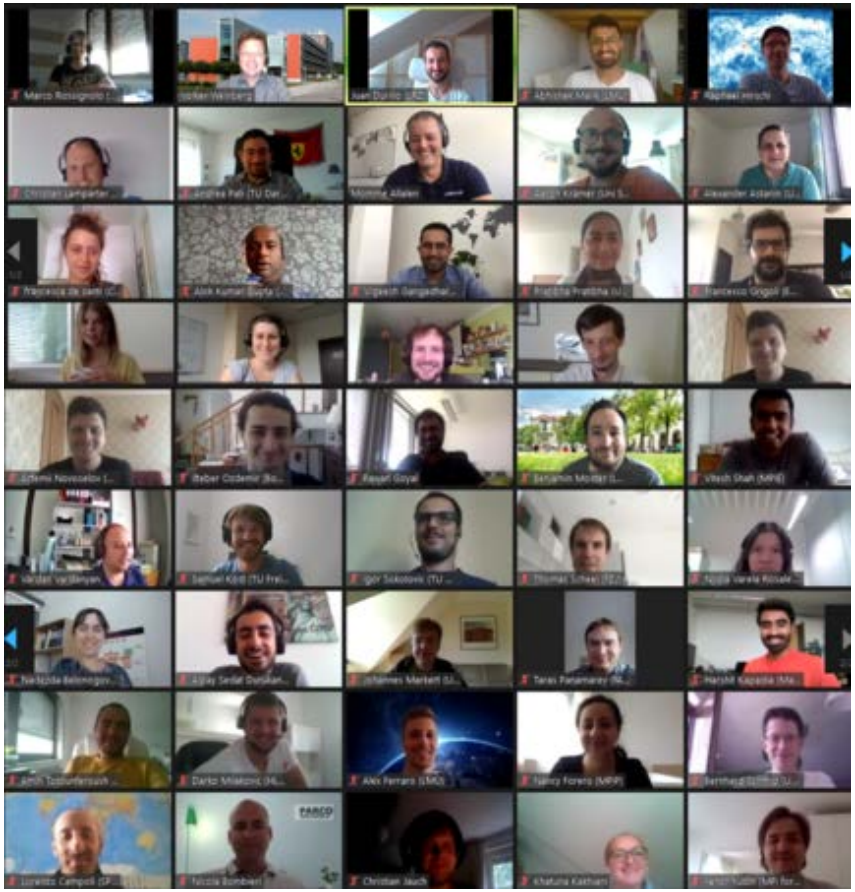
- **Traditional time format** of 3-5 days block courses with daily lectures 09:00-17:00 is **not adequate** for online training.
  - **Preferably max. 3 consecutive days** with shorter sessions 10:00-12:00 & 13:00-16:00.
  - **Weekly courses**, i.e. “Introduction to ANSYS Fluid Dynamics on LRZ HPC Systems”: 10 weeks, every Monday from 10:00-12:00 and from 14:00-16:00.
- Explicitly reserve enough pre-announced fixed time slots for **several coffee breaks** and lunch breaks. Clearly announce when the course continues on a slide or an **online timer** like https://www.webcountdown.de shown during the breaks.
  Show **slide with agenda** before the course starts and during lunch breaks.
  - One may also use an additional chat tool (e.g., Slack) for announcements & communication.
    - non-volatile / with all at any time / also during breakout sessions.

Best Practice 2: Personnel and Preparation

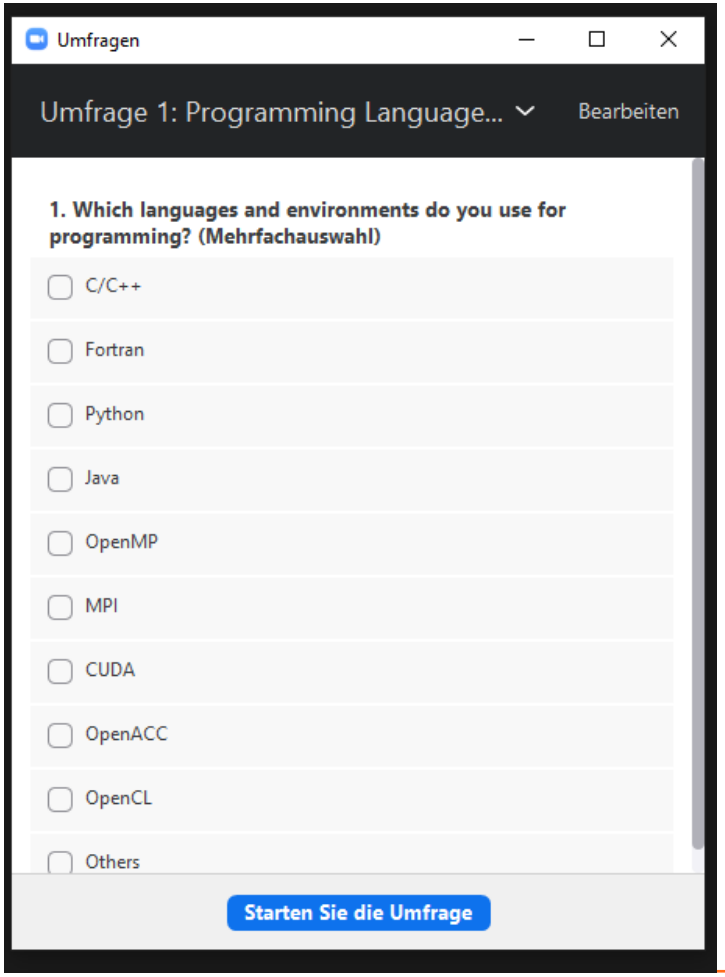
- For each **lecture** there should be **a speaker and at least one assistant** (mainly for monitoring the chat) assigned. For **breakout sessions one assistant** per room.
- Alternative: Modifying the exercises to minimize need of assistance
- Use **additional laptop / iPad** to better see what participants are really seeing during the presentation. Use additional devices to **visit multiple breakout rooms in parallel**.

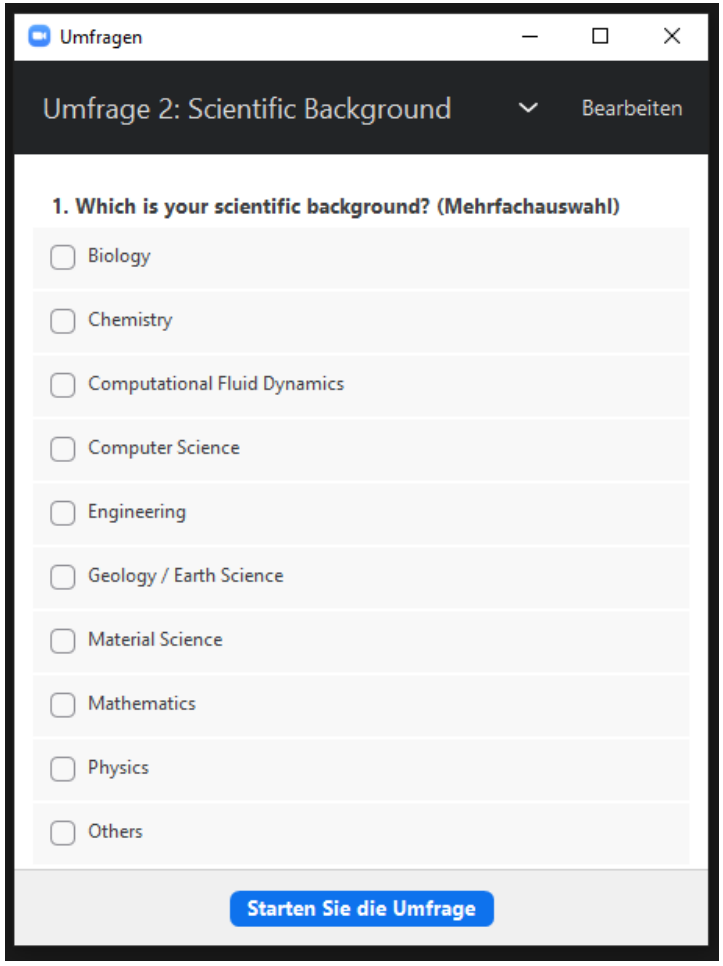
High development costs!
Cheaper during the course!

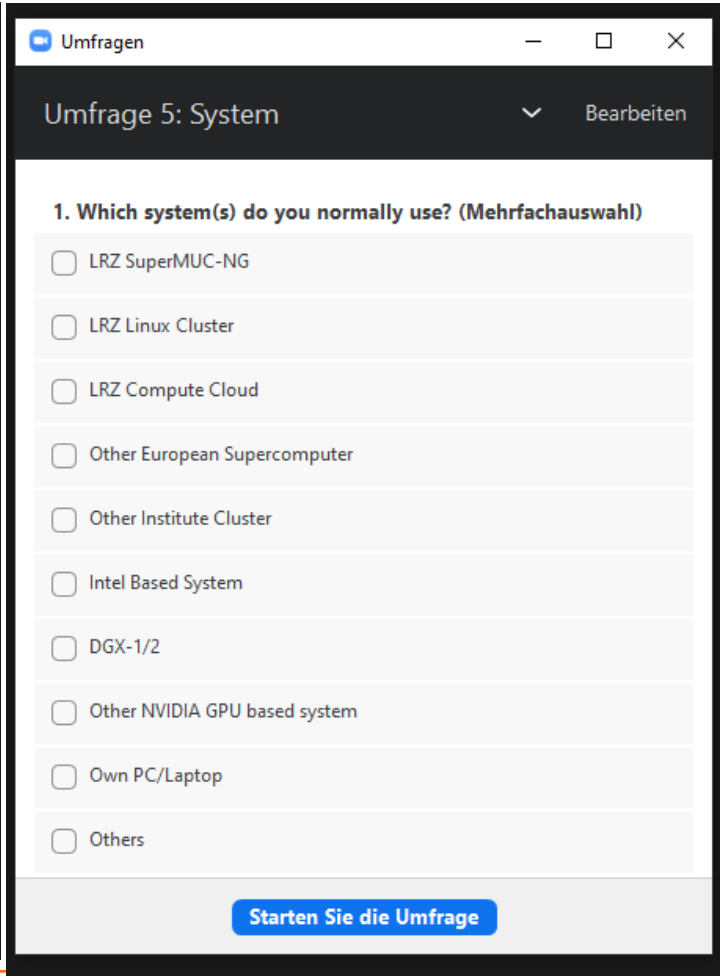
Best Practice 3: Encourage all Participants to keep Video on



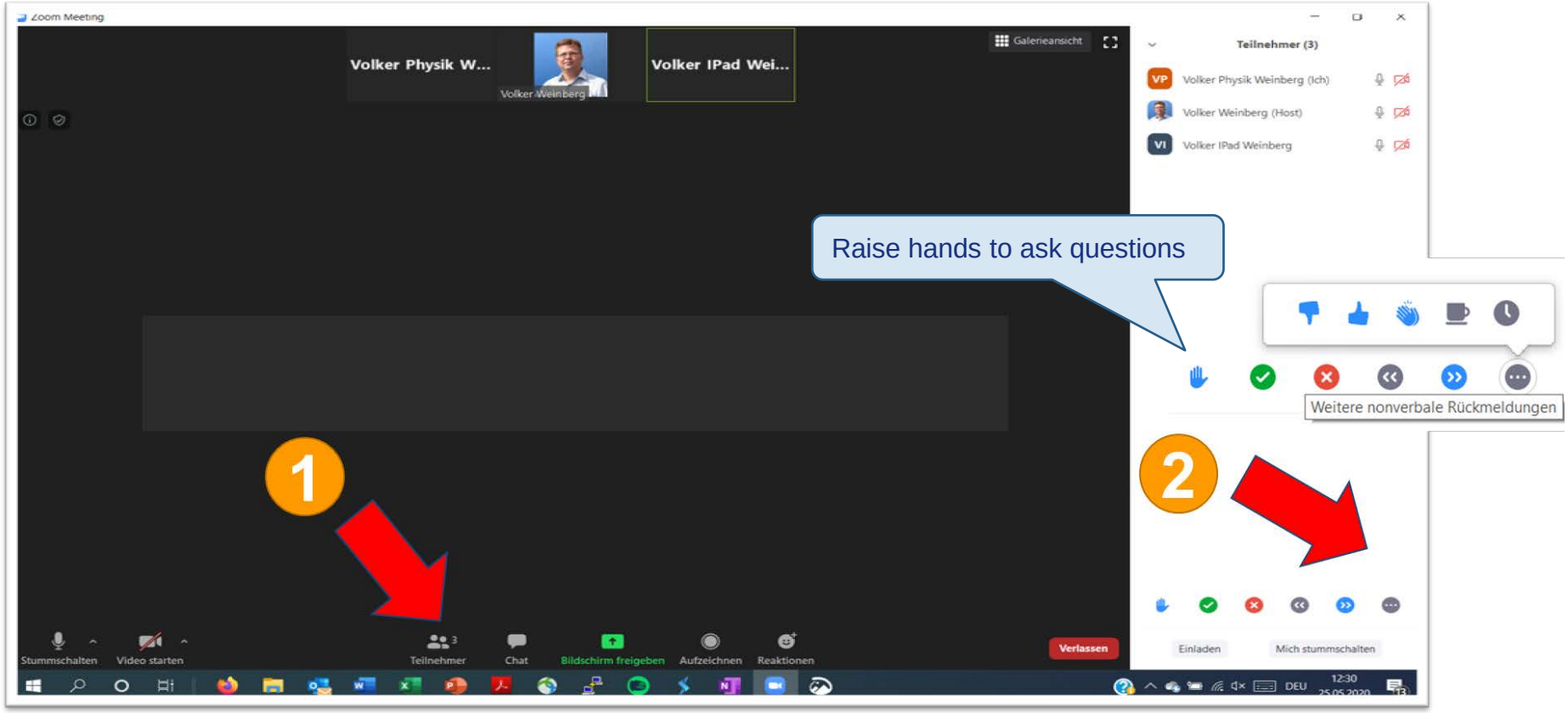
Best Practice 4: Start with Polls







Best Practice 5: Use Instant Feedback



Best Practice 6: Questions

- Better no questions during talks, assistant answers questions in **chat** and **selects some questions to be discussed in plenum after the talk**, the asking participant (not the assistant) should repeat the question in the plenum.
- Encourage participants to **switch on video when asking questions.**
- Encourage **usage of Feedback Icons** (yes, no, raise hands etc.) in Q&A sessions.
- Questions in the chat should be mainly monitored and answered by the assistant, it disturbs the flow of speech when lecturers respond to questions in the chat during their talks.
- Without such assistant: use same rule as in a classroom course
  - raise hand (a feature of ZOOM and others) if you have questions
- Plan **Q&A sessions** in the agenda and encourage lively discussions.

Best Practice 7: Exercises

- Different successful online approaches:
  - **Interleave short lectures with short moderated exercise sessions** in the main room.
  - Use **Breakout Rooms** for exercise sessions > 30 minutes for courses with many participants
    - Very useful if many participants have problems during hands-on sessions.
    - One assistant should be assigned to each breakout room to moderate the exercise sessions a bit and encourage discussions.
    - Alternative: Make smaller steps & provide solutions for each step.
    - Ideally 4-6 participants per breakout room & encourage cooperation.
    - Overhead to switch back and forth from main to breakout session.

High development costs!
Less assistance needed → cheaper during the course!

Best Practices 8: System Access

- Best if people use their **own laptop or institute cluster**. Communicate prerequisites like requirements for the compiler and the programming environment to the participants 1-2 weeks before the course.
- If you provide access, **make access to the system as easy as possible**, using e.g. **compute cloud resources and Jupyter notebooks**.
  → went very well with AWS resources preconfigured by NVIDIA for our online NVIDIA DLI “Deep Learning and GPU Programming Workshops” @ LRZ, HLRS, CSC
- Provide information how to **set up the system access** already some days before the course.
- If you provide access to your cluster, then only allow registration with institutional email addresses → cheapest way of authentication.

Need to be manually checked, whether they are not a fake, i.e., fit to usual rules

Best Practice 9: Social Events

- Make a **group picture** encouraging all participants (who agree to be on the picture) to switch on their video.
- Share the picture via **social media**.
- For multi-day courses plan a **virtual social event** with informal discussions and chats, sharing of experiences, feedback, suggestions etc. Works best if moderated by someone.
- In very intense courses, participants are often more happy to stop looking at their laptops → no social events after long online course days.

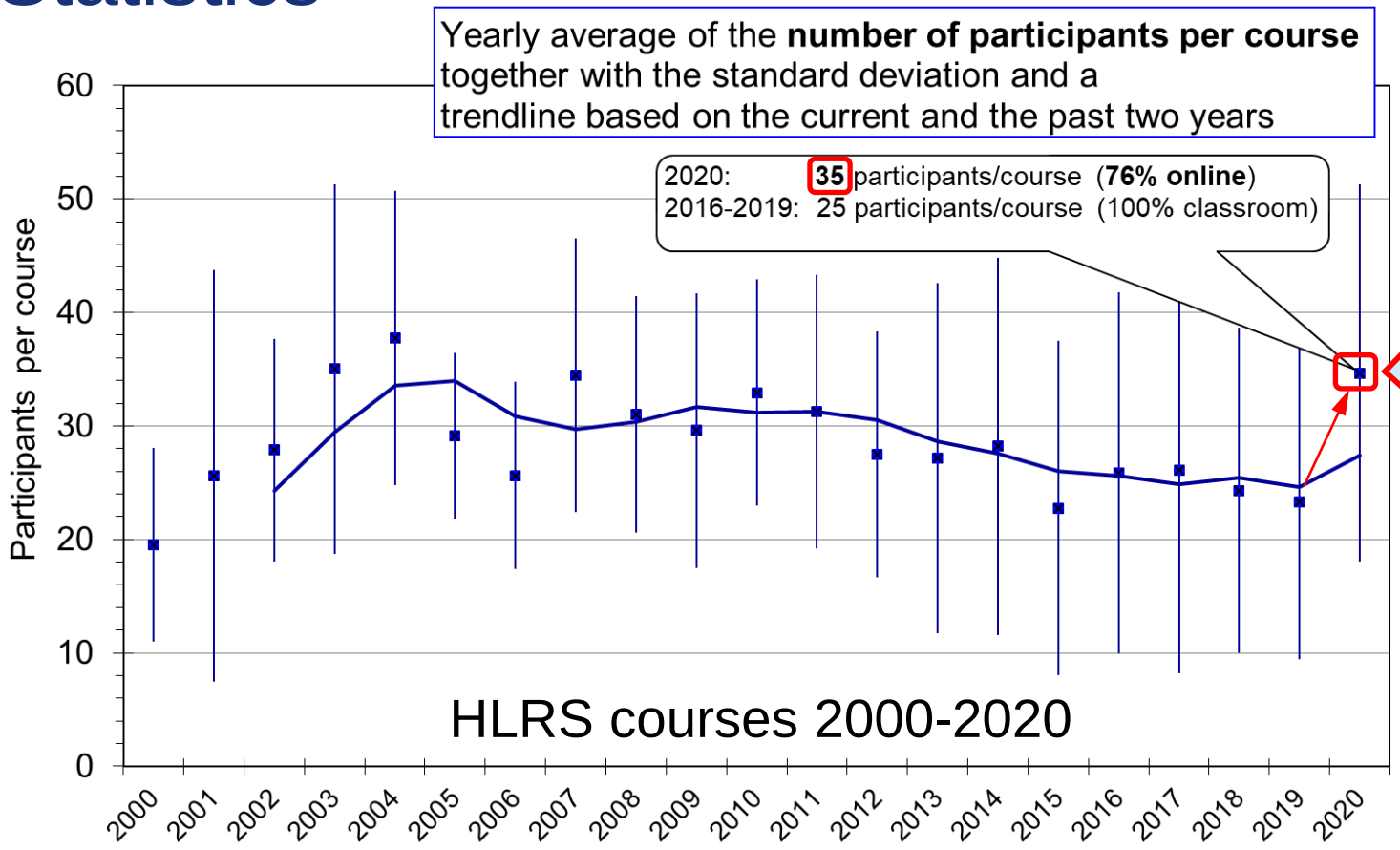
e.g. virtual beer garden

Completely different to classroom courses:
A social event is always better than spending the whole evening alone in the hotel.

Best Practices 10: Evaluation and Certificates

- Prepare an **online evaluation form** for every online course.
- **Reserve time on the last day** to let participants fill out the survey during the course.
- **Send digital certificates** to all participants after the course (using e.g. the pdf mail merge function of Word/Acrobat).
- At HLRS, no certificate without feedback.
  - Typically, we can achieve a feedback return rate >95%.
  - For anonymity, the participants must send an additional email to the organiser some time after their online feedback.

Statistics



By eliminating travel costs and travel time, we have many more participants per online course
&
Also more participants from outside Germany

2016-2019: 26,4%
2020: 38,2%

Summary

- The **transition** from onsite to online training is **challenging**.
- Since the pandemic hit Germany in March, GCS centres virtually hosted and co-hosted **2151 participants across 52 different online training courses**.
- Many participants enjoyed participating in training events **without having to travel**, some of the additional trainer costs was recouped by **not paying for trainers' and teachers' accommodation.**
- Online training allowed GCS as the largest European PRACE Training Centre to expand its training footprint to HPC professionals in **over 35 different countries**, exposing both participants and trainers to a wider range of applications and problems.
- Based on the positive feedback and success of online courses, GCS envisions **virtual training courses remaining a core part of the GCS training portfolio**.

Upcoming Courses

- Gauss Centre of Supercomputing (GCS):
  http://www.gauss-centre.eu/training

- HLRS: http://www.hlrs.de/training/
- JSC: http://www.fz-juelich.de/ias/jsc/events
- LRZ: http://www.lrz.de/services/compute/courses/

- Partnership for Advanced Computing in Europe (PRACE):
  http://www.training.prace-ri.eu/

THANK YOU FOR YOUR ATTENTION

www.prace-ri.eu