55TH INTERNATIONAL CHEMISTRY OLYMPIAD SWITZERLAND 2023

FINAL REPORT

LET'S FIND SOLUTIONS TOGETHER!

55ᵗʰ International Chemistry Olympiad
Switzerland, Zurich, 16 – 25 July 2023

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EDITORIAL

Dear participants, mentors, observers, partners, and supporters,
dear esteemed members of the scientific community

With the Closing Ceremony on 24 July, the International Chemistry Olympiad came to an end. And it filled my heart with immense pride and gratitude. We have witnessed an incredible gathering of bright minds, the formation of lasting bonds, new insights in chemistry and many other aspects of science during these intense ten days of IChO 2023.

In the spirit of fairness and healthy competition, our participants, mentors, observers, volunteers, and staff have demonstrated extraordinary dedication. They have pushed themselves with little sleep to their limits, enabling our young students to discover new secrets of chemistry. These bright young minds truly embody the spirit of champions, not only in their scientific abilities, but also in their willingness to share, discuss and learn together new things about chemistry, ETH Zurich, its partners and supporters, Swiss companies, and Switzerland in general.

I sincerely thank all those who have made this event possible. To our valued partners and supporters: I am grateful for your support and commitment. Your belief in nurturing young people and fostering global collaboration has been instrumental in making the International Chemistry Olympiad 2023 a success. I would also like to thank the ETH Executive Board and the Department of Chemistry & Applied Biosciences, who took up the challenge in 2017 to organise this event, before my time as a Rector and President of the IChO 2023. Together with the other organising bodies – the Swiss Chemistry Olympiad and the Swiss Science Olympiad as well as the Swiss Chemical Society – the foundation was laid.

A special round of thanks goes to our scientific and organising committees, whose careful planning and execution have transformed our vision into a remarkable reality. Your commitment to excellence and your attention to detail have created an environment where young minds could thrive and learn.

I also want to express our gratitude to the ETH community, the exam authors, the scientific community and all other individuals involved. Your encouragement and guidance have played a vital role in nurturing the next generation of scientific leaders and fostering an environment of collaboration and togetherness.

I extend my thanks to the incredible contributions of our dedicated volunteers, whose selflessness and hard work have ensured the smooth running of this Olympiad. Your efforts have left a lasting impact on the participants. We deeply appreciate your invaluable contributions!

Lastly, the unifying and constructive nature of the International Chemistry Olympiad, that we had wished for, was visible every day! We carry with us cherished memories with many insights and happy moments. Despite any conflicts that exist between countries, we have come together in the interest of science, proving that knowledge and understanding can cross boundaries. The friendships formed here will last, serving as bridges that connect nations and cultures and reminding us of the power of dialogue and cooperation.

In that spirit: Let's find solutions together!

PROFESSOR GÜNTHER DISSERTORI
President of IChO 2023 and Rector of ETH Zurich

2 ICHO 2023 IN A NUTSHELL

2.1 FACTS AND FIGURES

When	16 to 25 July 2023 (10 days / 9 nights)
	Opening Ceremony on Monday, 17 July 2023
	Closing Ceremony on Monday, 24 July 2023
Where	ETH Zürich Hönggerberg and all over Switzerland
Organisers	ETH Zurich
	Department of Chemistry and Applied Biosciences D-CHAB
	Swiss Chemistry Olympiad
	Swiss Science Olympiad (umbrella association)
	Swiss Chemical Society
Competing delegations	89 (new IChO record)
Observer delegations	0
Students	348 (new IChO record), of which 64 were female (18.4%)
Mentors	172
Observers	70
Guests	30
Total delegation members onsite	620
Remote observers	94
Volunteers	251
Exam authors	50
Awards given	217 medals (39 gold, 71 silver and 107 bronze)
	27 honourable mentions
Hotel nights booked	6,900
Meals organised	18,500
Budget spent	CHF 3,600,000

2.2 ICHO DELEGATIONS

A Argentina
Armenia
Australia
Austria
Azerbaijan

B Bangladesh
Belgium
Brazil
Bulgaria

C Canada
China
Chinese Taipei
Costa Rica
Croatia
Cuba
Cyprus
Czech Republic

D Denmark

E Ecuador
El Salvador
Estonia

F Finland
France

G Georgia
Germany
Greece

H Hungary

I Iceland
India
Indonesia
Iran
Ireland
Israel
Italy

J Japan

K Kazakhstan
Kuwait
Kyrgyzstan

L Latvia
Liechtenstein
Lithuania
Luxembourg

M Malaysia
Mexico
Moldova

M Mongolia
Montenegro

N Nepal
Netherlands
New Zealand
Nigeria
North Macedonia
Norway

O Oman

P Pakistan
Paraguay
Peru
Philippines
Poland
Portugal

Q Qatar

R Republic of Korea
Romania

S Saudi Arabia
Serbia
Singapore
Slovakia

S Slovenia
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Syria

T Tajikistan
Thailand
Trinidad & Tobago
Türkiye
Turkmenistan

U Ukraine
United Arab Emirates
United Kingdom
United States of America
Uruguay
Uzbekistan

V Venezuela
Vietnam

In addition to these 87 delegations and as per decision of the International Jury, two delegations with four students each participated as individual participants.

2.3 ICHO GLOSSARY

The following terms are used.

Delegation: Each national delegation consists of at most four students selected on a national level, plus up to two mentors, up to two observers and any number of guests.

Student: The IChO competitors are secondary school students or recent graduates who have not started university education. The graduation date of participants must not be earlier than the most recent graduation before 1 July of the competition year. The Students must be under 20 years of age on the 1 July of the year of the competition. The competitors must be passport holders of the country they represent or have taken part in the secondary school educational system of this country for more than one academic year.

Mentor: Up to two accompanying persons who are specialists in chemistry or chemistry teachers act as mentors, one of them being the head mentor. They are members of the International Jury, they must be capable of translating the text of the exams from English into the language used by their students and they must be able to judge the set of tasks and correct the work of the students.

Observer: In addition to mentors, delegations may be accompanied by maximum two observers. Observers may attend all jury meetings, assist in translation and help with the corrections.

Remote observer: After three years of remote IChOs due to the Covid-19 pandemic, the concept of remote observers was introduced. These are persons that remotely assist mentors and observers who participate in the IChO on-site. Remote observers have two positive side effects: First, they enable delegations with a smaller budget to get additional assistance since remote observers do not pay a registration fee and cause no travel costs. And second, they lower the overall CO_2 emissions of the event by not travelling to the event.

Guest: In addition to students, mentors and observers, a delegation may be accompanied by any number of guests, who do not officially represent the delegation and consequently do not take part in the jury meetings or any other official tasks. They are allowed to participate in the event and excursion programme of the mentors and observers.

Observer delegation: These are representatives of countries not yet participating in the IChO. They attend in order to observe and as a condition to participate with students, as stated in the regulations. At IChO 2023, there were no observer delegations.

3 GENERAL ORGANISATION

3.1 CANDIDATURE

The idea of hosting IChO was first brought up during the general assembly of the Swiss Chemistry Olympiad Association in the April of 2017. During this meeting, the association unanimously voted to support the idea of hosting IChO in Switzerland, despite many people at the time not knowing where their lives would take them in the years to come.

On 4 October 2017, the inquiry about a possible candidacy for an IChO in Switzerland, respectively at ETH Zurich, came to the then Department Head of the Department of Chemistry and Applied Biosciences (D-CHAB) and immediately fell on fertile ground. Three weeks later, the first meeting for initial preliminary clarifications took place, which got the ball rolling. On 22 December 2017, with the support of the Rector of ETH Zurich, the letter of intent for the IChO 2023 in Zurich was sent to the Chair of the IChO Steering Committee. On 29 July 2018 the International Jury of the IChO confirmed the committement. Based on the confirmation, fundraising and the search for a suitable general manager could begin.

CHALLENGES

- A person in D-CHAB and one from the ETH executive board management had to take care of the administrative part and push internal information to get acceptance of the project and drive the application process.

- Find the right person to take over the general management of the project as a temporary employee for this purpose.

RECOMMENDATION

- Find very committed people who push planning and processes especially at the very beginning until handover to people hired specifically for the project.

3.2 SETTING UP THE ICHO

Together with the Swiss Chemistry Olympiad, ETH Zurich was one of the main initiators and organisers of the International Chemistry Olympiad (IChO) 2023. This has brought great advantages as well as corresponding challenges. ETH Zurich is a technical and scientific university of the Swiss Confederation which brings great support and possibilities but also obliges to follow certain ETH or federally prescribed processes and procedures.

Whereas in other host countries expenditure is often largely covered by the state, things are a little different in Switzerland. Science Olympiads are not state institutions, but non-profit organisations mainly based on volunteer work. The Swiss Chemistry Olympiad and its umbrella organisation, the Swiss Science Olympiad, had almost no financial resources to support the IChO but rather contributed their network of potential partners, the know-how from organising both national and international Olympiads as well as many dedicated volunteers eager to help. Therefore, the IChO 2023 was not financially covered at the beginning of the project. After negotiations with the federal government and ETH Zurich itself, the project was able to financially secure about 40% of the CHF 4 million needed for the project. The major contribution of SERI (State Secretariat for Education Research and Innovation) as well as ETH Zurich itself made it more attractive for potential partners to invest or donate for the IChO 2023.

With ETH Zurich, its Department of Chemistry and Applied Biosciences D-CHAB, Swiss Chemistry Olympiad, Swiss Science Olympiad as well as the Swiss Chemical Society behind us, there was a large network of contacts and a lot of know-how at our disposal. Filtering out relevant and influential contacts is crucial. But then there was the Covid-19 pandemic with its lockdowns and working from home which did not make it any easier to find the right contacts, let alone to collect funds during this time of economic uncertainty.

In the end, we found solutions for many challenges and are overall very happy that we were able to hold an IChO on site again after a three year break due to the Covid-19 pandemic.

CHALLENGES

- For an external project/general manager (not ETH internal), it was challenging and time-consuming to learn about ETH and federal structures, internal processes, and specific procedures in addition to setting up the project.

- Not having a major part of the project financially covered at the organisational start of the project resulted in many months of focusing almost only on fundraising.

- The Covid-19 pandemic increased the challenge of fundraising and networking enormously.

RECOMMENDATIONS

- It is recommended to have an IChO general manager who knows Scientific Olympiads in general and is already familiar with internal procedures of a future host institution or university to be able to focus on essential organisational matters of the project.

- It is essential that financial support (governmental or other) is addressed very early and with high priority.

3.3 NATIONAL STEERING COMMITTEE

The National Steering Committee was set up by one representative of each organising body.
- Prof. Günther Dissertori, Rector of ETH Zurich and President of IChO 2023
- Prof. em. Karl-Heinz Altmann, Department of Chemistry and Applied Biosciences D-CHAB
- Patrik Willi and later Julia Fischer, both board members of Swiss Chemistry Olympiad SwissChO
- Cyrille Boinay/Mirjam Sager, Co-Directors and later Sari Amstutz, Swiss Science Olympiad (umbrella association)
- David Spichiger, Executive Director of the Swiss Chemical Society

The Steering Committee approved the budget and the overall financial planning, decided on top-level strategic questions, and supervised the Organising and Scientific Committees. The heads of these committees reported to the National Steering Committee roughly every three months. This dual project management ensured that the project was appropriately organised and ensured that IChO 2023 complied with the international regulations determined by the International Jury of the IChO.

3.4 SUPPORT COMMITTEE

A Support Committee was set up in a first project phase to enable a successful implementation of the IChO 2023 in organisational as well as financial terms.

People from political, economic and academic backgrounds were asked to support the IChO with the following purpose:
• Create contacts / Use network / Open doors
• Giving prominence
• Multiplication function / spreading information
• Voluntary, idealistic support with personal know-how
• Advocating applications for financial support
• Achieve positive perception of IChO 2023 within own sphere of influence

Membership entailed neither further obligations nor an additional administrative burden. Exchanges took place twice a year to provide information on the status of IChO.

3.5 SCIENTIFIC COMMITTEE

The Scientific Committee was responsible for all aspects of the IChO programme relating to scientific aspects, i.e. the conception of the practical and theoretical problems, marking, arbitration, the venues required for exams as well as their conduction, plus the Jury Meetings.

The initial scientific work that led to IChO 2023 was done by Dr. Jochen Müller and Patrik Willi, both members of the Swiss Chemistry Olympiad. They were soon joined by Prof. Wendelin Stark as Head of the Scientific Committee. It was of great help that they all had their own experience participating in IChOs either as students and/or mentors.

Over time, more people joined the Scientific Committee. For IChO 2023, fields of responsabilities in the Scientific Committee were:
• Meetings/General management
• Theoretical exam
• Practical exam/Lab logistics
• Quality control
• Exam logistics
• OlyExams/IT
• Administration

An important point to make here is that only the Head of the Scientific Committee was a professor while all other members were either students, PhDs, Postdocs or retired former Chemistry Olympiad mentors. The large majority of the members of the Scientific Committee did their work for the IChO 2023 as unpaid volunteers. This is in line with how the Chemistry Olympiad is organised on a national level in Switzerland where volunteers and usually former participants are organising both the competition as well as preparation camps as unpaid volunteers.

CHALLENGES

• Overall workload for several volunteers rose to a very high level besides their normal professional duties, especially during the six months before the IChO.

• Each member of the Scientific Committee needs to be able to allocate quite some time in the preparation phase as well as full time commitment during IChO.

• Guidelines were not clear and responsibilities were not clearly allocated. This was evident in the cooperation between the committee members, but also, for example, in the allocation and management of the scientific volunteers.

RECOMMENDATION

• A secretary or event manager familiar with the host universities' structure (with dedicated work time) should be part of the Scientific Committee for at least the last nine to twelve months prior to the Olympiad.

3.6 ORGANISING COMMITTEE

The Organising Committee was responsible for all operative and administrative aspects of the IChO 2023, i.e. everything non-scientific.

The first organisational and preparatory tasks were carried out by volunteers of the SwissChO. It was however clear that such an event was in need of a professionally lead office. Therefore, in October 2020, Linda Sonderegger was hired as General Manager, first with a 55% employment that rose over time to 100%. Due to pregnancy and maternity leave, in 2022, Linda handed over her tasks to Marco Gerber.

In addition to the above-mentioned personnel, staff from ETH Zurich supported the Organising and Scientific Committee in a variety of services, from facility management to media relations, finance and law services, lab set-up or ordering of chemicals and materials. They did this as in-kind services, uncharged by ETH Zurich and hence neither visible on the chart on the next page or in the overall costs. The same is true for the many volunteers who also supported the Organising Committee weeks and days before the actual IChO 2023 began. They all deserve our gratitude and appreciation.

Core Team
- Half a year after Linda began, she was joined by two part-time colleagues, supporting her in various tasks, from fundraising to communication. In this setting, the three members of the Organising Committee kept on working, increasing their part-time percentages from a cumulated full time equivalent (FTE) of 1.4 to 2.2 over time.
- One year before the event, more people were added to the team, reaching a maximum of eight persons by December 2022.

Additional support
- An event and communication agency working in science and technology supported the team starting in December 2022. They took over the organisation of events like the Opening and Closing Ceremony, the Finding Solutions Fair or the Career Evening. Additionally, they edited the newsletter *Catalyzer*, both prior to and during the event itself.
- In the months directly before the event, the core team was also supported by people from the ETH Zurich Event Management team, taking over for instance the logistics of the arrival and departure days.

Organising Committee
Personnel and agencies in full time equivalents (1 FTE equals a 100% job)
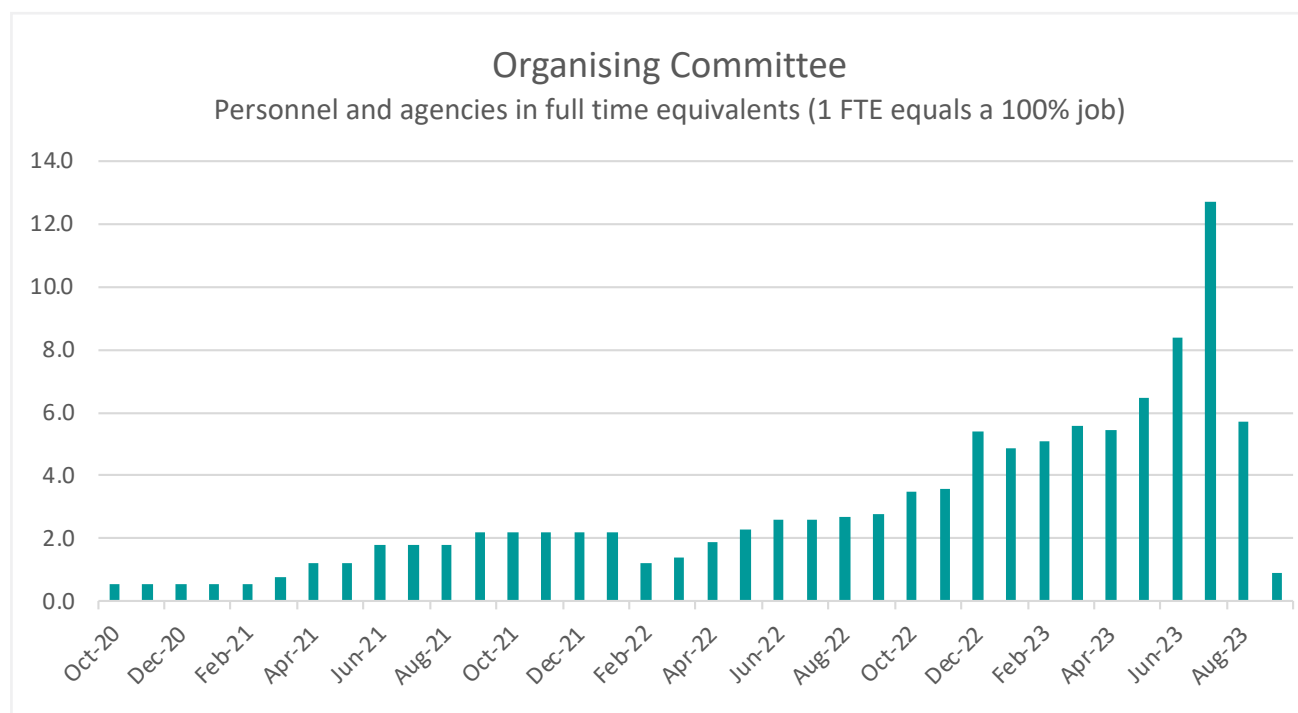
CHALLENGES

- For the three to two months prior to the event there were too few people on board, leading to long working days , sometimes without free weekends for some of the core team members.

- The Organising Committee had to be rearranged several times due to medical leaves, a maternity leave and a person quitting at short notice. This was a challenge on many levels, not just on a organisational but also on a personal one. Together, the team took these challenges and turned them into solutions, leading to a successful IChO 2023.

- For a long time, the committee members had specific tasks, like someone taking care of all catering, or someone taking care of all volunteer related matters. The transit from this set-up to an onsite-event focus happened rather late, just two months before the event. Two people were responsible for the student programme onsite (including all catering, accommodation, excursions, transports, team guides, etc.), two for the mentor programme. This lead to a high need of knowledge transfer with the occasional loss of information.

RECOMMENDATIONS

- A highly complex event needs appropriate personnel resources. Bring additional people on board if possible early enough prior to the event to gain know-how and share the workload with team members.

- For the IChO 2023 team, it paid off that the general manager had no planned operational tasks. He could therefore help out wherever help was needed.

3.7 VOLUNTEERS

3.7.1 VOLUNTEERS´ RECRUITING

For the recruitment of the 250 volunteers, it was useful that the responsible person in the Organising Committee was a former participant, and organiser of diverse Science Olympiads (IPhO, APhO, EuPhO). As the volunteers were effectively unpaid staff of the IChO 2023, no hourly compensation or similar was offered to any of the recruited volunteers. But in return, reimbursement of the travel costs and naturally the coverage of all the meals and accommodation during the time of IChO 2023.

We targeted the following volunteer pools:
• ETH Zurich and University of Zurich student population who would be in their semester break during IChO 2023 intense phase
• Former participants of Swiss Chemistry Olympiad and other Scientific Olympiads from both Switzerland and Liechtenstein
• Members and volunteers of the Associations of Swiss Science Olympiad
• Volunteers of the numerous International Olympiads organised in Switzerland from 2012

We decided to concentrate the recruitment around two major phases – one in November 2022 when we had published the Chemistry Department-wide call for volunteers followed up by the Professors conference, and one in April when the students were in the planning phase for their summer holidays.

We consider a volunteer to be a person who worked for the IChO without salary and in their free time, i.e. besides their regular job or studies. 250 volunteers worked on the following tasks:
• team guides (92) including two head team guides and one joker team guide;
• mentor guides (8) including one head mentor guide;
• scientific volunteers (123) not including the voluntary work of the Scientific Committee (9);
• assistants Organising Committee (29) including event volunteers (24) and communication volunteers (5)

On top of the travel, meals, and accommodation covered by the Organising Committee, volunteers who were also ETH Zurich employees have received one day paid vaca-

tion to compensate for the time that they have been engaged with the volunteering activities. ETH Zurich PhD students would receive, upon the agreement of their supervisor, 1 European Credit Transfer System (ECTS) point towards the requirement of 12 ECTS need for PhD graduation for each 30 academic hours (45 minutes per hour) spent volunteering. The above incentives were important for part of the highly-qualified PhD student population in negotiating their absence from the labs with their corresponding professors.

Of the 250 recruited volunteers, only 35 were accepted who were not Swiss residents but lived close by (citizenship was not considered, just the residence in Switzerland). This was – among other reasons – to comply with the sustainability objectives of IChO 2023 to limit the travel impact of the already CO_2-heavy event and give local opportunities for Swiss residents to volunteer.

Once a person has shown interest in volunteering by filling out a short online form and complied with a basic filter of being 18 years old or above at a time of IChO (for legal reasons) and being a Swiss resident, an invitation for a personal 30-minute interview with the recruiting responsible within IChO 2023 was sent out. As a result of the interview and after being accepted for a volunteer position, a person would receive a personal details form to fill in and a volunteering agreement to sign that comprised all the mutual obligations of the organisers and the perspective volunteers. The volunteer agreement also contained the honour code unified for all the participants of IChO 2023 outlining the principles of fair play and respect.

One month before the event, there was a digital kick-off event for all volunteers, giving some detailed insight into the IChO 2023 and the various programmes. This session was recorded and shared with all volunteers that could not take part in it.

The day before the arrival of the delegations, there was a volunteer onboarding event where those responsible for each branch of volunteers had an opportunity for team building, expectations setting and onsite training.

After the event, the reimbursement of the expenses of the volunteers were done in a centralised way. All expenses above CHF 20 had to be pre-approved by the organisers, no food or beverages outside of the official mealtimes were reimbursed.

CHALLENGES

- It was very hard to accurately access the need for various fields of scientific assistants – this is the most varied category among the entire volunteer pool. As a result, the roadmap for the scientific volunteer hiring has only emerged in January 2023.

- The unpaid nature of the volunteering engagement makes it easier for the perspective volunteers to change their plans according to other emerging priorities. Plan for volunteers cancelling on a short notice and keep 2–5% reserve in volunteers for the bottleneck positions (e.g. teamguides).

- The competitors are frequently not fluent in English. Even in Switzerland, that is magnetic for the talents from all over the world, finding native speakers for all the delegations has proven a challenge. Try as much as possible to match the subject-matter expertise (chemistry background) and the linguistic skills for the team guides, while the latter is more important.

RECOMMENDATIONS

- Approach the Professors' conference of the department of Chemistry specifically for the scientific volunteers and the university-wide Professors' conference a year before the event to present the project and communicate that the success of the project relies on the volunteers. Iterate with the Professors' conferences preceding the intense recruitment phases.

- Have a separate person on a payroll who's role it is to source volunteers and administer their recruitment. Alternatively get a firm commitment from the student organisations of the host of IChO or affiliated organization to recruit on the scope of 250 volunteers.

- As not everyone reads the documents and watched preparatory videos, plan and communicate redundantly about the expectations and rules. During the event, use a messaging platform (e.g. Telegram) with a one-way channel and two-way chat communication to spread and collect the information.

3.7.2 TEAM GUIDES

Per delegation of four students one team guide was allocated. In addition, two spare team guides were recruited as backup, although by the time of the event only one remained. Two senior team guides with no allocated delegation were put in charge of being the main points of contact for all team guides and the Organising Committee. All guides except one were available for the whole eleven-day event period including the onboarding event. Two team guides shared a delegation and split the days amongst them. The background of the team guides varied. From ETH students to former participants, from ETH staff to former team guides or volunteers at other Scientific Olympiad events.

After the recruitment phase, communication and briefing of the team guides was taken over by the team leading the student programme (and consequently the team guides) during IChO.

The onboarding and briefing during IChO was conducted in the following steps:
- One month prior to the event: digital kick-off with a general introduction, followed by a team guide only session providing a very broad overview of the student programme. Questions could be posted with Google Forms and were answered for all. Documents were made available, incl. the recording of the briefing sessions.
- One day prior to the event: volunteer onboarding with a general introduction for all volunteers, followed by a special team guide introduction. In this session, the focus was on the following topics: communication lines, briefing procedures, important general information, detailed briefing for day one and two.
- Daily: daily detailed briefings were provided to the team guides. The organising team aimed for distribution of the briefings around lunch the day before, but in some cases, briefings were sent out later. Reading these detailed instructions was crucial for the success of the programme, and the majority of team guides had very few questions, some of which could even be answered by fellow team guides.
- Daily briefings addressed the following topics: weather forecast, daily schedule, locations, programme, catering information (incl. snacks, menus and allergens), transportation information, what to communicate to students, what to bring, important contact numbers, additional information and attachments.
- Telegram channel and chat: a Telegram channel was set up for posting briefings, adding reminders and communication with the team guides.

CHALLENGES

- Heterogenic group: with diverse experiences and backgrounds, the team guides were a quite heterogenic group. This was especially challenging as not all team guides lived in Zurich, not all were even from Switzerland and not everyone was familiar with Swiss touristic sights and culture. This resulted in some more briefing efforts (i.e. with specially organised city tours) and did perhaps change the "Swiss" experience for some of the delegations.

- Recruitment and hand-over to team responsible for student programme: as the recruitment phase was finished very late, there was no clear cut-off date for handing over the communication to the onsite team. A streamlined communication with the team guides in the lead-up to the event was not possible. Last-minute changes did cause some additional efforts in re-allocation of teams and resource planning for replacing the reserve team guides.

- Allocation to teams: team guide allocation can be quite complex. Besides language skills, it is also recommended to consider age, gender, and cultural fit. Having conducted interviews with all volunteers, also personality and experience of the team guide could be evaluated for the allocation.

- Handling and taking care of various ill students (ranging from "not feeling well" to hospitalisation) was time-consuming and emotionally challenging. Fortunately, one of the team guides was a medical doctor. However, having a dedicated medical person in the team is highly recommended.

RECOMMENDATIONS

- Staffing: as the event days are long and a lot of unforeseen (and time-consuming) things can happen during an event like IChO, it is recommended to staff the senior positions in a way that they can work in shifts. This could be morning/afternoon, but preferably one day working followed by a day off. Having a spare team guide was very helpful, and three senior team guides working would be a minimum number recommended (six in total with a shift system).

- Recruitment: if possible, the focus should be on local volunteers to enhance the cultural and touristic experience for the students. The recruitment phase should be finalised at least six weeks before the event to have sufficient time for allocation and communication/ briefings. Two to three circulars could be sent out to the team guides before the event to distribute relevant information as early as possible. Senior team guides should be recruited early with availability to support the organising team in the weeks leading up to the event. Support tasks could be the team guide allocation process, the circulars, preparation of briefings, etc. Having to onboard senior team guides and team guides at the same time put additional workload on the Organising Committee.

- Recruitment: staff the team with at least one medical expert (doctor or nurse) to take care of the ill students properly and to not bind too many team resources.

- Briefing: to provide the team guides with a general overview, know-how on the most important topics and then a daily in-depth briefing only the day before, proved to be a very successful concept with only few questions. Using the Telegram channel for short reminders on what will happen next, and which task the team guides are supposed to take on next additionally supported the smooth running of the event.

- Communication channel: configure the chat channel to function as a unidirectional mode of communication, enabling only administrators to share information.

3.7.3   MENTOR GUIDES

While it was important to accompany the young students (aged 15-19 years) very closely with one guide (minimum age 18) per four students, the other members of an IChO delegation – the adult mentors, observers and guests – do not need (and probably do not want) such close guidance structures. Other than the students, most mentors, observers and guests are experienced international travellers, know the IChO programme from previous participations and can therefore be considered more independent. Nevertheless, eight mentor guides were recruited to assist the Organising Committee during the IChO with the following non-exhaustive list of tasks related to mentors, observers and guests:

- General hospitality: answering any questions as a first point of contact. Questions ranked from private topics like "Where can I get a SIM card?" to "Which bar or club do you recommend?" all the way to specific programme related questions.
- Arrival and departure: picking up and welcoming mentors, observers and guests on the arrival day and assisting in the farewell procedures on the departure day.
- Registration: handing out of T-shirts and goodie bags, answering general questions.
- Public transport: helping to find the right tram or bus. Accompanying groups in transfers with the public transport to programme locations.
- Jury meetings and arbitration: helping set up laptops, electricity (adapters), Wi-Fi, and exam tools. Carrying the microphones to persons with questions and remarks during discussions. Handing out of printed documents.

One of the mentor guides took over the lead as senior guide. As a Zurich local, former IChO participant and mentor and former mentor guide at other international Olympiads in Switzerland, he brought a lot of very valuable experience perfectly fit for this job. He assisted the organising team already before the IChO, preparing the work schedules and briefings for the mentor guides.

CHALLENGES

- Other than the team guides of the students, mentor guides do not need to be present during the entire event. On some days (translations, corrections, arbitrations), there are almost no tasks for them, while on other days (arrival day or Opening Ceremony day) there are many tasks to take care of, leading to a need for good planning and communication before and during the event.

RECOMMENDATIONS

- It pays off to have several mentor guides that are former IChO participants. They know the programme, the procedures and the specific needs of the mentors, observers and guests.

- Having days with almost no tasks can be beneficial for the volunteers, as they get a chance to relax and recover from the busy days. However, many volunteers are very dedicated and bring valuable skills and experiences. On these slow days, mentor guides can also assist the Scientific Committee in their tasks (i.e. exam supervision) or help out in other areas.

3.7.4 SCIENTIFIC ASSISTANTS

Around 120 scientific volunteers helped with the following tasks:
- lab assembly and disassembly
- lab inspections
- conduction of lab safety demonstrations for all contestants
- exam supervision (for both the practical and theory exams)
- analytics of the practical exam
- marking of both exams
- printing, scanning, and sorting tasks

The coordination of scientific volunteers was a touching point between the Organising and the Scientific Committees. Recruitment, first contact, and accommodation were handled by the Organising Committee. The Scientific Committee distributed the volunteers according to volunteer needs and the volunteers' availability, abilities and wishes to the specific tasks. For each task, the responsible members of the Scientific Committee took care of the respective volunteer group, including communication of the details, briefing for specific tasks, leading during the carrying-out of the tasks, and providing the volunteers with snacks, lunch or dinner.

Once the Olympiad started, the entire management of scientific volunteers was handed over to the Scientific Committee. Due to a lack of communication beforehand, a systematic distribution of badges, T-shirts and goodie bags had not been organised nor thought of. Time slots for pick-up by the volunteers were organised at short notice and the times and locations were chosen to be convenient for key volunteer groups such as exam supervisors.

CHALLENGES

- Volunteers from a company and volunteers who were promised university credit points for their work have different needs, expectations and mindsets regarding volunteering.

- Unfortunately, the recruitment of scientific volunteers was not finished until after the Olympiad had already started. This had several consequences: more badges had to be printed during the event, and someone had to take care of the communication, distribution, and potential accommodation of new volunteers at a time when the Olympiad was already in full swing.

- Lack of communication between the Scientific and the Organising Committees: many different parties took part in communication with scientific volunteers, and in particular both the Organising and the Scientific Committees were involved. Due to a lack of time and communication, a number of things were lost on the way, including a properly organised distribution of badges, T-shirts and gifts to the volunteers.

RECOMMENDATIONS

- Have a person dedicated entirely or almost entirely to the coordination of scientific volunteers. Either leave the management with the Organising Committee, or have a dedicated person on or assisting the Scientific Committee to take over well before the Olympiad starts.

- Aim to finish recruitment early and anticipate short-term absences of volunteers.

- Figure out a system for the distribution of badges, T-shirts and goodie bags. Scientific volunteers are working on many different days at several locations. Lab assembly and disassembly volunteers, for example, may only work before the Olympiad starts or after it has already finished.

3.7.5 EVENT VOLUNTEERS

We organised several events, such as "Discover ETH" or the "Reunion Event", which required a substantial number of event volunteers. In the end, we counted approximately 28 event volunteers. However, within the core team, we had about five event volunteers who dedicated themselves to working every day. Notably, one of these volunteers had already joined the team a week prior to the IChO event, which proved to be highly beneficial. Additionally, 6 event volunteers committed to working for a minimum of four days, while 19 event volunteers signed up for one or two days.

As part of the organization process, we collaborated with three to four co-organisers responsible for planning events and excursions over the course of ten days. Our initial step involved identifying specific tasks for volunteers and determining the precise number of volunteers required for each task.

The recruitment process was initiated by the person in charge for volunteering and was then managed by the program coordinator. This approach extended to communication and onboarding procedures. Throughout the IChO event, we differentiated between on-site briefings and pre-day briefings, especially for more complex events and excursions. Given the diverse working schedules of our numerous volunteers, we opted not to create a Telegram channel for communication purposes.

For volunteers committed to working more than five days, we conducted personal interviews to gain deeper insights into their backgrounds and capabilities. This information allowed us to later assign responsibilities and designate key individuals within the programme organisation. In the case of complex events and excursions, we selected lead volunteers to serve as points of contact for service partners and fellow volunteers.

The onboarding and briefing during IChO was conducted in the following steps:
- 1 month prior to the event: digital onboarding with a general introduction; event volunteers were invited to join the adjoining onboarding for team guides.
- 14 days prior to the event: a working schedule excel file was shared before the beginning of the event to ensure everyone knows about their schedule, free time and can plan their days around the IChO accordingly.
- On-site briefings: were conducted before the event, excursion on site.
- Pre-day briefings: were done by email to all volunteers listing all tasks and explaining the event or excursions in detail with specific responsibilities. Lead volunteers enjoyed a more detailed briefings in advance in person.

CHALLENGES

- The volunteer management process was early transferred to the programme manager which was time consuming.

- Juggling responsibilities for the programme, event volunteers, the student hotel, and team guides posed a formidable challenge. This was compounded by the need to prepare daily briefings for both groups of volunteers (event volunteers and team guides) while also attending to the demands of service partners and programme collaborators.

- Managing this dual role made it demanding to ensure timely delivery of the briefings.

RECOMMENDATIONS

- Staffing: having a dedicated group of event volunteers who were present throughout the entire IChO proved invaluable. They possessed a strong grasp of organisational intricacies and knew how to ensure the seamless execution of events and excursions.

- Recruitment: having more than just one volunteer already involved before the IChO would have been beneficial. This would have also facilitated the transfer of knowledge about the planned events and excursions.

- Preparation of briefings should be meticulous because the devil is in the details.

3.7.6 COMMUNICATION VOLUNTEERS

The fixed team consisting of the Head Marketing and Communication and the Manager Communication have been supported by two professional film-makers as well as five volunteers during the entire duration of the event, starting from the volunteer onboarding day on 15 July.

Six months before the event began, we started searching the volunteers on our website. The initial search focused on three volunteers as assistants' video and photo plus two to three writer volunteers. The echo to the publication on the website was okay. The Manager Communication did short online interviews with the applicants. However, the closer the event came, the better we knew how to set up and distribute tasks. As we had two autonomous and professional film-makers, our volunteers' team could be allocated to the following tasks.

One volunteer for small-talk interviews
We produced short interviews of the daily top events with duration between 30 seconds to 3 minutes. These short videos gave live impressions of the event. Please find more details in the respective chapter.

Three volunteers for photos and small-talk videos
The three volunteers covered the main events of the day and rotated between taking pictures and filming small-talk videos.

One volunteer for writing articles
The newsletter *Catalyzer* was published daily. The writer volunteer wrote about the top events of the day. She has been briefed by and worked closely with the *Catalyzer* team. Please find more details about it in the respective chapter.

Both one month and one week before the event, online meetings took place for briefings plus to introduce the team members to each other.

CHALLENGES

- Even if we held online meetings and briefings before the event started, it took a moment to bring the volunteer team onboard and make them understand the complexity of the event.

- The volunteers had different level of experience with communication and openness to learn, which created a lot of extra shifts for the Manager Communication.

- Many events took place simultaneously in different locations (sometimes hours away from Zurich) and we wanted to maintain a balance between the various groups like students, leaders, volunteers, staff, people's places of origin and genders. Therefore, the volunteers had long and intense days and the schedules for the volunteers were tough.

RECOMMENDATIONS

- To check respective skills prior the event is a must. We also recommend some training sessions to bring the team on similar level before the event starts. And finally, they should start at least two days before the volunteer briefing starts.

- Do not underestimate the resources to lead a volunteer team during the IChO: from planning, briefings, feedback rounds, etc. In addition, plan enough volunteers so that they can also have one or two half days off during the packed week.

- The small talks required a lot of preparation to ask interesting question that led to spontaneous and sometimes humorous answers. An empathic, extraverted and as well spontaneous interviewer is needed.
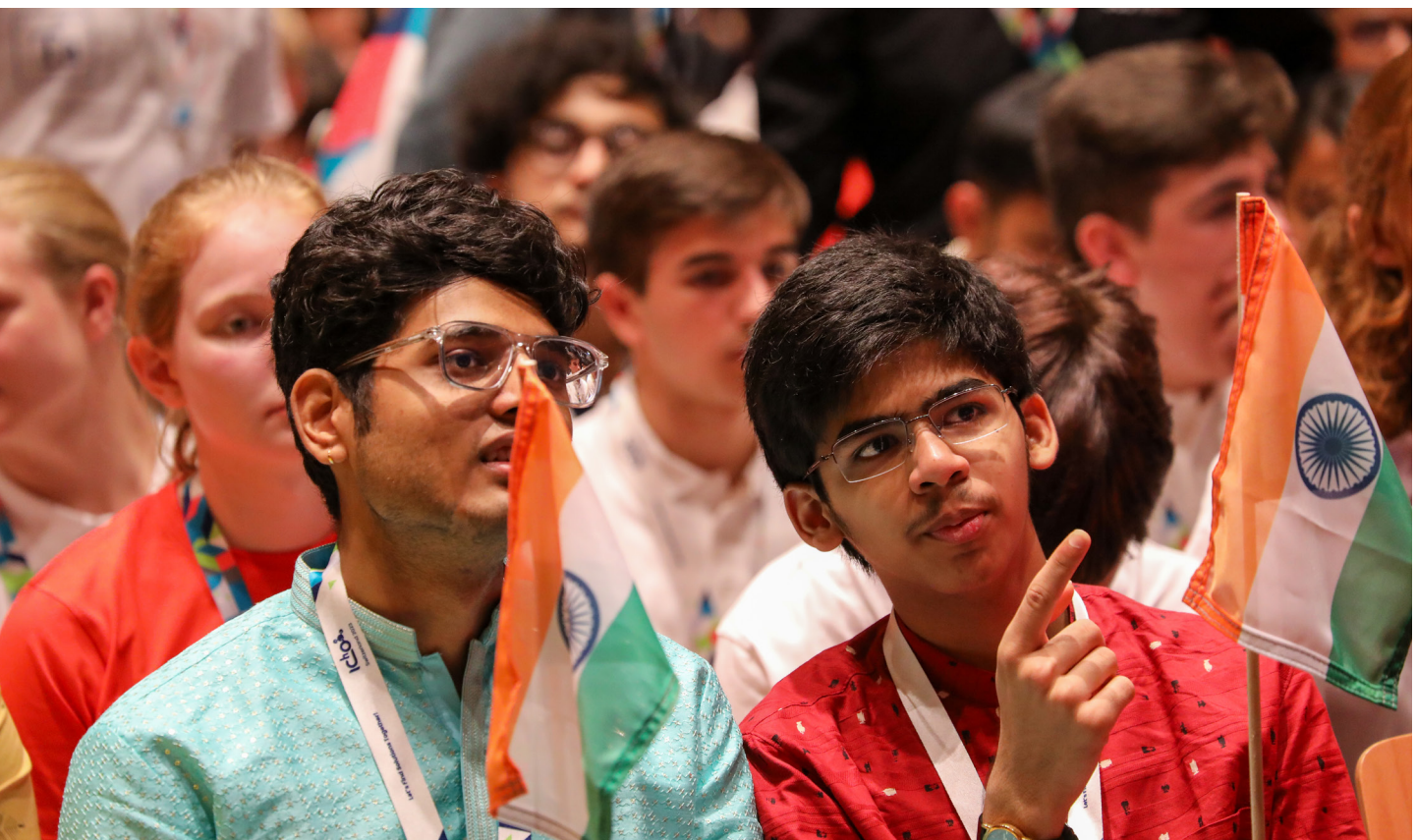
3.8 BUDGET AND EXPENSES

A total of roughly CHF 3.6 million were spent on the IChO 2023 (the average exchange rates in July 2023 for CHF 1.00 were about EUR 1.03, USD 1.16 or CNY 8.3). However, this does not reflect the real efforts and costs of the IChO 2023. Much work carried out by the organisers, mainly by employees of ETH Zurich, was not charged to the project and was done as in-kind services. Also, a tremendous amount of work carried out by volunteers was unpaid and does not appear in the above mentioned expenses.

In order to get a better understanding of the real costs of such an event, these uncharged services, as well as all discounts granted by partners and sponsors, should also be taken into account. This leads to an overall cost of the IChO 2023 of CHF 5.5 million.
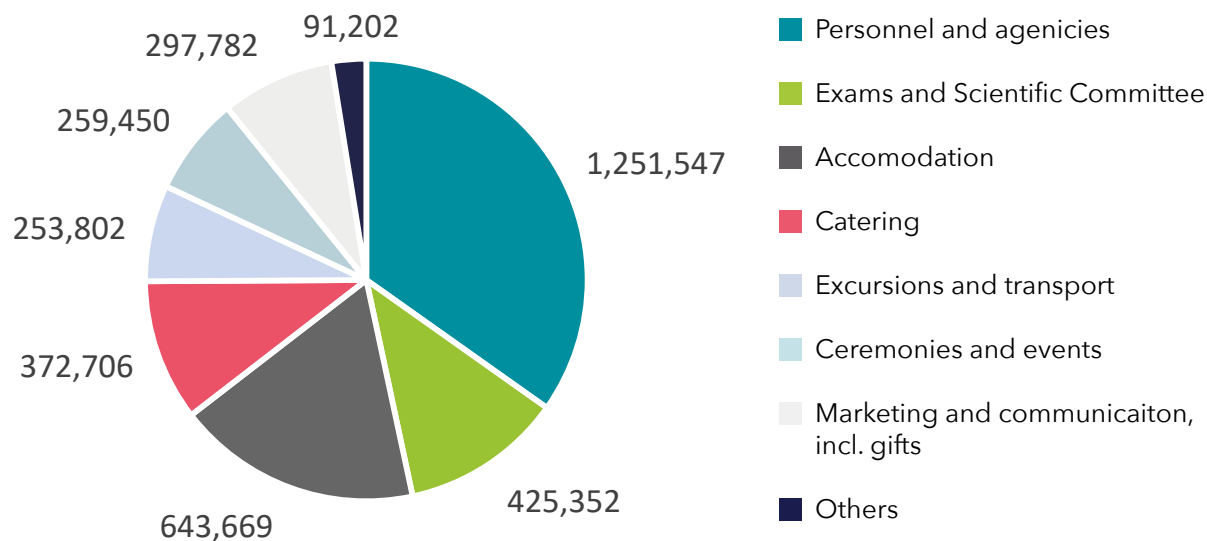
Of the CHF 3.6 million spent, 35% was spent on salaries for employees and hired agencies. The entire exams materials and infrastructure (including Jury meetings) summed up to 12% of the overall costs. A further 18% was used for accommodation, 10% on catering, 8% on excursions and transports as well as 7% on events and ceremonies. Give-aways, T-shirts, marketing and communication also cost 7%, leaving 3% on other costs like insurances, expenses of volunteers and staff and such.

The discounts and sponsored services received by our partners were mainly in the field of accommodation, food and beverages, event infrastructure and locations, excursions and transport. The real cost of these categories would thus be much higher.

Besides the large amount of unpaid work (volunteers and uncharged services provided by the organisers) the financial contributions of the organisers themselves amounted to up to 17%. Governmental bodies contributed an additional 20%. Further, the budget was covered to a large extent by fundraising and donations from partners, of which 36% came from charitable foundations, and 16% from companies. Finally, participation fees of the delegations and extra charges (i.e. for single room accommodation) contributed 11% to the financial income.

Financial costs of IChO 2023 (CHF 3.6 million)

- 1,251,547 — Personnel and agenicies
- 425,352 — Exams and Scientific Committee
- 643,669 — Accomodation
- 372,706 — Catering
- 253,802 — Excursions and transport
- 259,450 — Ceremonies and events
- 297,782 — Marketing and communicaiton, incl. gifts
- 91,202 — Others

Financial income for IChO 2023 (CHF 3.6 million)

- 616,000 — Financial contributions of organizers
- 1,285,000 — Foundations
- 720,000 — Government and cantons
- 584,849 — Companies
- 389,064 — Delegation fees and extra charges
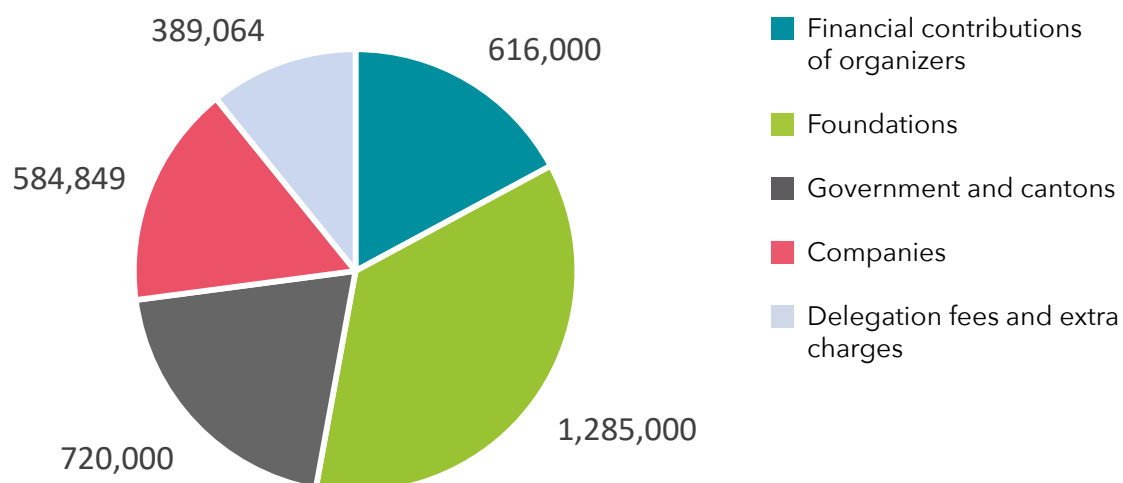
3.9 FUNDRAISING

Switzerland's status as a high-cost country makes hosting an IChO a costly endeavour. The challenges posed by the pandemic and the worldwide economic instability resulting from various factors made it difficult to secure funding. Potential partners shifted their priorities, and their willingness to contribute larger sums diminished.

The budget was established based on insights gained from previous International Science Olympiad organising experiences. Taking various factors into account, including inflation and the overall economic climate, the estimated budget used for fundraising ultimately reached CHF 4.3 million.

The strategy of fundraising was focusing on getting some financial governmental commitment as base, followed by approaching partners that already had a relation to Swiss Chemistry Olympiad or Science Olympiad in general. A major hub was scienceindustries (a business association of chemistry, pharma, and life sciences) combining a huge network of companies that were potential partners. In the beginning, we were quite euphoric about getting funds quickly together by a few global players. We learned that it is not that simple, and it will need much more effort to get financial support secured.

Setting up a well-maintained fundraising list with over 300 potential supporters helped us a lot to contact foundations and companies in a well-structured way and with endurance. Obviously, such a list requires a lot of time figuring out the real potential of a possible partner (contribution amount, probability of commitment, amount of effort).

In terms of sponsorship for companies, we structured four distinct categories, drawing from the insights gained from previous International Olympiads hosted in Switzerland. Partners were offered personalised and collaboratively crafted participation packages to recognise their support:

• Main Partner: contribution of more than CHF 450,000
• Gold Partner: contribution of more than CHF 150,000
• Silver Partner Plus: contribution of more than CHF 50,000
• Silver Partner: contribution of more than CHF 20,000

We figured out that the set company sponsoring tiers were too high in the amount and not really very attractive for interested sponsors. Therefore, we made some adjustments focusing also in the fundraising on the premise "Togetherness" offering the interested sponsors to get visibility in participating in the programme.

For external communication, we have decided not to mention these gradations explicitly and to use a categorisation as follows: Organsisers, Partners, Supporters, International Partners.

The objective was to secure the necessary finances by no later than spring 2022. Solicitations were initiated as early as two years prior to the event. Thanks to many efforts, the funds started to flow in, not only from companies and other corporations but mainly from various foundations.

Personal contacts to potential donors or partners of previous, similar events proved to be very important. They were more likely to respond positively to fundraising requests. Nearly 80 direct requests were sent out. Approximately 30% received a positive reply. The finances raised by autumn 2022 allowed to organise an attractive programme around the demanding examinations.

In 2022, the International Steering Committee proposed the creation the IChO Endowment Fund to attract support from international partners committed to long-term contributions to the International Chemistry Olympiad. This initiative was inspired by a global company's decision to support the IChO for three consecutive years (2022, 2023, 2024). Aligning this international sponsor with the existing sponsorship tiers for IChO 2023 took some time. The IChO Endowment Fund aims to assist countries with a smaller budget to participate in IChOs (through full or partial coverage of the participation fee) and support host counties that may not have full government funding in organising such an Olympiad.

CHALLENGES

- Raising funds with no network or knowledge of fundraising is tough, it needs time to get into the topic and understand mechanics.

- Fundraising for a one-time event like an IChO needs to be presented with different arguments to potential financial partners than an ongoing initiative like the national Chemistry Olympiad.

- Create attractive participation for partners without making the event over-commercialised.

- Foundations may experience significant delays in their response times due to the infrequency of their board meetings, plan accordingly.

RECOMMENDATIONS

- Start early enough with a concept for fundraising also including some communication aspects, like clear target groups and goals; start more than three years before the event with fundraising.

- Understand what is important for different partner sectors (governmental, foundations, companies, organisers, etc.).

- Ensure to have a clear goal (focus) what you would like to achieve with the project and what impact you will drive, what is the output you want to generate. Use these goals, impacts and outputs to explain why it is worth to invest money into a format like IChO.

- Learn about the company and foundation before contacting them, prepare a story line and remain flexible for learnings; identify key persons and decision-makers.

- Set up a proper partner management that does not stop after requiring funds.

4 ACADEMIC PROGRAMME

4.1 PREPARATORY PROBLEMS

The catalogue of preparatory problems was constructed once there was already a good understanding of the expected content for the IChO exam problems in place. This ensured that the fields of advanced difficulty could be defined appropriately and published alongside the preparatory materials. Curation of the preparatory problems happened in iterative rounds, in which the authors also got more and more sensibilised towards the regulations applying to IChO questions.

We opted to implement the preparatory problems in an instance of OlyExams this year. This proved quite useful during the meeting with the International Steering Committee (ISC) in January 2023, as it was possible to gather their feedback neatly in one place as well as expose the author teams to the software already way before IChO.

The credentials for the access to this preparatory problem server of OlyExams were then also shared with the delegations in order to to streamline their feedback or any questions to the preparatory problems via OlyExams.

CHALLENGES

- The content of the preparatory problems tends to diverge quickly from the associated exam question, as the authors do not want to give away too much of their problem in the preparatory set. Thus, they often touch on topics that might have to be classified as a separate field of advanced difficulty according to IChO regulations.

- The preparatory problems represent a large body of work, so enough time for implementation in OlyExams needs to be accounted for.

RECOMMENDATIONS

- Sharing the IChO regulations with author teams early on and introducing them to the concepts of the fields of advanced difficulty is recommended.

- Implementing the preparatory problems in OlyExams allows to streamline feedback during the discussion with the ISC in January as well as feedback from delegations after the publication.

- Exposing author teams to the OlyExams platform already at the stage of the preparatory problems is good preparation for the actual processes involving OlyExams during IChO in summer.

If you wish to see the preparatory problems, visit https://www.icho2023.ch/problems.

4.2 EXAM DEVELOPMENT (THEORETICAL)

Switzerland has a special feature: there is no central, national ministry of education, but 26 cantonal directorates of education. This meant that we could not rely on a central institution and had to take a personalised approach to finding authors. We proceeded with three goals in mind:

1. We agreed in our core team to address current topics (energy, ecology) such as the use of CO_2 as a raw material or the production of H_2.

2. We decided to give space to research results and products that originated in Switzerland. If you think of Switzerland, you immediately think of chocolate, cheese and mountains. Accordingly, there were also preparatory problems for this.

3. We wanted to reflect as many of our universities as possible with their research foci. We succeeded in finding authors from three universities and other research institutes such as Empa and the Paul Scherrer Institute.

Altogether, it was not a trivial task. We succeeded in finding motivated and competent authors through direct contact who provided us with exam and related preparatory problems. Since we collected the exam problems with priority, we were able to target the preparatory problems very precisely to these tasks. A point that received general recognition in the feedback during IChO (exam problems are well in line with the catalogue of preparatory problems).

All tasks, the preparatory and the exam problems, were checked and revised in several rounds (6 to 15) for their correctness, linguistic expression, and compatibility with the IChO regulations.

The following table shows an overview of the different development stages of the tasks:

Mar. to Nov. 2021	Contacting and recruiting authors A handout describing the process and the requirements for formulating a problem proved useful
Dec. 2021 to Sept. 2022	Ten exam problems and most preparatory problems; first optimisation
Oct. 2022	Setting up a review team of four (three SwissChO members, one PhD student from ETH Zurich) plus three native English speakers for language checks
Oct. 2022 to Jan. 2023	Several rounds of correcting and aligning of prep problems to IChO regulations
Jan. 2023	Typesetting of preparatory problems into OlyExams
End of Jan. 2023	Review by Steering Committee; 31.1. publishing of preparatory problems
Feb. to Jun. 2023	Review process for the exam problems in several rounds; simultaneously typesetting into OlyExam
Mar. to Apr. 2023	Testing of exam problems by second- and third-year students from ETH
14 Jul. 2023	Mock exam by Steering Committee and final review

CHALLENGES

- Finding author teams that were willing to commit so much time and effort in preparation for and during the event.

- Conveying the appropriate level of difficulty and the many regulations that apply to an IChO exam to people not as familiar with the Olympiads.

RECOMMENDATION

- Clear communication with the authors about what exactly is expected before and during the event is crucial. Giving them a good overview of the many steps of review and the specifics that apply to an IChO exam is important (make them read the regulations).

4.3 EXAM DEVELOPMENT (PRACTICAL)

The same considerations outlined in subchapter 4.2 are also relevant in this context. Below, we emphasise specific aspects that must be taken into consideration when developing the practical exam:

From February until April 2023, the problems were discussed internally within the author teams and with the Lead Lab to make sure the problem texts are IChO-student-friendly and also to compile the order list of equipment and chemicals.

By April 2023, the experimental procedures as well as the approach to data analysis were preliminarily finalised and the first ten sets of equipment were ordered. Problem testing was done in two phases: the first-phase testing performed by author teams and second-phase testing performed by volunteers (see Quality Management of Exams for some more details).

Based on the second-phase testing results, there were a few adjustments to the experimental procedure text and one major adjustment to the analysis procedure for Problem 1: it was decided that the combined yield of mono- and dechlorinated products is evaluated for Product B. After the second-phase testing, the final design of the workplace was decided upon. Based on the mock exam feedback, there were two major changes:
- One titration was removed from Problem 2 to make sure IChO students had enough time to finish the whole exam.
- IChO students had to start the practical exam with Problem 3 and spend a maximum of 1 hour on it. During this hour, they were not allowed to start with Problem 1 or 2, as chemicals from those problems could be used in Problem 3, which could result in release of hazardous amounts of H_2S. The initial workplace setup was changed, so that only the box with equipment and chemicals for Problem 3 was on the table, while all other boxes were inside the cabinets. Students were only allowed to take out those boxes once they handed in the Problem 3 box.

Finally, during the sampling of iron (III) chloride for Problem 2 it was realised that the compound absorbs water from the air too fast, making large-scale sample preparation impossible. The attempt to do so in the glovebox was also unsuccessful, so the solutions of known exact concentrations were used instead to prepare the samples by weight.

Feb. to Apr. 2023	Internal review and preliminary testing, preparation of problem texts and lists of equipment and chemicals to be ordered
Apr. to May 2023	Equipment and chemicals ordering
May to Jun. 2023	First-phase testing, finalisation of problem texts Equipment and chemicals arrival
5 to 24 Jun. 2023	Second-phase testing
25 Jun. to 8 Jul. 2023	Analysis of the testing results, adjustment of problem texts, preparation of grading schemes
3 to 18 Jul. 2023	Lab Assembly

CHALLENGES

- Keeping track of the different versions of the problem set and communicating them effectively between the involved parties. This can affect second-phase testing and Lab Assembly.

- Making sure the problem is scalable for ca. 400 participants, both with respect to the equipment and the time it takes to prepare all workspaces.

- Developing grading schemes for qualitative problems and for quantitative problems with large, expected errors.

RECOMMENDATIONS

- Have a list of equipment and chemicals ready as early as possible (April of the IChO year at the latest, but the delivery times can be country-specific!).

- Consult previous IChO reports for grading schemes (e.g. Baku 2016, Budapest 2008), they can be quite helpful.

- If possible, avoid the problems where large errors are expected in the result.

- Be aware of the volume of equipment and chemicals that will have to be stored properly, for weeks or up to months.

- When planning the exams, do not lose sight of the costs and budget with a certain reserve.

4.4   QUALITY MANAGEMENT OF EXAMS

The quality management of the theoretical exam was carried out by the Scientific Committee, which had two members whose focus was quality control, alongside with the person responsible for the theoretical exam. The quality control team worked closely together with the problem authors and external reviewers.

The quality control of the theoretical exam started shortly after the preparatory problems were published (January 2023). First, some of the Scientific Committee members solved the theoretical problems to identify mistakes and redundancies, to tailor the problems to be in accordance with the preparatory problems, and to ensure compliance with the rules of IChO (avoiding double penalty, making sure that there is nothing in the problems that is outside of the scope of the fields of advanced difficulty).

Based on the first round of review, some changes were made in agreement with the problem authors. The Scientific Committee held weekly meetings, where some time was always dedicated to the quality control of the problems. Two rounds of language review were carried out by native speakers.

A mock exam was also conducted relatively early on (March–April 2023), where the participants were former second- and third-year chemistry Bachelor students. The participants signed a non-disclosure agreement to keep the contents of the exam confidential.

The results of the mock exam were evaluated, and alongside with the comments from the language reviews and the weekly Scientific Committee meetings communicated towards the problem authors in multiple rounds. This discussions led to a refined version of the problem set before the Olympiad.

The International Steering Committee (ISC) also solved the problems in a mock exam a few days before the competition and suggested refinements to the problems, together with the mentors of the teams, who had the chance to talk to the authors. These changes were discussed further at the jury meeting, where all mentors, the ISC, the Scientific Committee and problem authors were present. The final changes were put to a vote, and a last overall vote finalised the theoretical exam. However, there were still some small mistakes that were identified and corrected later during the translations.

CHALLENGES

- Keeping track of the different versions of the problem set and communicating them effectively between the involved parties.

- Time pressure: meeting all the deadlines of the multi-step quality control process.

- Ensuring that enough volunteers are available, for example for participating in mock exams.

RECOMMENDATIONS

- Compartmentalisation to ensure confidentiality.

- Using a specialised software for file-sharing and communication.

- Looking at the exam early on can be beneficial, to avoid redundancies and to make sure that the overall length of the exam is suitable.

- Have a team in the roles of authors (but not authors themselves) be in charge of the general instructions

The quality management of the practical exam was carried out mainly by problem authors together with two members of the Scientific Committee responsible for the practical exam as a whole. The quality control started in February 2023 and was carried out in five rounds:

1. Internal review and preliminary testing (February – March 2023) – the author teams presented the texts of the problems and discussed them with the Lead Lab. The purpose of this phase is to make sure the problems are formulated in an IChO-student-friendly way and to roughly estimate the time needed to solve each problem individually and together. The preliminary list of chemicals and equipment to be ordered is also determined during this phase.

2. First-phase phase testing (master value collection, May–June 2023) – the author teams tested their problems only using the problem texts finalised during the preliminary phase in order to collect the master values. This only applies to the problems where numerical values (yield, purity, volume of titrant etc.) are to be evaluated. The purpose of this phase is to create the basis for the grading scheme (approx. 20 values) and finalise the texts and lists of chemicals and equipment.

   This testing round was done by the authors mostly in their labs with the equipment and chemicals that were similar or identical to those used during the IChO. Assuming the preparation of the test run and the run itself take a maximum 3.5 hours per problem, this round of testing required **70 person-hours per author team**.

3. Second-phase testing (unqualified testing, June 2023) – 27 volunteers (Bachelor students to postdocs with chemistry background, with or without prior Chemistry Olympiad experience) previously unfamiliar with the problems tested the problems maximum six times per person. The purpose of this phase is to collect the data for the final grading scheme construction (78 values were collected) and also to check if the problems can actually be finished within the time allocated for the practical exam.

   This round of testing was done in one of the labs later used during the IChO using glassware and chemicals identical to those used during the IChO. It was delayed by 3 weeks, because one piece of equipment arrived later than expected. The testing was organised as follows:

› Approx. 2 weeks before the start, an email was sent to people who signed up for volunteering inviting them to participate in testing and to fill the doodle with the time slots. Testing was planned for 3 weeks, Mon.–Sat., two sessions per day: 8.00–12.30 a.m. and 2.00 to 6.30 p.m. During the session, a volunteer is asked to solve Problems 1 and 2 (those where numerical values are to be evaluated) or to perform the whole exam (only in the morning). For logistical reasons, a maximum of five people were allowed to participate in one session, because of the need to wash the glassware and reorganise the workspaces for the next session and because only ten sets of equipment were available.

› After the volunteers' answers were collected, the definitive schedule was sent to them. As testing requires one supervisor to be present during the session, we aimed to minimise the number of sessions used, for example, by cancelling the sessions where less than three people signed up. Supervisors were also asked to prepare the workspaces (maximum five) for the next session. In the end, we scheduled 20 sessions over 11 days, which together with volunteer participation resulted in **351 person-hours for testing volunteers and 90 person-hours for supervisors**.

› Volunteers were asked to sign the non-disclosure agreement before each session.

› At the end of each session, volunteers were asked to hand in their synthesis products, TLCs and answer sheets.

4. Mock exam (13 July 2023, 6 days before the practical exam) – six members of the ISC and one mentor tested the problems in their final form in the real IChO setting. One supervisor was present during the mock exam (5 person-hours).

5. Master value collection during the IChO practical exam – five people who participated in the second-phase testing were asked to perform the Practical Exam in different labs during the actual practical exam to make sure there's no significant difference in results between labs/floors. In addition, nine more people who did not participate in the second-phase testing were asked to perform titrations only.

The feedback from the unqualified testers was useful for correcting certain aspects in the problem texts, e.g. description of colour change during titrations and using some pieces of equipment. Additionally, it was demonstrated that 5 hours is barely enough to perform the whole exam, which was also confirmed during the mock exam and resulted in removal of a part of one of the problems from the final version. Finally, it turned out that people with previous IChO experience are on average no better in testing than the others when it comes to problems that require the current IChO-specific knowledge (i.e. getting familiar with the preparatory problems).

CHALLENGES

• Keeping track of the different versions of the problem set and communicating them effectively between the involved parties.

• Ensuring that enough qualified/suitable volunteers are available for second-phase testing and for master value collection during the actual practical exam.

• Ensuring the author teams are ready to prepare and process quite a few samples during second-phase testing.

RECOMMENDATIONS

• Using a specialised software for file-sharing and communication (instead of emailing Word files to each other).

• Allow for at least 3 weeks for second-phase testing, recruit people well in advance.

• When inviting volunteers for second-phase testing, it should be communicated clearly that they will need to do the same problem multiple times.

• Looking at the exam as a whole can be beneficial as early as it is reasonable, to avoid redundancies and to make sure that the overall length of the exam is suitable.

4.5 IT EXAM TOOLS

OlyExams was used to provide a framework in handling the exam logistics. To make the tool more convenient and eliminate boring and repetitive processes, a few scripts were written for tedious tasks which are provided in our git: https://github.com/daniisler/icho2023.

The Olympiad organisation needs someone authoritative with dedicated OlyExams responsibilities. This includes defining exam phases and making decisions on when exams are visible, when the mentors are able to provide feedback, when translations can be started and so on. This sometimes needs to be decided more spontaneously should things not go perfectly according to plan, and therefore someone with the ability and responsibility to make quick decisions is required. In our case this was a member of the Scientific Committee, which worked well.

Further, it is important to make efficient use of the abilities of the technical OlyExams support. Even though they are happy to help with many things, we should only allocate tasks to them that involve problems or small developments of the system. For example, they do not need to be involved in the printing process other than making sure the PDF files are provided. Otherwise, they can quickly get overloaded, which would be very much counterproductive since OlyExams running smoothly is crucial for the event.

The system is best explained by going through the workflow:

1. **Typeset** the exam and solutions into OlyExams: This requires about 100 person-hours of work by scientific volunteers. This process is error-prone, and the typeset should be done as early as possible, so the exams can be reviewed extensively, about 25 person-hours of review at least. This works best if the problem authors are made familiar with OlyExams directly and enter their questions themselves. For this, see a guide in the appendix. It's important to not only provide the guide, but to present it, so the information is actually digested!

2. **Mock exams** in OlyExams: This proved to be a great test run of all the functionalities and gave the option to ask the developers for minor functionalities that made the process easier, for example better navigation in the marking view. Also, like this the whole printing and scanning process could be tested, and the biggest problems were already eliminated.

3. Process **feedback** (by ISC): At this stage the authors need to be familiar with OlyExams or have personal administrative assistants. They need to evaluate the feedback and modify their questions accordingly.

4. Before the jury meetings, most **feedback needs to be implemented** or the authors need to be ready to **defend their version**. The changes can be observed well in the diff/accept view of the new version. Minor further changes are best directly implemented into OlyExams, for major changes it might be beneficial to load the compiled PDF into Microsoft Word and formulate them there for efficiency reasons. More details on how a jury meeting can be conducted efficiently can be found in the appendix, in the presentation for the authors briefing.

5. For the **votes** during the jury meeting, a dedicated person needs to follow the discussion and set up votes when it seems like a discussion cannot be resolved otherwise in advance. Foreseeable votes, like the votes on the final version of each question should be prepared beforehand to reduce the stress.

6. Translation by delegations: A **first level support team** consisting of five people familiar with OlyExams and LaTeX needs to be present during all translations sessions. This is important, because the mentors cannot be expected to solve LaTeX errors on their own. If they then just go on working due to the lack of support, it gets increasingly harder to spot the causes. To cover the most common points and give them all an idea how to start, a few videos were recorded. Please find these in our git in the folder OlyExams_helper_vids.

7. **Printing** can be solved on an individual basis. OlyExams has developed the functionality to provide the final submission PDFs in an FTP folder, where the printing team can access them.

8. The **scans** of the written exams need to be uploaded into another FTP folder, from where they get evaluated and sorted by the OlyExams system. They will be split up into single PDFs per student per task. Through the bulk scan view, scans with missing pages can be identified, which then need to be rescanned until successful or added manually if the QR codes are broken for some reason.

9. The students' answers were reprinted, since the markers requested to **mark their problems on printouts**. The script provided in the git was used for this. For the markers grading electronically, a shared cloud folder was created to upload their scans to.

10. The markers were **grading the answers** under the authors' supervision and entered the results directly into OlyExams. For this, strict deadlines are needed, so the mentors have a well-defined time window to add their own marks and decide which marks need further discussion.

11. After arbitration, it needs to be ensured the **marks are accepted** before the last jury meeting starts, so there is enough time to export the final marks and provide some statistics. Find some scripts that were used for this in our git.

12. When the event was over, all the **marked papers were scanned** again and sorted using the QR codes to give the delegations something to take home. This should not be promised before, as it is a lot of additional work, but very nice if it can be done. Again, for this, the used scripts are provided in our git.

MAIN CHALLENGES AND RECOMMENDATIONS IN SHORT

- The problems were provided as Word documents by the authors individually, with no claim on consistency. When a new version arrived, the changes were hardly trackable. The changes need to be clearly visible, otherwise it's very hard to spot them all, so this process needs to be well defined. Further, the format must already be fixed before adding the problems to OlyExams, meaning the split into question, answer and solution sheets needs to be clear.

- In the original typeset, a lot of LaTeX content was included. This had to be changed into the equation format, because it causes trouble in the translations, since many mentors are not familiar with LaTeX. There were only three appearances of raw LaTeX content left in the version published for translation, and all of them caused PDF errors, because it was not easy to handle them in the translation.

- The typesetting team can be overloaded quickly. Enough volunteers/administrative assistants are required for this task, who are able to work together with the problem authors. Ideally, the authors typeset and update their problems in OlyExams as early as possible.

4.6 PRINTING AND SCANNING

Our team was given the following assignments for the IChO:

Description	Timing (duration)
Produce mentor pre-prints of the official English versions of both exams and solutions (ca. 13,500 pages, two volunteers)	Morning 2 days before Exam #1 (4h)
Print translated student versions of the practical exam (ca. 21,000 pages, two volunteers)	Evening before Exam #1 (5h)
Scan and sort the practical exam scripts and print paper copies for the marker teams who requested it (ca. 2,000 printed pages, two volunteers)	Afternoon after Exam #1 (8h)
Print translated student versions of the theoretical exam (ca. 35,000 pages, three volunteers)	Evening before Exam #2 (5h)
Scan and sort the theoretical exam scripts and print paper copies for the marker teams (ca. 12,000 printed pages, five volunteers)	Afternoon after Exam #2 (5h)
Produce reprints of both exams for those delegations who requested it (ca. 15,000 pages, two to five volunteers)	Evening after Exam #2 (9h)
Rescan post-arbitration scripts (five volunteers)	Morning after arbitration (4h)

We employed the ETH Print and Publish centre[1] in all cases except for printing delegation copies of student answer sheets. After lab inspection, head mentors were asked if they were happy to only receive electronic versions of their students' answers (15 delegations chose this option). Delegation reprints were produced at the mentor hotel, using one HP E57450 and two HP E55040 printers. These operated at a quarter of the maximum advertised printing speed, forcing the volunteers to work late into the night. All other printing assignments were carried out using professional printing equipment (two printers achieving speeds of 90 pages per minute), operated by an employee of the Print and Publish centre. This greatly reduced the volunteers' workload – late submission of translated scripts was the clear rate-limiting factor. Using professional scanning equipment also vastly increased the speed at which markers could access the students' answers, with the first electronic versions available 1 hour after the end of the exam.

Printing: whenever a delegation submitted the final versions of their students' scripts, the corresponding PDFs were generated in the OlyExams FTP printing folder, complete with a cover sheet that displayed the student code and the examination hall/lab number, clearly visible through the address window of a C4 envelope. After printing, our volunteers sorted the envelopes into 1 of 16 predefined groups, ready for distribution the following day.

Scanning: the students were instructed to put all pages, including the question sheets, back into their envelopes. All pages were scanned double-sided and processed by OlyExams, which filtered and sorted the answer sheets by student and task to present it to the markers.

Reprinting: a script monitored the incoming scans through the OlyExams API and collated them task-wise into PDF documents of approximately 100 pages, ready to be sent to print.

Rescanning: a set of volunteers operated five scanners in parallel, and a script combined the rescanned physically marked answer sheets with those marked electronically.

Processing: the Python scripts written to assist in these tasks can be found on https://github.com/daniisler/icho2023.

CHALLENGES

- There were not enough volunteers for scanning and re-printing the scripts from the practical examination.

- Several answer sheets from the practical examination had to be located in the labs after the exam, since not all students followed the instructions to place all the sheets back into the provided envelope.

- The speed of the printing equipment in the mentor hotel was severely overestimated.

- It was hard to locate scripts missed during rescanning.

RECOMMENDATIONS

- Use a professional service for any major printing assignment.

- Make the workers of the printing facility fully aware of the extent of the job and how crucial it is for the success of the Olympiad.

- Test all scripts and workflows in advance.

- For scanning, engage at least one volunteer per scanner, one for sorting the originals for long-term storage, one for delivering the reprints to the markers, and one for monitoring the scans on OlyExams. In addition, have someone operate and troubleshoot the Python script for collating reprints.

- Use several mechanisms to monitor which documents have been printed or scanned. In addition to OlyExams, we used signing sheets (see git repository for a script used to generate these). Each successful job was ticked off, which made it easy to identify missing documents.

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[1] https://ethz.ch/staffnet/en/service/office-supplies-printing-and-mailing/print-publish.html

4.7 LAB ASSEMBLY/DISASSEMBLY

Equipment and chemicals started to arrive in May and were placed into the storage room. As 90 delegations (maximum 360 students) were expected, equipment and chemicals were ordered in amounts sufficient to prepare 400 workplaces. Hotplates were borrowed from the University of Zurich (UZH), the Chemical and Equipment Shop of the HCI building and from thestudent practicums. Approximately one half of the lab stands was also borrowed from UZH and student practicums. The rest of the equipment and chemicals was ordered new. Three forklifts were borrowed from the workshop to manipulate the palettes with the equipment.

The experimental exam was planned to take place in 14 labs normally used for student practicum: 2 labs underground (C-labs, floor –2), 4 labs on the ground level (E-labs, floor 0), 3 labs on floor 2 (G-labs) and 5 labs on floor 4 (J-labs). A total of 376 workspaces were prepared. Five additional labs were used as backend labs for chemical storage (G-labs, floor 2), preparation of samples and solutions and, for logistical reasons, as a central storage of backup equipment and chemicals during the practical exam itself. One of the backend labs was in the end also used to prepare workspaces for two sick students, who were placed ca. 5 metres apart (the information about their health was communicated on the day before the exam). Due to space constraints, assembly of the boxes (see below) was done in two bigger labs later used for the practical exam.

Lab Assembly was carried out under supervision of the Lead Lab during 3–18 July 2023 (except 17 July – Opening Ceremony, lab inspection) by volunteers who signed up for specific time slots. A total of 45 volunteers (856 person-hours) participated in the Lab Assembly. The procedure included two sessions (8.30–12.30 a.m. and 1.30–5.30 p.m.) every day, the lunch for volunteers was provided in the form of vouchers for the canteen on campus or in the form of pizza during the weekends. The coordination of volunteers during Lab Assembly was done by means of a Telegram chat created specifically for this purpose, the link to the chat was provided in the invitation email so that people could join in advance. The equipment and chemicals were divided into the following groups (the order here roughly reflects the order of distribution):

- "General" – equipment that was supposed to be on the bench when the exam started. Mostly bulky pieces of equipment that did not fit into the boxes or pieces that needed to be pre-installed/pre-assembled.
- "Box 1", "Box 2", "Box 3" – problem-specific pieces of labware (with very few exceptions).
- "Equipment personal" – pieces of labware that required a label with a student code.
- "Chemicals non-personal" – chemicals that didn't require a label with a student code.
- "Chemicals personal" – chemicals that required a label with a student code.
- "General lab" – equipment and chemicals that are distributed per lab, e.g. UV lamps, gloves, ice containers.

The assembly of the boxes and equipment on the bench was controlled using the checklists according to the categories above (total seven checklists per workspace).

The day before the exam, all the workspaces to be used during the IChO were marked with an IChO logo to orient the people who distribute the glassware and chemicals. In addition, all the workspaces were photographed, so that they could be brought back to their initial state during Lab Disassembly.

- During Day 1 (3 July), all the workspaces received one hotplate, one labstand, one clamp, one clamp holder, one thermometer and one crystallisation dish ("General" equipment). Power and hotplate test was run as follows: in all the labs, all the hotplates with the crystallisation dish filled with water were turned on after the signal was given in the Telegram chat. If the water temperature did not to reach a certain value within a certain time, the hotplate had to be replaced. No power issues were encountered, about 15 hotplates were replaced.
- Days 2–4 (4-6 July) – assembly of problem-specific boxes
- Days 5–6 (7-8 July) – distribution of the boxes, removal of non-IChO-related stuff from the workspaces, distribution of "General" items
- Days 7-8 (J9–10 July) – distribution of remaining "General" items, start of labelling vials for "Chemicals non-personal"
- Days 9–10 (11–12 July) – filling bottles with acetone and distilled water, sampling and aliquoting "Chemicals non-personal", labelling "Equipment personal", preparation of the mock exam workspaces
- Day 11–12 (13–14 July) – distribution of "Chemicals non-personal", "Equipment personal", clean-up after the mock exam, implementation of changes decided upon after mock exam
- Day 13–14 (15–16 July) – distribution of remaining "Chemicals non-personal", "Equipment personal", labelling and sampling of "Chemicals personal", implementation of changes decided upon after the mock exam
- Day 15 (18 July) – distribution of "Chemicals personal" and "General lab", final clean-up.

Lab Disassembly was carried out under supervision of the Lead Lab during 20–27 July 2023 (except 24 July afternoon – closing ceremony – and 25 July morning) by volunteers who signed up for specific time slots (the skit system was the same as for the Lab Assembly). As the initial form for volunteers left the possibility to sign up for activities that are incompatible timewise, Lab Disassembly turned out to be a bit understaffed (approx. 450 person-hours total). During the disassembly process all the glassware was rinsed and sorted into the boxes used for the practical exam and put in the storage. The leftover chemicals were disposed of, which resulted in a total of ca. 800 L of heavy-metal waste (Problems 2 and 3, collected separately), ca. 50 L of chlorinated aqueous waste and ca. 100 L of solvent waste. Waste handover was organised in advance with the HCI waste disposal facility.

CHALLENGES

- The estimation of 800 person-hours for Lab Assembly was an underestimation, especially since some of the changes to the workplaces were decided upon after Lab Assembly had already started.

- Some minor pieces of equipment and boxes partially have not arrived in time.

- Communication with volunteers during the Lab Assembly was suboptimal sometimes, as the cell phone reception is generally bad in the building, and those who relied on their mobile data rather than Wi-Fi did not realise they were offline.

- As the initial volunteer sign-up form allowed the volunteers to select the activities that are not compatible timewise, and also due to the fact that different activities were managed by different people, some of the volunteers were missing, which turned out especially critical during the Lab Disassembly.

- Safety labels for chemicals were not thought of in time, which resulted in two separate rounds of labelling for certain items.

- Weighing iron chloride to prepare 400 samples proved to be a problem, so the samples were prepared from solutions (see Exam Development for more details).

RECOMMENDATIONS

- Count on 900 person-hours for Lab Assembly and 600 person-hours for Lab Disassembly (that is of course location-dependent, as transportation of items takes a significant portion of time).

- It's always beneficial to have at least several people who are familiar with the venue and/or participate in the Lab Assembly for several days.

- Avoid altering the workplace setup after the start of the Lab Assembly unless absolutely necessary, allow for sufficient time and volunteer resources after the mock exam, as the changes (if any) to be implemented are most likely to arise at that point.

- If coordinating volunteers using any messenger, make sure they all have good connection and stress the importance of this aspect for the success of the procedure.

- Minimise the chance of people signing up for activities that overlap in time.

- Think in advance of any "bulk sample preparation" effects that may not be obvious when preparing just a few samples.

4.8 MOCK EXAMS

The experimental mock exam was carried out on 13 July in one of the IChO practical exam labs (the same lab as was used for second-phase testing) with seven participants: six members of ISC and one mentor who agreed to come earlier and participate. Eight workspaces for the mock exam were prepared on 12 July and disassembled on 14 July. The first meeting after the mock exam (mock exam volunteers, problem authors, Lead Lab, lead exams) took place the same day after lunch, where several general concerns were discussed.

The theoretical mock exam took place the next morning, in the same examination halls as the actual IChO exam was to be held. After lunch, we also held a short meeting with the mock exam volunteers and some of the problem authors where initial impressions and general concerns by the mock exam participants could be discussed.

In the afternoons, the mock exam volunteers then got to enter comments via OlyExams to the various problems. These comments were discussed during meetings on Saturday, 15 July, and the author teams made appropriate changes before the exams went to the first print (printout for mentors). In the morning, all comments to the practical exam were discussed, in the afternoon a split session for the theoretical problems was held. Additionally, the chairmen for the jury meetings were also invited for these discussions, as it also served as sort of a rehearsal for the official jury meetings.

CHALLENGE

- If not enough ISC members were available to join for the mock exams, getting mentors to participate was tricky, only one out of four invitees agreed.

RECOMMENDATIONS

- Invite mentors earlier (in January at the latest). Try to first invite those from the neighbouring countries and from the future host countries.

- Holding a short general meeting after the mock exam in presence of the problem authors allows the authors to get a good first vibe check as to how their problems were received, even if the mock exam participants did not have time to enter any comments yet.

- Having the jury meeting chairmen present for the discussion of the mock exam serves as a good rehearsal for the type of discussions that will most likely occur during the official jury meetings.

4.9 EXAM CONDUCTION

4.9.1 VENUE

The experimental examination took place across 14 laboratories in the HCI building of the ETH Hönggerberg campus. The theoretical examination was held in the HIL building, across four halls that are usually used for conducting university exams. A custom Python script, called the icholocator,[2] was used to allocate seats to students in both exams, considering geographical proximity, mutual intelligibility of widely spoken languages, and other factors. To simplify the logistics of conducting students from the breakfast area to their exam venues, all students were split into 16 groups. Each group was assigned two team guides, who lead the students from the assembly points, shown below, to the exam venues. The guides were briefed two days before the opening ceremony, instructed on the order of departure, and shown the route they should follow.

Assembly points in the foyer and in front of HPH

4.9.2 EXPERIMENTAL EXAM DAY

The schedule for the day was as follows:

06.30	Buses depart from hotel
07.00 – 08.15	Breakfast at ETH Hönggerberg
08.15	The 8 groups in set A leave for the exam venue
08.25	The 8 groups in set B leave for the exam venue
08.45 – 14.00	Exams

The envelopes with exam printouts, pre-sorted into the 16 groups, were collected from the Print and Publish centre and subsequently distributed by the supervisors (one from each lab). The same supervisors returned the filled printouts to Print and Publish after the exam.
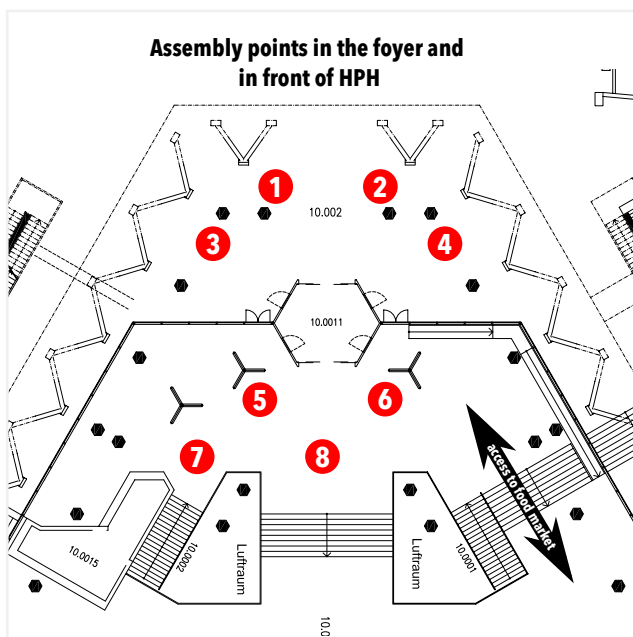
The students assembled at the designated areas on time, in accordance with the laboratory number printed on their badge. The departure of the different groups was coordinated by a team guide with a megaphone. Upon arrival, it transpired that laboratory numbers on the badges were printed incorrectly, and the students had to be rerouted to the correct venues, causing a 30-minute delay.

Writing equipment was provided, and snacks were available in designated areas outside the labs. The students had to bring the calculators, lab coats, and goggles they received on arrival to the hotel. Each student was supplied with four colour-coded non-verbal communication card to signal if they wanted to leave the room, needed technical assistance, had a medical emergency or wanted to consult the official English version of the exam (all explained in the General Instructions). No major incidents occurred during the exam.

Set A 08:10 - 08:15	Practical 19.07.	Finger	Theory 21.07.		Set B 08:15 - 08:20	Practical 19.07.	Finger	Theory 21.07.
①	HCI E374	3	HIL G61, Gp. I		①	HCI J194-2	1	HIL G61, Gp. IX
②	HCI G194-2	2	HIL G75, Gp. II		②	HCI E394-1	3	HIL G75, Gp. X
③	HCI J198-2	1	HIL F61, Gp. III		③	HCI C191-3	2	HIL F61, Gp. XI
④	HCI E376-1	3	HIL F75, Gp. IV		④	HCI J192-2	1	HIL F75, Gp. XII
⑤	HCI C191-4	2	HIL G61, Gp. V		⑤	HCI E376-2	3	HIL G61, Gp. XIII
⑥	HCI J196-2	1	HIL G75, Gp. VI		⑥	HCI G196-2	2	HIL G75, Gp. XIV
⑦	HCI E392	3	HIL F61, Gp. VII		⑦	HCI J190-2	1	HIL F61, Gp. XV
⑧	HCI G198-2	2	HIL F75, Gp. VIII		⑧	HCI E394-2	3	HIL F75, Gp. XVI

4.9.3 THEORY EXAM DAY

The schedule for the day was the same as during the practical, except that the theoretical exam runtime was 15 minutes shorter, as there was no specially designated reading time.

We followed a similar procedure for conducting students to their designated seats with some important modifications:
- students were told to disregard the information on their badges and instructed on their correct group by their team guide
- team guides leading students to the exam venues were supplied with lists of student codes comprising their group

All went as intended, and we could proceed according to schedule. As before, writing equipment was provided, and snacks were available in designated areas outside the examination halls. The students had to bring the calculators received on arrival. They were also allowed to bring their IChO water bottles. This time, the students received three non-verbal communication cards to signal if they wanted to leave the room, needed to consult the official English version of the exam or wanted their water bottle refilled. Every group (ca. 20 students) was assigned a "fixed" supervisor to monitor their conduct. An additional four "nomadic" supervisors moved between rooms, to ensure that at least two supervisors remained in a room at any given time. The need for extra supervisors was communicated via a Telegram channel. Any additional queries relating to the exam were communicated through the same channel and monitored by the lead of exams.

CHALLENGES

- Some students found it hard to follow verbal directions on which groups were up for departure.

- The misprint of the practical venues on student badges caused a considerable delay and major stress to the organisers and volunteers.

- Some examination sheets, chiefly for languages written right-to-left, contained unusable sheets due to typesetting issues.

RECOMMENDATIONS

- For conduction to exam venues, ensure that the team guides are provided with checklists to verify that the correct students are joining their groups.

- Issue the team guides leading each group with a sign clearly showing the group number.

- Avoid printing venue information on badges unless this information is cross-checked with the internal database.

- Brief the supervisors on how to assist students upon arrival and departure, set out a procedure for how the students should be accompanied on toilet and snack breaks, and instruct them to ensure that the students adhere to the General Instructions, including placing all printed material back into the envelope provided.

- Have enough copies of the official English version to provide students with substitute question sheets if their own are unreadable.

- If any issues arise with the QR-coded answer sheets, document these immediately during the exam.

- Have someone familiar with the rules of the Olympiad respond to the queries from the supervisors via a messaging platform. The same person(s) could be in charge of logging the issues with answer sheets.

4.10 MARKING

The marking of the practical exam could only be done with the help of many volunteers. The practical problems in parts had a lot of follow-up analytical work (GC & NMR) that required sample preparation and processing.

The marking of the theoretical questions was mainly done by the respective author teams themselves (since they knew their problems the best) and additionally by a small pool of volunteers who were briefed for the specific marking task by the respective author team. Author teams could indicate if they wanted to receive a reprint of the scanned answer sheets (marking on paper) or if they preferred to mark the answers purely digitally. After a general briefing of all author teams, the continuous rollout of reprinted answer sheets was delivered to a central location where it was picked up. For the teams marking on paper, a suitable file-storage system was conceived, where the papers could easily be sorted by delegation and therefore also easily found for the arbitration.

CHALLENGES

- Marking had to be done under a very tight time schedule (e.g. the results for the theory exam were expected by the next day).

- Analytics of the practical examination was a big workload due to the necessary sample preparation and was strongly dependent on the smooth running of machines.

RECOMMENDATION

- Put emphasis on the aspects of quick and unambiguous marking already during the exam design!

4.11 ARBITRATION

As the markers might make mistakes when working under time pressure, IChO offers the option of arbitration to the mentors, where they can compare their own markings with the markings provided by the markers and discuss possible differences.

For this, a full day was allocated with the problem author teams present and nine one-hour sessions during which the mentors could wander through the desks and discuss possible adaptations with the authors. To lead the session and make sure that the delegation did not surpass their one-hour slots, a professor was given the lead, to have someone everyone will surely respect.

Since for some delegations one hour was not enough in the late evening an extra hour was offered for the few delegations that requested more time. After this, a hard deadline had to be set.
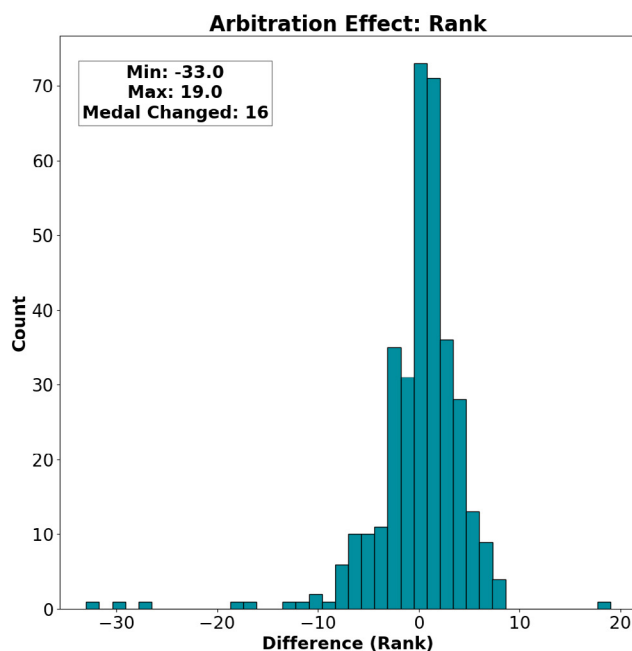
CHALLENGE

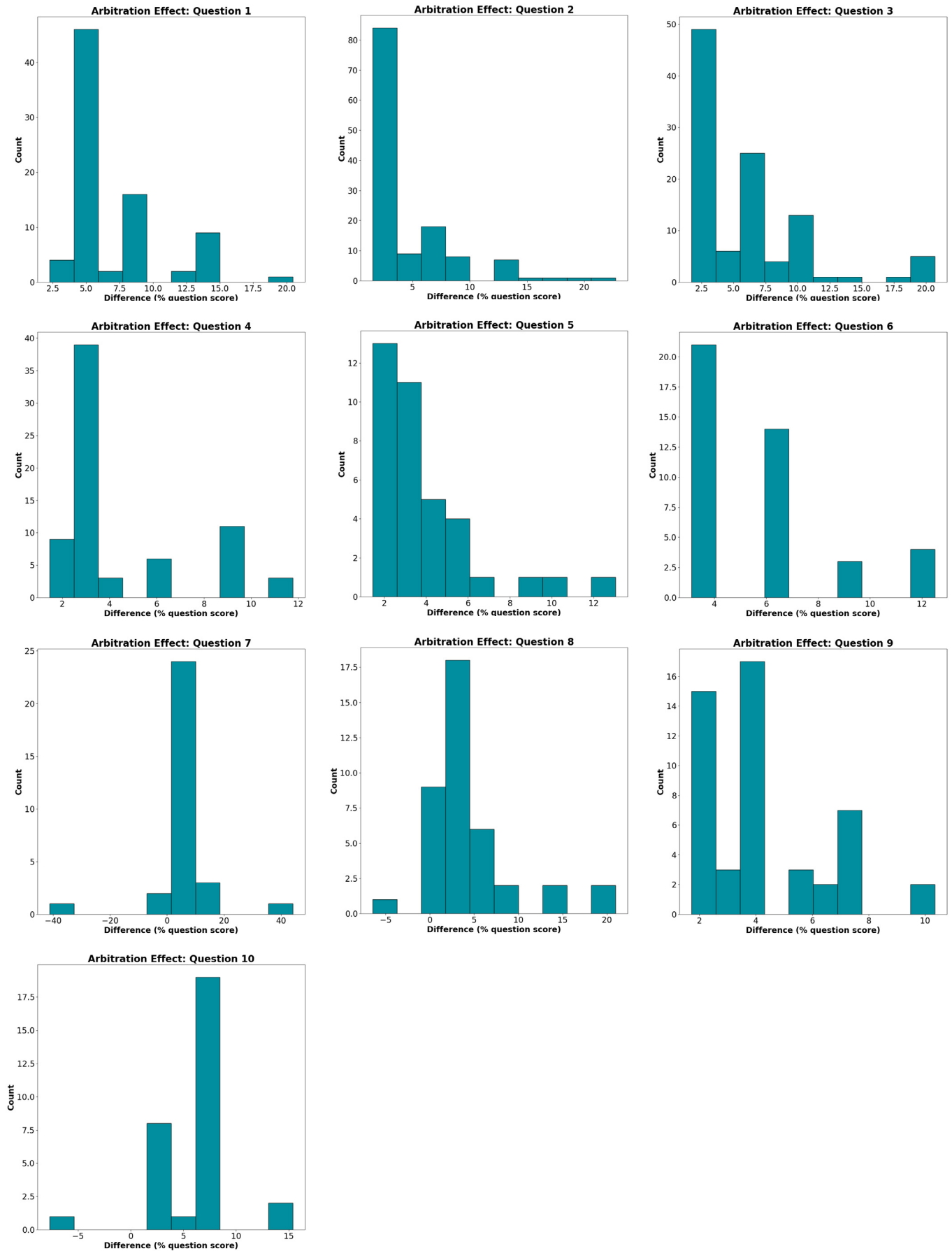• Find an authoritative person to be present during the whole session.

RECOMMENDATIONS

• Brief the authors to mark lightly but stand their ground during arbitration.

• Get the delegations to sign off the final marks as soon as possible.

STATISTICS ON THE RANKING

Arbitration Effect: Rank

Min: -33.0
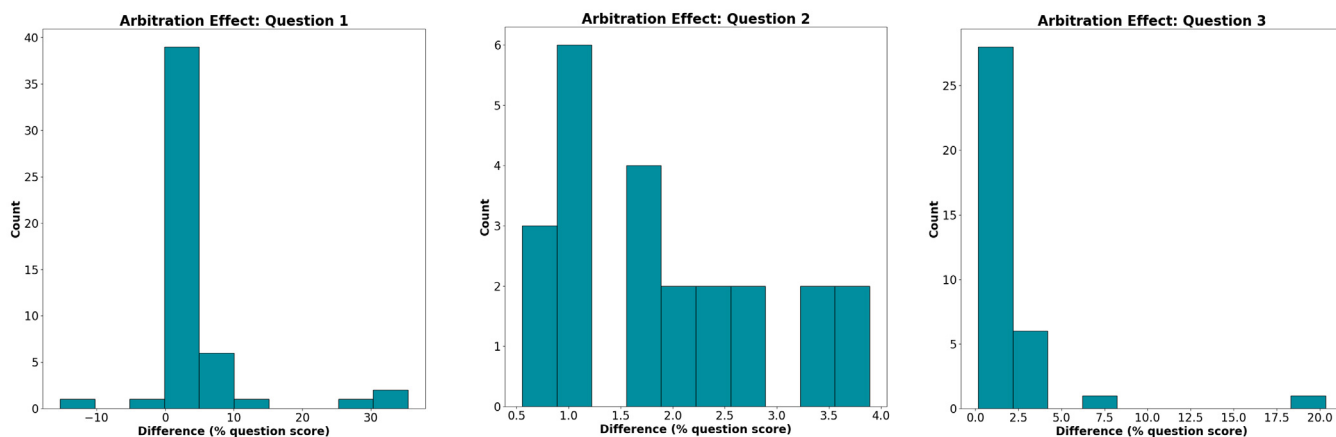Max: 19.0
Medal Changed: 16

The above plot shows how the ranking has changed from the official organiser marks before arbitration to the final marks after the arbitration discussion. Note that most ranks only changed by a bit, however, there are some extreme cases. As a total of 16 medals have changed, one can deduce the arbitration session was in fact important.

BY QUESTION: THEORY

Arbitration Effect: Question 1

Arbitration Effect: Question 2

Arbitration Effect: Question 3

Arbitration Effect: Question 4

Arbitration Effect: Question 5

Arbitration Effect: Question 6

Arbitration Effect: Question 7

Arbitration Effect: Question 8

Arbitration Effect: Question 9

Arbitration Effect: Question 10

BY QUESTION: PRACTICAL

Arbitration Effect: Question 1

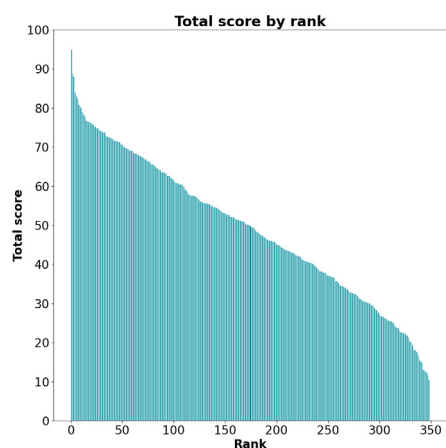Arbitration Effect: Question 2

Arbitration Effect: Question 3

## 4.12 EXAM RESULTS AND STATISTICS

As soon as all markings were accepted by the delegations, a CSV file with all marks could be exported from OlyExams. As many database queries need to be made, this can easily take up about 15 minutes. First the practical and theoretical exam markings were separated manually by opening the CSV file in Excel and saved in separate CSV files. These were evaluated using the scripts provided in our git: https://github.com/daniisler/icho2023, where the process is explained in detail.

If you wish to see the ranking, visit https://www.icho2023.ch/results.

OVERALL RESULTS

Total score by rank

Total score

How to read this graph: On the y-axis the weighted total score is listed. Rank 1 reached 94.8% of the possible score. The x-axis shows the distribution of the score down to the last rank 348, which achieved who scored 10.5% of the possible score.
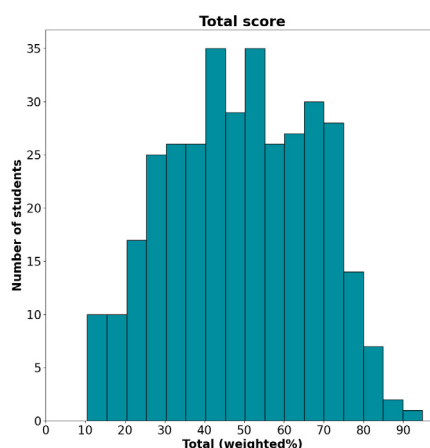
How to read this graph: The y-axis shows the number of students who have achieved the score indicated on the x-axis. We observe that a distribution over all scores was achieved, which shows the students could be well separated based on their performance.

MEDAL ALLOCATION

The medal allocation was done according to the procedure described in the IChO regulations: gold medal until the biggest point difference in the first 10–12%, silver until the biggest point difference in the next 20–22% and bronze medals until the biggest point difference in the next 30–32%. Honourable mentions were awarded until the biggest point difference in the first 70–71%.

The computed differences were:
- gold until rank 39 (72.35%)
  after which the point difference is -0.29%
- silver until rank 110 (59.87%)
  after which the point difference is -0.76%
- bronze until rank 217 (42.81%)
  after which the point difference is -0.44%
- honourable mention until rank 244 (38.08%)
  after which the point difference is -0.21%

Gold medals — Gold until rank 39

Bronze medals — Bronze until rank 217

Silver medals — Silver until rank 110

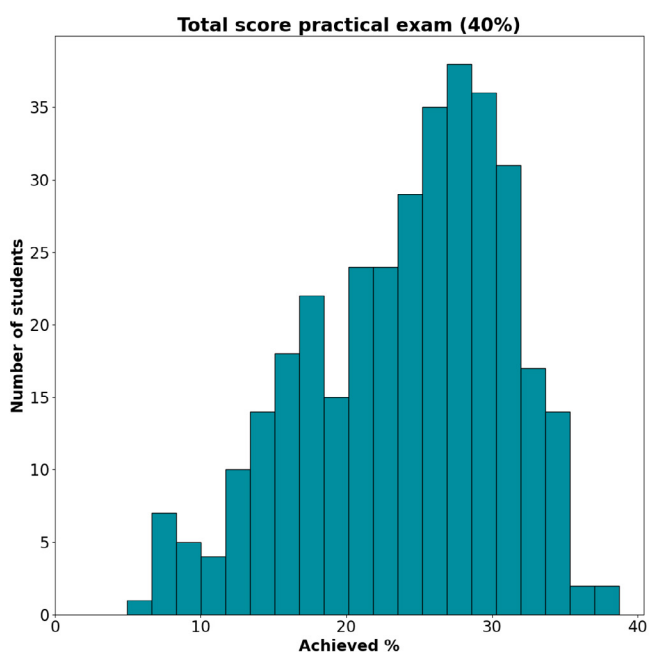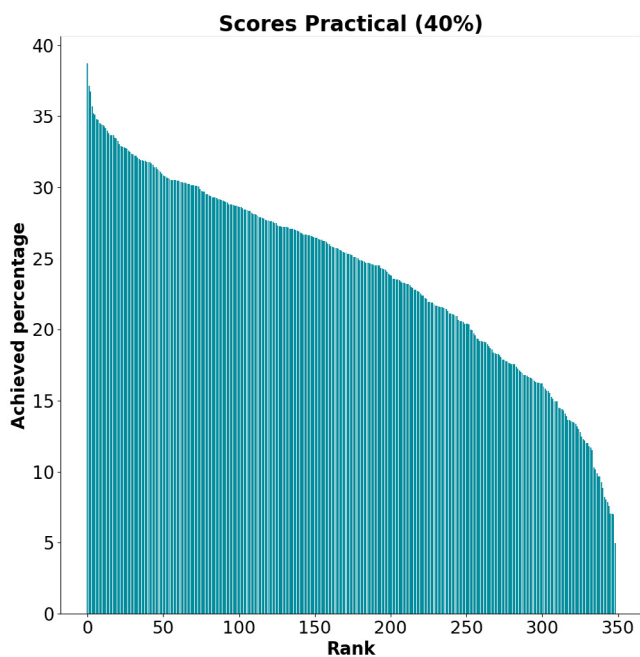Honorable mentions — Honorable mention until rank 244
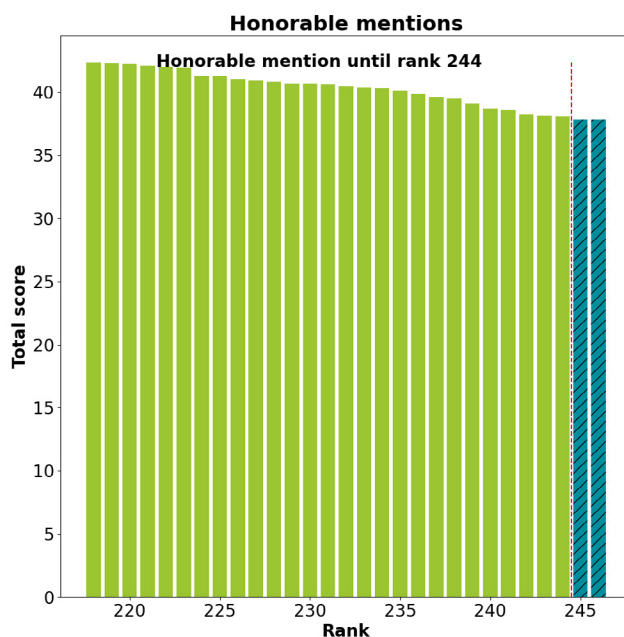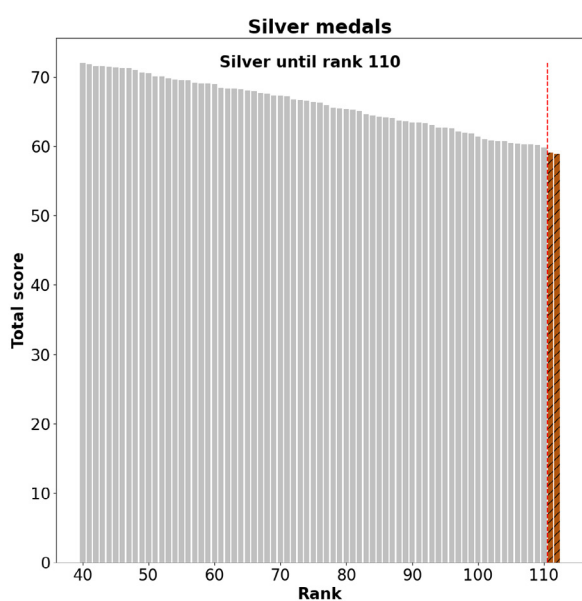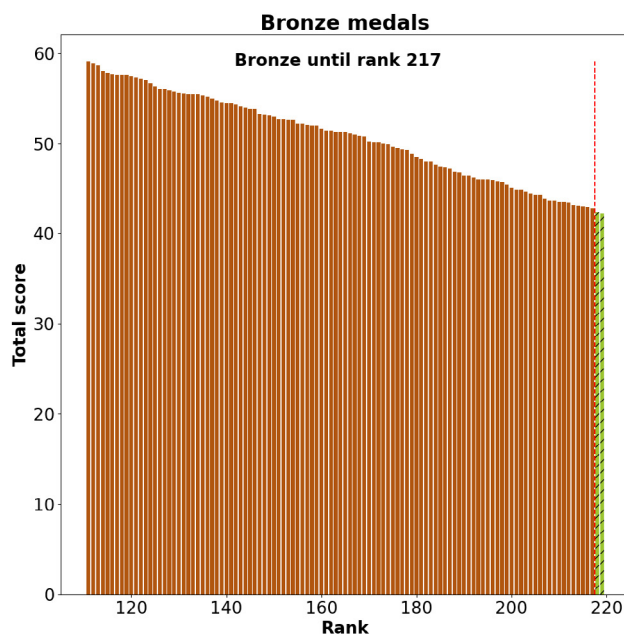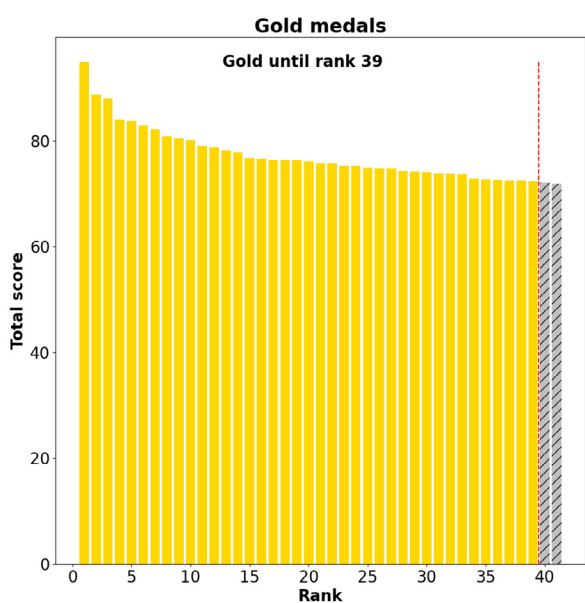
PRACTICAL EXAM

Mean: 24.0
Std: 6.8
Max: 38.7
Min: 5.0

How to read this graph: The maximum reachable score in the practical exam was 40% of the total score. The student on rank 1 achieved about 38.7% of all practical exam points. The student on rank 200 achieved about 23% of all theoretical exam points.

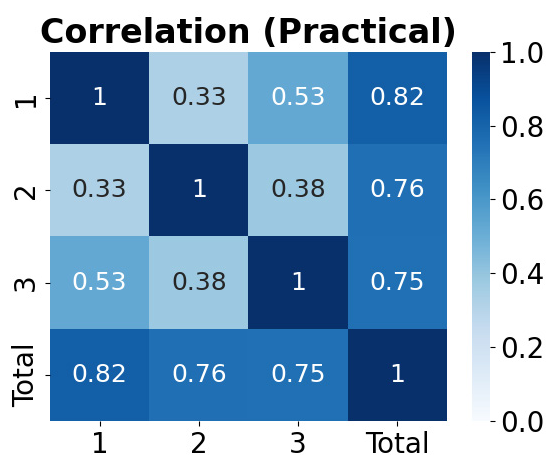## Achieved score per question
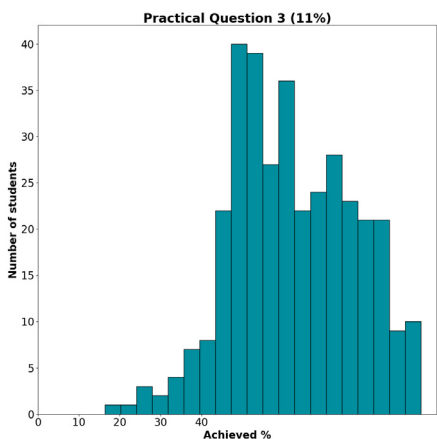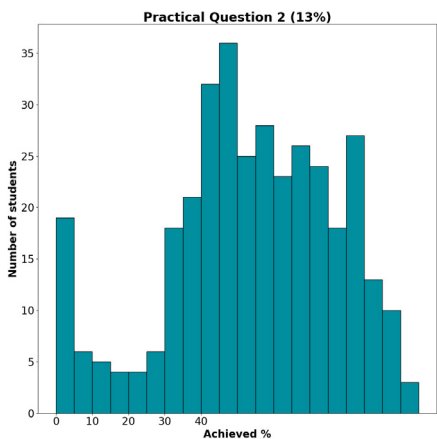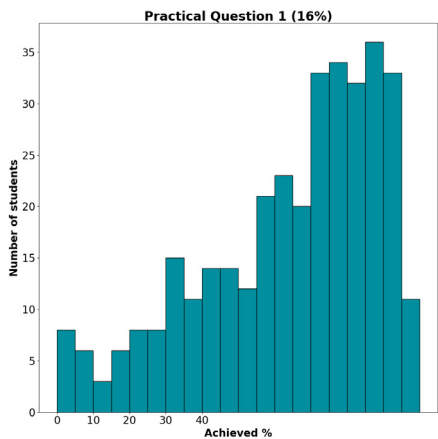
THEORETICAL EXAM

Mean: 25.1
Std: 12.7
Max: 56.1
Min: 2.4
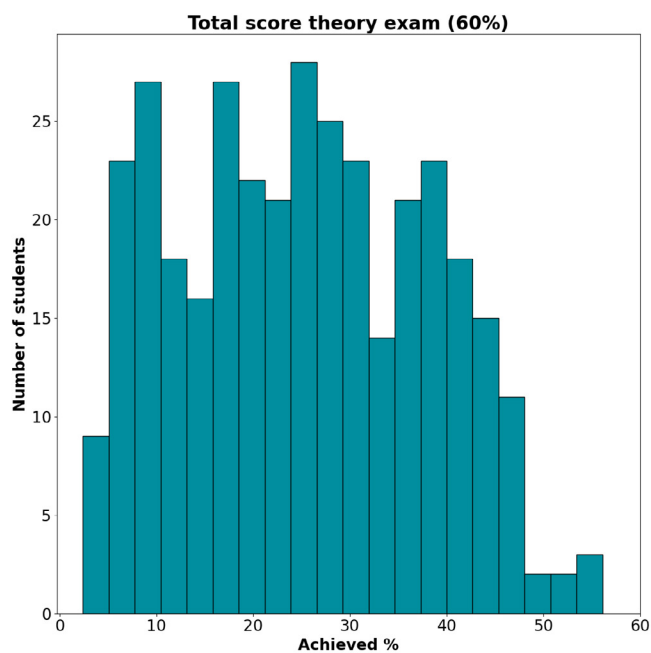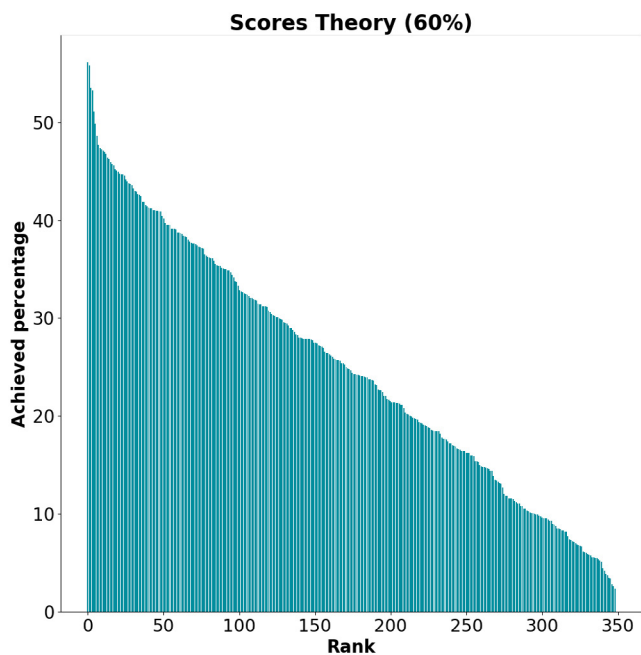
How to read this graph: The maximum reachable score in the theory exam was 60% of the total score. The student on rank 1 achieved about 56.1% of all theoretical exam points. The student on rank 200 achieved about 25% of all theoretical exam points.

Achieved score per question

Theory Question 1 (5%)

Theory Question 2 (5%)

Theory Question 3 (6%)

Theory Question 4 (6%)

Theory Question 5 (7%)

Theory Question 6 (7%)

Theory Question 7 (7%)

Theory Question 8 (5%)

Theory Question 9 (6%)

Theory Question 10 (6%)
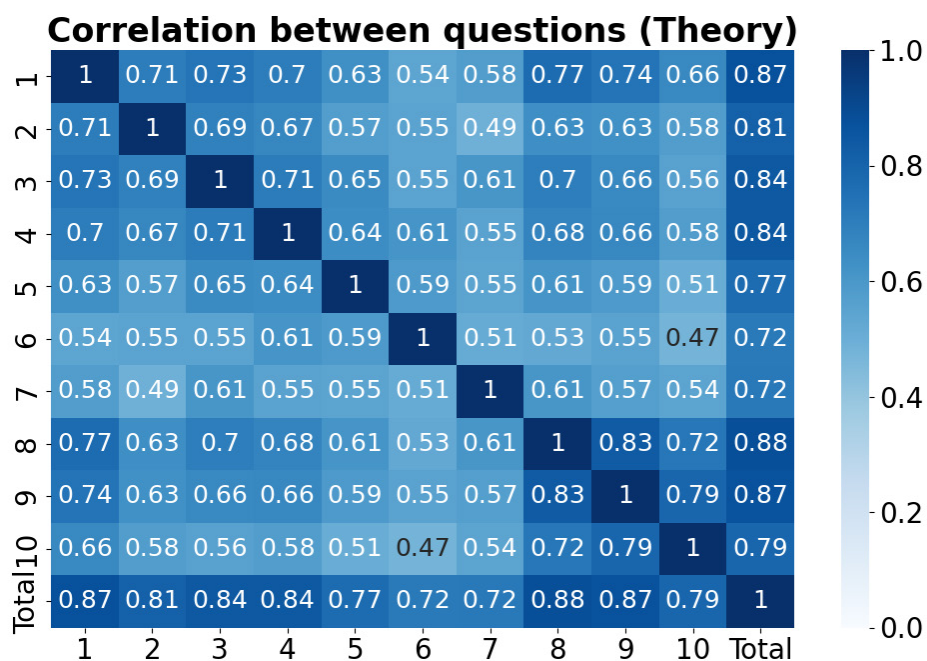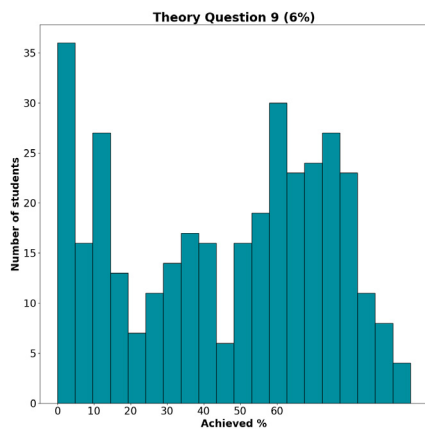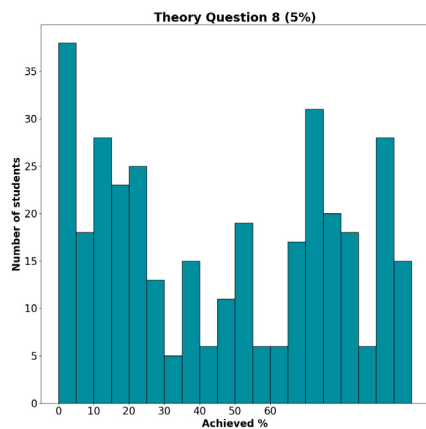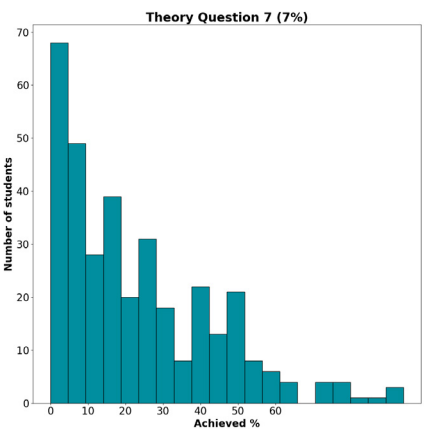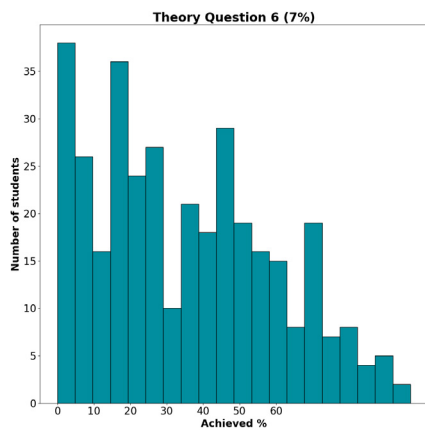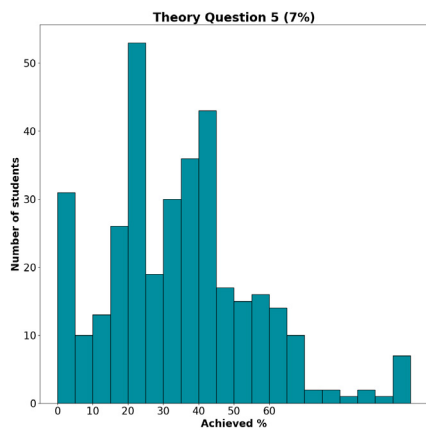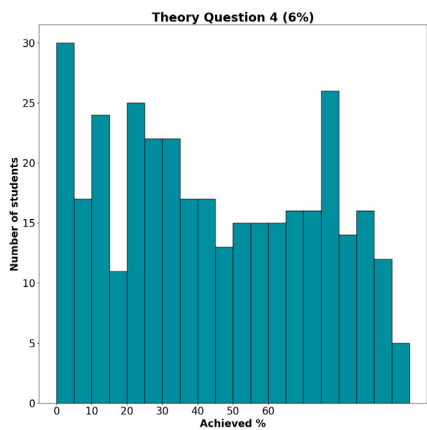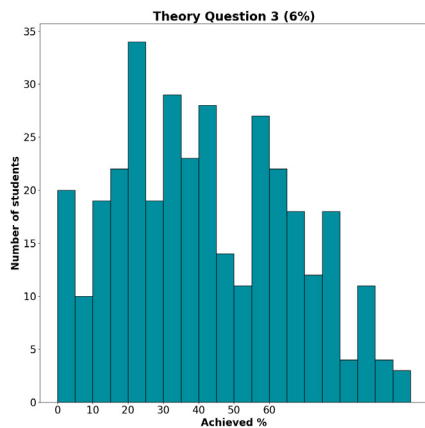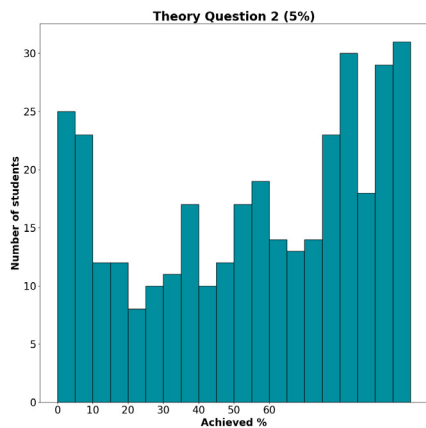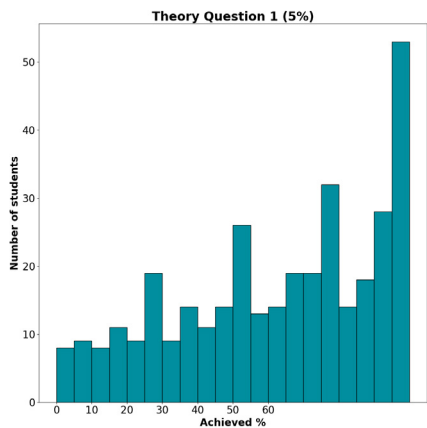
5 HOSPITALITY, EVENTS AND LOGISTICS

5.1 REGISTRATION AND ADMINISTRATION

For the event administration the same person in charge of volunteer management, the liaison between the Organising and the Scientific Committees, and the liaison manager to the delegations was mandated. This person from the Organising Committee was responsible for the following working packages in registration and administration domain:
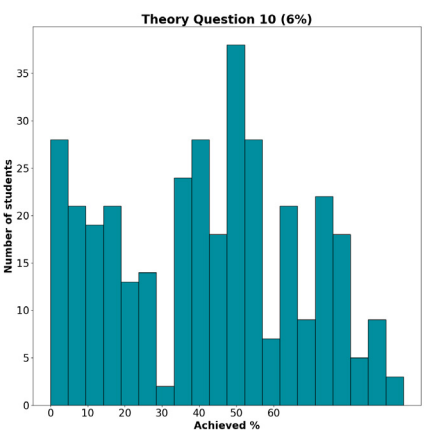
- Online and onsite registration
- Administration and handling of various requests and questions sent by email to info@icho2023.ch

For communication with the delegation and online registration, the following process and timelines were defined.

19 December 2023: The first circular letter with information on the official invitation letters, schedule for opening the registration platform and the publishing of the preparatory problems, reminder to obtain visas as soon as possible (that we kept repeating in each of the subsequent Circulars) was sent to all country coordinators (list available through the IChO Steering Committee).

25 January 2023: The second circular letter with information on registration and login for online registration, and the registration fees was sent. OlyExams was introduced as a translation, corrections, and discussion tool also for the preparatory problems that help onboard the mentors on the tool already at this stage. Delegations were asked to register the number of participating students, mentors, observers and guests, single room requests by the adults in the delegation plus the number of remote translators online by the end of May. Names and other personal details were not needed at this stage. For all the registered data by 31 March 2023 the delegations received a 5% discount as a token of appreciation.

20 March 2023: Reminder that the early bird registration closes at the end of March. This and the continued personal reminders to the delegations that did not register has prompted 87 delegations to register with an early bird discount. Further content was: motivations to the delegations to travel by land and provide information on the travels early, especially if they travel outside of the event dates, hotel booking support for early arrivals and departures, electric sockets in Switzerland.

18 May 2023: Reminder that the registration for delegations closes on May 31, reminder on the insurance policies, personal protective equipment, calculator type for IChO 2023, communication devices that would have to had been handed in.

16 June 2023: Proposed regulation changes by the Steering Committee, Telegram mentors group joining link (moderated as some delegations forwarded the links to the students, parents, etc.).

3 July 2023: Two separate documents, a students' and a mentors' circular were sent out. Some of the content included: public transport system in Zurich, arrival and departure logistics, what to pack, check-in time into hotels, policy on the friends and family in Zurich.

It was of the central importance that we collaborated with the State Secretariat for Migration (SEM) to ensure visas were delivered on time to all the countries concerned. This allowed us to quickly deliver visas to all the delegations with exception of Afghanistan, whose delegation was refused Schengen visa.

For the online registration a commercial solution (EventsAir) was chosen, a tool that is regularly used at ETH Zurich for events. Since the complexity of IChO 2023 is way beyond the typical conference ETH Zurich would organise, dozens of hours of programming were spent to deliver some of the functionalities that were needed by the Organising Committee. The format of the data export and the version control have proven to be major concerns that required a lot of manual control on the side of the Organising Committee.

The onsite registration of the adult delegation members in the mentors' hotel was organised in an organic way: the registration consisted of checking whether the arriving delegation has paid all fees, if that was positive, event accreditation badge was handed out. With the badge, the delegates could proceed to the registration desk of the hotel for check-in. The goodie bags and T-Shirts could be collected in a separate room nearby.

CHALLENGES

- The commercial solution that was used by ETH Zurich to manage the conferences was not flexible enough to reply to the rather complex demands for the registration for IChO 2023, requiring a lot of manual adjustments.

- IChO 2023 team has decided to offer participating countries time till the end of May to register the size of their delegation. This has led to some delays in overall event and hospitality planning. Early bird discount, however small, has allowed 87/90 of the delegations (including Afghanistan that did not get visas after all) to register before the end of March.

- It is of the central importance that the host knows the entry requirements for citizens of different countries. Be insistent on your help to those delegations where you assess any potential entry complications – it might be that the mentors are not aware and risk having the visas of their students not delivered on time.

RECOMMENDATIONS

- Keep using OlyExams as a translation, discussion, and corrections platform, and develop the integration with the open source registration platform available for all future hosts. It is a waste of resources if every year a new Organising Committee has to go through setting up a registration tool that fits the complex needs of an IChO.

- When setting up a registration tool of your own, try to anticipate which data you will need when and in which format (like what kind of file exports). Work from that goal backwards including as many details as needed.

- Communicate the financial support procedures by the Steering Committee early on to avoid any problems with the access to the financial support.

- Do not assume that by sending emails to the national contacts you are automatically reaching the right persons reading their emails. Try to keep track of which delegations are responsive and find other ways (e.g. Telegram, LinkedIn) reaching out to those who are not replying. Motivate the delegations to update their contact information with the IChO Steering Committee.

5.2 FEES AND INVOICING

The delegation participation fees are set mandatory to cover parts of the expenses like accommodation, catering, and excursions during the IChO 2023. All fees were due in Swiss Francs (CHF),and we preferred them paid preferably by bank transfer in advance. Credit card payment was also possible, but always cost 2–3% of fees. The delegation fee was set to CHF 2,750 which was equivalent to USD 3,000 per 19 January 2023 (as per agreement with the International Steering Committee).

To appreciate an early registration, we applied an early bird discount of 5% to the entire registration fee if the delegations registered the number of participants through the registration platform by 31 March (no names were needed at this stage) provided no changes to the numbers are done after this deadline.

Fees (in CHF)	Early bird fee Registered until 31 March	Regular fee Registered after 31 March
Delegation fee (up to four students, up to two mentors, including head Mentor)	2,615	2,750
Observer	1,425	1,500
Remote translator (translation and correction)	0	0
Guest	2,850	3,000

62 countries requested payment by invoice, 12 paid by card in advance, and the rest either brought cash to Zurich or paid some outstanding amounts by credit card onsite. Many delegations wanted the registration fees split in multiple transactions because of the variety of sponsors or individual payers.

We had to issue multiple reminders for the delegations about their payment situation that depended frequently on the local ministerial bureaucracies or sanctioned banking systems. Some delegations paid through their corresponding embassies.

CHALLENGES

- Despite attempts to collect the funds in advance, the organisers were still left with CHF 40,000 in cash that had to be processed.

- Get a plan ready for arrears in payments, also from the countries you would never expect. Insist of a last date by which the bank transfers can be made, and the wiring option should no longer be available (you do not want to deal with the proofs of transaction from all over the world).

RECOMMENDATIONS

- Set an expectation in communication that the delegations that did not have their registration fees paid will have the adults not getting the hotel room keys until the payment is successful.

- Communicate the registration fees early and fix them in the local currency. Define the currencies in which you would be accepting cash payments and if possible, fix the exchange rates already.

- Get prepared to issue a lot of variations of invoices and confirmations of transactions and provision yourself with a believable stamp for the countries that require those on their paper payment confirmations.

- Set the guest fee corresponding to the actual amount you are spending on the guest, including full administrative overheads.

5.3 PROGRAMME

There was a separate programme for students and the group of mentors, observers and guests. It covered the following overarching topics.

Discover Science and Innovation
- Discover ETH Zurich as well as the research institutes Empa, Eawag, and PSI
- Finding Solutions Fair (at ETH Zurich with partners, research groups, ETH spin-offs)
- Career Evening (panel discussion in two groups about career paths in chemistry)
- Reunion Event, University of Zurich (lab tours and science booths)

Discover Switzerland and Entrepreneurship
- Visit Metrohm AG as well as Lonza Group
- Finding Solutions Fair and Career Evening
- City Tours (Zurich, Bern, Lucerne)

Discover Culture and Nature
- Visit Mount Rigi and Mount Säntis
- Cities of Zurich, Bern, Lucerne
- Reunion Event, University of Zurich (local food, traditional music and instruments)

Additionally, there were some ideas offered in a document called "Options during free time" to students and the groups of mentors, observers, guests for free time they might encounter (incl. museums, city walks, trendy areas, views points, etc.).

The public transport pass every participant had on their badge was valid in the whole Canton of Zurich, so there was plenty to explore and see in and around the city of Zurich. Cogwheel trains within Zurich and the ships on the Limmat and Lake Zurich were also covered. There was a great interest of the team guides to show the delegations around in Zurich and have them make some lasting memories of their visit. Additionally, we offered some indoor and outdoor games and organised an open fire on the welcoming evening of the students.

Other than in previous years, no dedicated separate programme for the persons registered as guests was set up. We learnt from previous IChO organisers that often only a small fraction of this group showed up if a separate programme was organised. Therefore, and given the many things guests could discover in Zurich independently with the public transport pass and the document "Options during free time", a guest programme was not set up.

Before the programme officially started with the Opening Ceremony on Monday, all electronic devices from the students were collected by the organising committee to prevent the communication between the students and the group of mentors, observers and guests during the exam period.

Characteristics
- Overall, we planned with good and bad weather options for every situation, event, and excursion.
- Usage of public transport as much as possible to also showcase the excellent network of public transport in Switzerland and due to sustainable aspects.
- An optional programme offered ideas what to explore in Zurich.
- Consideration of the overarching themes in the programme planning allowed the participants to gain a good understanding and impression of Switzerland.
- Partners became involved directly into the programme (Finding Solutions Fair, Career Evening, company visits). Following our theme "Togetherness", this led to a high commitment and great collaboration with partners.

CHALLENGES

- Knowing late in the organising process, how many participants will attend IChO due to late registration deadline and incomplete registrations of many delegations.

- Collection of devices had to be limited to a certain time on the arrival day, which was challenging due to different arrival times of the delegations. The storage of the devices took a lot of space, we locked them up in a specific room. The collections should be planned well in advance.

- Creating an attractive programme within the financial limits and showing as much as possible without overdoing the programme.

- Ensure everyone and everything is on time, that there are no extra-long waiting times.

- For some programme points and for breakfast we had to split the student group into two groups (pre-assignment on badge). This lead at some days to dissatisfied teams.

RECOMMENDATIONS

- Explain the needs and compositions of the two main target groups carefully to the service and programme partners and make them aware of certain occurrences such as not exactly defined numbers of participants. Especially, keep in mind that the students are a target group of young, bright minded people from a lot of different cultures. Some are travelling for their first time. Consider most of them are very keen to learn as much as possible about the host country, take them as interested above average.

- Limit the planned programme especially on Monday and Tuesday before exams. Give both groups the opportunity to experience the city on their own, offering an attractive optional programme.

- Ask former participants about the attractiveness of your programme ideas and involve them into the organisation of the event.

- Recruit team guides with a good knowledge of the city and the host country in general to allow a great experience for your guests.

- A comprehensive and careful briefing of the programme support staff such as event volunteers and mentor guides is essential for a smooth running of the event. Success lies in the details.

- Try to ensure that the programme, including ceremonies, reunion events and excursions, follows a red line or a story (e.g., finding solutions, togetherness).

- Organising some extra side events like Finding Solutions Fair, Career Evening or "Discover ETH" was generating much more workload. Staff accordingly.

- Include local food and traditional music experiences in the programme.

DAY / DATE	STUDENTS		MENTORS / OBSERVERS	
Day 1 – Sunday, 16 July 2023	Arrival day: registration hotel check-in	Option: discover Zurich for early arrivals	Arrival day: registration hotel check-in	Option: discover Zurich for early arrivals
Day 2 – Monday, 17 July 2023	**OPENING CEREMONY**			
	Discover ETH and city of Zurich ETH Zurich and Chemistry / Molecular Science Discover the city of Zurich Finding Solutions Fair – chemistry and our partners		**Lab orientation ETH Hönggerberg**	
			Meeting with authors	
			First Jury meeting – discussion practical exams	
Day 3 – Tuesday, 18 July 2023			Translation practical exams	
	Lab security			
Day 4 – Wednesday, 19 July 2023	**PRACTICAL EXAMS**		Discover Science and Innovation Chemistry and Science at EMPA / Eawag	
	Free time in the afternoon			
	Career Evening – panel discussion		Second Jury meeting – discussion theoretical exams	
Day 5 – Thursday, 20 July 2023	Discover Science and Innovation Chemistry and Science at Paul Scherrer Institute (PSI)		Translation theoretical exams	
			Evening programme Zurich by night (boat trip)	
Day 6 – Friday, 21 July 2023	**THEORETICAL EXAMS**		**Discover Switzerland Entrepreneurship and Nature** Chemistry at Metrohm AG, Innovationspark Ost, Säntis	
	REUNION EVENT AND DINNER			
Day 7 – Saturday, 22 July 2023	**Discover Switzerland Entrepreneurship** Chemistry at Lonza Visp		Corrections	
			Free Time	
			Marking and third Jury meeting	
Day 8 – Sunday, 23 July 2023	**Discover Switzerland Culture and Nature** Rigi, Lucerne		Arbitration and fourth Jury meeting	
			Discover Zurich	
Day 9 – Monday, 24 July 2023	**Free Time with optional programme points in Zurich**			
	CLOSING CEREMONY AND FAREWELL DINNER			
Day 10 – Tuesday, 25 July 2023	Departure day			

5.4 CEREMONIES AND REUNION EVENT

OPENING CEREMONY

The Opening Ceremony was hosted by Prof. Helma Wennemers, an ETH Professor in Organic Chemistry. The opening speech was held by Prof. Günther Dissertori, Rector of ETH Zurich and President of IChO 2023. The moderation was accompanied by a comedy show contributed by Swiss entertainer and comedian Jane Mumford. We choose not to have any additional entertainment.

Following recommendations of former organisers, we kept the ceremony as short as possible, allowing not too many speakers and shorten the speaking time. In the Opening Ceremony the focus was clearly on welcoming all participants but also on calling for respect and tolerance among all delegations and everyone involved.

After the event, the mentors followed their schedule (lunch and lab inspections) while the students went to have lunch at ETH and in the afternoon joined the "Discover ETH" programme and explored Zurich by city tours. Unlike previous IChOs we did not offer a welcome lunch for students and mentors together given the tight schedules.

Characteristics
- The Opening Ceremony started on time. Duration of event was short (90 mins) without neglecting the formal aspects of an opening event.
- Speeches of a maximum of five minutes each, to keep the event entertaining.
- No big national flags were allowed, due to fire restrictions, but also to avoid an over-nationalistic ambiance. Instead, we provided each delegation with small flags.
- Delegations were presented using a drawing video in which country, country map and three typical icons (geographical, cultural, historical) were shown.
- Delegations were presented in a random order to keep the audience's attention. The host named each country and the students cheered and waved their flags.
- A fair-play act was held on stage by two students and Prof. Wendelin Stark of the host country. The act consisted of an oath underlining cheating awareness and respect for each other.

CHALLENGE

- Creating an entertaining, short ceremony where all guests could enjoy the presentations without skipping any formal aspects.

RECOMMENDATIONS

- Find a format to present the delegations in an entertaining way and in a short time frame.

- Limit the number of speeches and set a clear time frame for the speakers (we asked for the speeches in advance).

- Some participants might want to attend in traditional national attire, consider this in the planning of the following programme, as they might want to go back to the hotel to get changed.

- Introducing the countries and areas by showing a map, a flag or even the country/area name can be demanding due to political conflicts. Keep attention to this.

REUNION EVENT

The "Reunion Event" marked the end of the exams and was held by the University of Zurich. Just before the event, students got their electronic devices back. The programme of the evening was diverse, and there were some lab tours offered as well as science booths showing research at the University related to chemistry. Since this was the first occasion after exams for the groups of the students and mentors, observers, and guests to meet again, there was also time and space for gatherings. To allow to dive into a Swiss experience, entertainer and musician "Dr Eidgenoss" was hired to offer some traditional music (yodelling) and instruments such as Alphorn. Foodwise, traditional dishes were offered like Älplermagronen, Cervelat but also a fusion Burger with Rösti and Raclette cheese.

Characteristics
- The "Reunion Event" was held at the Irchel Campus, outside the building complex and inside the University Hall.
- Lab tours and a fair with booths allowed to dive into chemistry research at the University of Zurich.
- A Swiss experience was offered by providing some traditional music and local (fusion) food.
- Seating was available, but the event was set up to allow guests to move around and mingle, especially as this was the first time students and mentors had met since the Opening Ceremony.

CHALLENGES

- Due to limited time for the excursion for mentors, observers and guests on the same day, the day of the "Reunion Event" started early and was packed with a tight programme that didn't allow time to change clothes in the hotel between excursion, Jury Meeting, and "Reunion Event".

- Plan the reunion programme flexible enough and take into consideration that there is a jury meeting with undetermined length immediately prior to the event.

- Because the organisation of the event was done by the University of Zurich and an event agency, it was important to ensure that the event seamlessly aligns with the themes of "Finding Solutions" and "Togetherness" within the programme.

RECOMMENDATIONS

- Provide a setting with time to talk and interact; this is the first time students and mentors meet after the days of examination.

- Offer an entertaining and fun programme.

- If there are speeches, they should be short. Attention span can be very limited.

CLOSING CEREMONY AND FAREWELL DINNER

The Closing Ceremony took place in the Tonhalle, a historic concert hall in Zurich. It was followed by a farewell dinner that was organised in the adjoining Congress Hall Zurich. Four speeches were held during the Closing Ceremony, each a maximum of five minutes. After the first speech, a video summarising the past week was shown. The ceremony was framed by organ sounds played by Tobias Willi to incorporate and demonstrate the impressive organ of the Tonhalle. After awarding the gold medallists, "We are the Champions" was played on said organ.

Seating of students was organised in a way that participants could not figure out who won which kind of medal. It remained a surprise until participants were called to the stage by name. This had a more emotional effect on all but obviously was a challenge to organise.

Medal ceremony structure
- Honourable mentions (27 in total): names were projected alphabetically but not read out loud through the hosts; students did not enter the stage.
- Bronze (107): winners were called by name and country individually to the stage, at the same time their name was displayed on the screen. Bronze medallists remained on stage to take a photo at the end. Medals were handed over by Prof. Dissertori and Prof. Stark.
- Silver (71): winners were called by name and country individually to the stage, at the same time their name was displayed on the screen. Silver medallists remained on stage to take a photo at the end. Medals were handed over by Prof. Dissertori and Markus Steinke, Metrohm AG.
- Gold (39): winners entered the stage at the time their names and country were read, and the person called was given the medal. Gold medallists also received a periodic table with a personal signature of the president of IUPAC and after the ceremony also a smart watch offered by Huawei. Medals were handed over by Prof. Dissertori and Pierre-Alain Ruffieux, CEO Lonza Group and former IChO participant. Special attention was given to the top three gold medallists and the best overall winner (best overall, best theoretical, and practical exam which were combined in one student). Gold medal winners remained on stage during the distribution of special prizes.
- Special prizes (1): see above, the best overall, best theoretical, and best practical exam winner received a box of Swiss Chocolate.
- All award or participation certificates were distributed after the Closing Ceremony during the farewell dinner by a mentor guide to all head mentors.
- After the medal ceremony and more speeches, the handover to the organiser of IChO 2024, Saudi Arabia, followed. A representative held a short speech and showed their welcome video. The official IChO flag was handed over from the President IChO 2023 to Saudi Arabia.

CHALLENGES

- The goal was to streamline the award ceremony, keeping it as entertaining as possible and limiting it to a maximum of two hours.

- The huge number of awards (in total 217 medals and 27 honourable mentions) made the organisation of the event challenging.

RECOMMENDATIONS

- Find a format to present the medals and honourable mentions in an effective time frame and keep the format attractive for the audience while also allowing ample space to acknowledge everyone's achievement. We consider two hours the maximum for an event without intermission or catering.

- Reconsider the possibility of asking Honorable mentions to come on stage as well.

- The stage presence of the future organiser or any other guests should be planned well in advance.

- Order enough medals, as due to moderation of the results the number of medals needed will vary from year to year. We calculated the maximum percentage per category awarded in the past four on site IChO's and added some more to be on the safe side: 12% gold, 22% silver, 32% bronze, as percent of the total number of participants.

- Do not underestimate the workload between the final vote on the marks and the beginning of the medal ceremony. Certificates need to be prepared, medals arranged, and the final ranking must be printed, put in online format, and sent to various persons.

- Stream Opening and Closing Ceremony if the budget allows. Parents, mentors, professors, teachers, and friends at home like to watch live, especially the awarding.

- Having three different prices for the special categories. In this IChO, the same person won all three different categories and hence three times the same price.

5.5 EXCURSIONS

The various excursions showed our guests the beauty of Switzerland as well as a variety of institutions and organisations focusing on chemistry. The aim was to create an attractive programme around the exams.

CHALLENGES

- Finding the balance between must-have excursions and long bus tours or train rides.

- Finding excursion options where roughly 450 persons (students and team guides) could stay together at the same place at the same time was almost impossible. On almost all excursions, they had to be split into subgroups which ended up in more effort in the organisation.

- For such a big group of people, the interests are very diverse, find a way to offer a wide range of attractive programme points including free time options.

- Since the excursion programme was not compulsory for mentors, observers and guests, we had to estimate how many of them would attend the excursions, assuming that some would not show up (define a no-show rate).

- The visit to some research facilities was limited to 200 people and did not allow all mentors and observers to participate. In general, lab visits are asking for small groups which is an organisational challenge.

RECOMMENDATIONS

- Check excursions with local students, former participants or (senior) team guides for the attractiveness during the planning period.

- Be aware that when handling large groups, sufficient time is crucial.

- A detailed briefing in writing, and delivered orally, for all event volunteers and guides is important for the smooth running of processes and adequate support onsite.

- Take the time to work out a good, trustworthy, and respectful relationship with your partners and service providers. Make sure they understand the target groups. Communicate clearly and reliably.

- If possible, plan enough free time for students beside the excursions, e.g., for shopping, to explore the city with their team guides, or to just relax in a park.

5.6   TRANSPORTATION

During the IChO 2023, students, mentors, observers, guests and volunteers had to be transported.

There was a differentiation made between transportation within the city of Zurich and transportation outside of Zurich (excursions).

IN ZURICH – PUBLIC TRANSPORT

Public transport in Zurich offers a safe, efficient and environmentally friendly way to navigate within the city and its surroundings. With a well-developed network of trams, buses, and S-Bahn trains, transportation options are reliable and available at short intervals. All participants and staff at IChO 2023 received a public transport pass valid for the Canton of Zurich. With this pass everyone could easily reach all event venues like the hotels,, ETH Zurich (both campuses), venues for Opening and Closing Ceremony as well as the "Reunion Event". It even allowed to explore much more than the city area. There was only one exception: on exam days, students were transferred by organised coaches from a private company to avoid potential delays and to start the exams on time.

Team guides accompanied the students and mentor guides offered accompanied transfers to groups of mentors, observers and guests, but the latter group could also choose to move freely around Zurich and find their way independently.

Guests were impressed how punctual and reliable public transport is in Switzerland.

OUTSIDE OF ZURICH – COACHES AND TRAIN

For all excursions outside of Zurich, coaches were hired to transport the participants. The students did one excursion by train, with a special train rented for the occasion.

As the programme for the students was mandatory, calculating the number of people and the effective need for hired busses was no challenge. Thanks to the great commitment of the team guides and the help of the students, the departure of the buses and even the train was on time.

The mentor, observer and guest programme on the other hand was not mandatory. It was difficult to predict effective numbers of participants for each excursion and to plan accordingly. As transportation was one of the critical issues, we always planned capacity for all mentors, observers and guests. Although punctuality was an issue for some participants, the majority was on time and excursions could leave the hotel as planned.

ARRIVAL AND DEPARTURE DAY

For transportation on arrival and departure day, please see the respective chapter of this report.

EVENT LOGISTICS

We rented three cars over the course of 10 days to facilitate the transportation of materials, documents, and individuals. Additionally, we also used taxis. The vehicles were used for both pre-scheduled transportation and unforeseen requests. We did not have a dedicated transport coordinator.

CHALLENGES

- Calculating travel times and setting departure times has sometimes proven to be tricky regarding unpredictable variables such as efficiency when boarding or traffic.

- Parking and waiting space for coaches can be scarce. It is recommended to define these spaces in advance in close cooperation with the bus company.

- Communication with each individual bus driver proved to be difficult in some instances.

RECOMMENDATIONS

- Delegations were not assigned to a specific bus. Boarding without pre-defined buses has proven to be highly efficient, ensuring that punctual individuals are not penalised due to latecomers.

- We only accepted full delegations of students when boarding the coaches. This simplified and accelerated the verification process.

- Have a dedicated coordinator for the coaches. Communication with only one person is easier, and communication with the bus drivers is best to be done by a dedicated person from the service partner.

- If possible, make use of public transportation as it allows the participants to freely move around the city.

5.7 ARRIVALS AND DEPARTURES

All delegations were requested to provide arrival and departure information during the online registration process. The deadline for the provision of these data was set to 16 June, a month before the start of IChO 2023. However, only 60% of delegations did provide the travel details by the deadline set. Approximately 90% of all travel data was available by the end of June. Many delays were caused by long waiting times for passports, visa or governmental travel planning.

Pick-up services were provided on the arrival day, 16 July, and drop-off services were provided on the departure day, 25 July until 3 p.m. For delegations arriving before 16 July, public transport tickets also covering the airport and all of Zurich were sent by email as an extra service.

ARRIVAL PROCESS

Each delegation could either be picked up at Zurich Airport or Zurich main station on 16 July.

Airport: after collecting their luggage at Zurich Airport, delegations were asked to go to the IChO 2023 welcome desk, located in the arrivals' hall of terminal 2 (Arrival 2). For all delegations with registered travel details, the team guide welcomed the team when entering the arrivals' hall (terminal 1 and 2) after customs clearance and accompanied the delegation to the welcome desk.

Shuttle buses ran between the airport and the mentors' hotel for mentors, observers, and guests, bringing them directly to the registration office at the hotel. Students received their badge including the public transport pass at the airport and accompanied by a team guide, travelled to the students' hotel by public transport.

During the waiting time for the next shuttle bus, mentors, observers, and guests were offered a coffee and something to eat. Shuttle bus times were optimised according to arrival times, the waiting times were set to a maximum of 45 minutes.

Main Station: the ten delegations arriving by train were asked to walk along the platform to the main hall of the station where a team guide would be waiting to welcome the delegation. The official meeting point was communicated as another point of reference.

After handing out the badges incl. the public transport pass, transfer to the hotel was done by tram, accompanied by a team guide (students) or a mentor guide (mentors, observers, guests).

Early arrivals: for the delegations arriving before 16 July, a meeting point and time was arranged for the team guides to meet the students. This could be the student or mentor hotel or another place within the Zurich area defined by the delegation.

Statistics:
- 62 delegations arrived at the airport.
- 10 delegations arrived by train.
- 11 special cases (individual arrival) were picked up at the airport.
- 14 delegations arrived before 16 July.

DEPARTURE PROCESS

Assistance for the departure by the organising committee was available on 25 July until 3 p.m. After 3 p.m. latest, it was the mentors' responsibility to take care of their students. The provided public transport tickets were valid until the end of the day.

Airport: airport shuttle buses ran from the mentors' hotel via the students' hotel to Zurich Airport regularly until 3 p.m, depending on the departure times registered. The entire delegation, including students, travelled together to the airport. Shuttle times were communicated through the team guides and Telegram mentor channel accordingly.

Main station: delegations travelled to the main station by public transport. Students were accompanied by the team guide.

Statistics:
- 69 delegations departed from the airport.
- 11 delegations departed by train.
- 9 special cases (individual departure) were taken to the airport.
- 8 delegations departed after 25 July.

CHALLENGES

- A lot of delegations failed to meet the final deadline for providing their arrival and departure details. In addition, changes at very short notice and misleading information also caused many individual and time-consuming clarifications by email or during the IChO itself.

- Registration was set up in a way that only one arrival and departure information per delegation could be registered. This led to individual communication and enquiries with all delegations that did not arrive on the same plane (about 15 cases).

- The high number of early arrivals caused a reduced workload for pick-up services but increased the individual communication and enquiries for meeting points on the arrival day.

RECOMMENDATIONS

- The registration form should offer the possibility to enter travel details for all participants either by copying the data entered (if identical for the delegation) or by entering individual travel details per person. A concise arrival and departure report would reduce the number of individual enquiries.

- Working with shuttle buses has proven to be useful. However, flexibility due to late arrivals and longer customs clearance must be taken into consideration.

- Have the general concept ready but start with the detailed planning as late as possible. The IChO Organising Committee received additional support by an ETH Zurich staff during the final three weeks before the arrival day, taking care of the detailed planning.

5.8 ACCOMMODATION

Switzerland has only a small number of student dorms belonging to universities. While other hosts of IChOs can use such dorms to accommodate their guests, in Zurich hotels were the only option. It was the organisers' objective from the beginning to book only two hotels: one for the students and team guides (as well as some staff from the Organising Committee) and one for mentors, observers, guests and Scientific/Organising Committee staff and volunteers.

With the Crowne Plaza hotel and the aja hotel chosen as accommodation venues, this goal was achieved – in a small and expensive city like Zurich not an easy task. The two hotels were in the same region of the city, approximately 3 km apart.

Criteria for the selection were:
- Number of rooms
- Number and availability of twin-bedded rooms
- Size of meeting room facilities for mentor hotel
- Room rates because of limited budget
- Cancellation conditions
- Catering possibilities
- Distance of the two hotels

For all students, accommodation in twin rooms was planned. Mentors, observers, and guests could choose between shared and single rooms. However, for single rooms an extra fee was charged (CHF 600).

Rooms were allocated according to the following criteria:
- Explicit room share request stated in the registration tool
- By gender and within delegation
- When mixing delegations: by gender and by language/culture

Meeting rooms in the hotels

In the student hotel, a meeting facility the "aja club" was booked for the students to mingle and have a place to meet. However, because the club was located directly below an apartment, it could not be used after 10 p.m. to avoid noise complaints from the neighbours.

In the mentor hotel, the main meeting room was used for all Jury meetings, translations, corrections, and arbitrations.

In the hotel's workshop centre, an additional six meeting rooms (varying from 25 to 60 m² in size) were booked as office facilities, registration office, meeting rooms as well as for the "Meet the author"-meetings. Another room was reserved for social gatherings and as an additional catering break-out option for the hotel. However, thanks to the spacious lobby, terrace, bar and restaurant spaces in the hotel, this back-up was not used.

For early arrivals (before the arrival day of 16 July) and late departures (after the departure day of 25 July), spe-cial rates in the students' and mentors' hotel could be arranged. Contact details were provided to the delegations, and the booking was done by each delegation directly with the hotel.

One to two spare rooms were kept throughout the entire period in both hotels to be prepared for illness, change requests or short-notice single room requests.

The following numbers of rooms per day and hotel were needed.

Room night bookings in mentor, observer, guest hotel

Mentors, observers, guests, scientific volunteers, staff	12.07.	13.07.	14.07.	15.07.	16.07.	17.07.	18.07.	19.07.	20.07.	21.07.	22.07	23.07	24.07.
Single room	11	13	16	20	82	85	83	82	83	84	85	83	83
Double / Twin room			2	3	107	107	110	113	113	112	111	111	108
Total	**11**	**13**	**18**	**23**	**189**	**192**	**193**	**195**	**196**	**196**	**196**	**194**	**191**

Room night bookings in student hotel

Students, event and communication volunteers, team guides, staff	12.07.	13.07.	14.07.	15.07.	16.07.	17.07.	18.07.	19.07.	20.07.	21.07.	22.07	23.07	24.07.
Single room			5	9	11	11	11	11	11	11	11	11	10
Double / Twin room			1	46	218	218	218	218	218	218	218	218	217
Total	**0**	**0**	**6**	**55**	**229**	**229**	**229**	**229**	**229**	**229**	**229**	**229**	**227**

CHALLENGES

- Data in the registration system was not available for an automated rooming list. This led to an enormous work-load and a manual data sorting process. Due to the late registration and data entry deadline, final numbers with regards to hotel room needs could only be communicated shortly before the event. Late cancellation deadlines proved to be very helpful.

- Besides single room requests, there were some family room requests as well as people arriving with the family without prior notice. This led to administrative efforts in calculating and invoicing room rates as well as commu-nication.

- As the student hotel was not booked exclusively, the or-ganising team experienced quite a few complaints on noise from other guests and residents alike. The vast ma-jority of students complied with the rules and the Orga-nising Committee would like to express its gratitude to all students who did. For the last night, a security service was booked to prevent further complaints.

- Space in the students' hotel proved to be an issue. Meals had to be taken in shifts, and the breakfast before the exam was outsourced to the university canteen. There was no place for the students to be together in late hours.

RECOMMENDATIONS

- One hotel per target group proved to be very useful and decreased handling efforts.

- Arranging for special rates for the early arrivals and late departures without taking on the booking and invoicing procedure, is a recommended way to manage these special requests.

- Try to organise a meeting room for the students to spend the evenings together without paying too much attention to residents and other guests. Noise (within normal range) should be possible.

- If possible, chose a student hotel with large enough catering and office facilities. Although considerably less meeting room space is needed compared to the mentors' hotel for work related tasks, some extra rooms to spend free time would have made the time at the hotel a bit more relaxing for both students and organisers.

- Book spacious hotel rooms so that sharing a room for 10 days is comfortable.

5.9   FOOD AND BEVERAGES

FOOD

The following general requirements with regards to catering were defined:
- Buffet style catering, whenever possible, with a variety of dishes to choose from.
- The selection should always include a gluten- and lactose-free alternative. Caterers to refrain from using the most common allergens (nuts, etc.).
- In general – no food with alcohol or pork.
- Inclusion of Swiss specialities and dishes to taste local cuisine.
- All dishes had to be labelled, at least in English. Allergens had to be clearly labelled. This applied to all meals, including breakfast, snacks, and coffee breaks. If this was not possible (e.g., flying buffet), a list of dishes and allergens were available.

Food was offered starting with lunch on the arrival day, ending with a breakfast/lunch bag on the departure day.

Breakfast was included in the hotels. As the student hotel did not have the capacity to cater for all students at once, the breakfast on exam days was organised in the university canteen.

For the mentors, observers, and guests, most meals were offered at the hotel. For students, most meals were taken at the ETH Zurich canteens. The university's caterer has experience with culinary diversity due to the international students, offered budget-friendly prices and the facilities to cater for a group of 450 in a relatively short time frame.

Student programme only: communication on menus and allergens was done through the team guide briefings one day in advance, so that all students knew what was on offer and what food they could eat. This reduced waiting times and made the selection for special food requirements easier.

Student programme only: typical Swiss snacks were on offer almost every day. Students and team guides could grab some snacks for excursions and free time. By offering these snacks, also students who did not like one meal had something to eat. Having a supermarket close by and some take-away food in close distance, we noticed that some students bought their own food.

BEVERAGES

Switzerland is famous for its high water quality and drinkable tap water. Every participant received an IChO-branded aluminium water bottle to refill daily. In the mentor hotel, water dispenser were organised to provide water as the main source of drink. It was part of the Organising Committee's sustainability strategy to minimise PET waste and to promote water as the number one healthy drink. Students and mentors alike did value the quality of Swiss water and got used to carrying around their personal water bottle.

In some special cases, iced tea and other drinks were offered.

Alcohol: For students, alcohol was served only at the farewell dinner (beer, white and red wine). Wristbands were provided to all students above 16, the legal drinking age in Switzerland. The also present mentors were informed and made sure the laws and cultural rules of the respective homelands were respected.

Upon registration at the beginning of IChO 2023, mentors, observers, and guests were given vouchers for the hotel restaurant and bar. Vouchers could be redeemed for a glass of wine, beer, or a soft drink. For the whole period, 15 vouchers per person were offered making budgeting easier.

CHALLENGES

- Food and beverages are expensive in Switzerland. The Organising Committee had to plan very carefully finding creative solutions how to minimise costs without compromising the guest experience.

- Expectation management: halal was originally planned as vegetarian catering. Due to initial feedback from the participants, we organised halal meat for four meals plus one lunch bag for students and increased the amount of fish meals for mentors. This effort was very positively received but did cause a lot of efforts onsite.

- Food requirements of participants were registered in the database. Data quality and completeness of data is to be questioned as some requests were only communicated onsite. This could be due to the fact that often only one person (i.e., head mentor) fills in the registration for all delegation members, potentially lacking the information on some persons. In general, it can be noted, that catering for special requests was time-consuming and costly.

RECOMMENDATIONS

- Ask for preferences in the registration process but communicate clearly what is possible and what not.

- Go for buffet-style catering with a broad range to meet various food preferences. Try to avoid the most common allergens.

- In case you plan to offer lunch/dinner bags for excursions: to make logistics easier, offer vegetarian lunch/dinner bags for everybody, but do not forget participants with gluten or lactose intolerance.

Food restrictions	Students	Mentors/ observers/ guests	Volunteers	Staff	Guests Closing Ceremony
Vegetarian	13	1	23	3	5
Indian vegetarian only	4				
Vegan	1	1	3		1
Halal	29	9	4		
Kosher	1	1			
No beef	9	7			
No pork	1		3		
No lamb	3	1			
No seafood or shellfish			3		1
No fish	2				1
No dairy / lactose intolerance	4		2		2
No eggs / allergy	1		2		
No mushrooms			1		
No nuts / allergy	2		3		
No peanuts			1		
No walnut, no pecan nuts		1			
No uncooked nuts with skin on them (e.g. raw almonds)			1		
No berries			1		
No gluten			1		3
No spicy			1		
No mustard	1				
No sesame seeds	1				
No fruits and vegetables	1				
No buckwheat	1				

Total food requirements as per registration in database

6 MARKETING AND COMMUNICATION

6.1 LOGO

The creation of the IChO 2023 logo has been done by an agency in the beginning of the project. There were two versions in use, a square (portrait) and a horizontal (landscape) one. In addition to the word mark IChO, the "O" has been used to create an icon which was used e.g. in social media.

Official logo
Portrait   **Symbol**

55TH INTERNATIONAL
CHEMISTRY OLYMPIAD
SWITZERLAND 2023

Landscape

55TH INTERNATIONAL
CHEMISTRY OLYMPIAD
SWITZERLAND 2023

In addition to the primary colours there have been secondary colours to freshen up the impact and make it livelier, matching the target group of the young participants.

Primary colours

Secondary colours

For the reduced version of the logo, that was mainly used for gifts and event collaterals, the following versions could have been used.

Positive
Logo in dark blue or black on white and following backgrounds

Negative
Logo in white on following backgrounds

For the font, Avenir Next has been chosen in regular, medium, and bold font.

Headline   Lead
Avenir Next Bold   Avenir Next Medium
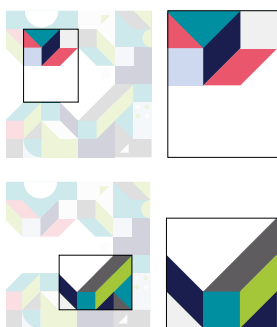
Copy
Avenir Next Regular

The so-called pattern completed the corporate design. This could be used in sections or by individual elements.

Base
Whole pattern

For the design use…
… a section   **… individual elements**

The pattern allowed us to play around with the colours and shapes and to adapt them accordingly to gifts, website, signage, and many more.

CHALLENGES

• The chosen colours were very nice and modern. However, the adaptation on giveaways like t-shirts or water bottles was colour-wise very challenging. Due to tight production deadlines, we could not always ensure that the right colours were implemented.

• Only after some time, we decided to add secondary colours as we have seen that with the primary colours the branding during the event was too monotonous. Best would be to create a logo and the corporate design in the beginning of the project considering all the needs, including the event branding.

RECOMMENDATIONS

• Keep in mind that a logo's first goal is a strong brand impact wherever it is used (documents, online, t-shirts, gifts…), so consider staying away from over-detailed and true-to-life designs but concentrate more on an abstract modern adaption. Take brand and communication professionals on board who have experience in logo creation and implementation. And focus the main target group of the students, so choose fresh and modern colours.

• To create a logo consisting of a chemistry symbol would both be nice and suitable. For this, involve chemists from the organisers in the brainstorming and creative process.
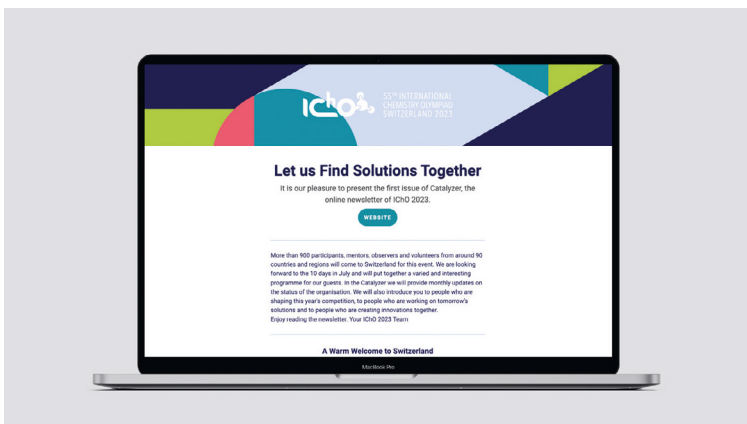
6.2 KEY MESSAGES

As usual for major initiatives and projects, we defined four so-called key messages. These key messages gave orientation during planning and execution, not only for the communication team, but for everyone in the Organizing and Scientific Committee.

Finding Solutions
Position chemistry as innovative, solution oriented and future minded science

Switzerland & Zurich
Position Switzerland and Zurichas innovative country / city and possible future study / research / work place

Togetherness
Position Science Olympiads and Research as areas relying on collaboration and fostering international exchange

ETH Zurich
Position ETH Zurich and its Department of Chemistry (D-CHAB) as leading institute of technology and research

FINDING SOLUTIONS – FOR A SUSTAINABLE FUTURE

Everyone can contribute to find solutions for a better future, in the way we live and work, to make an impact. Finding solutions for us was also (but not restricted) in relation to the Sustainable Development Goals of the United Nations. We wanted to come up with hopeful messages in difficult times. To spread a spirit of optimism and pioneering. And therefore, we focused on people, their ideas, visions, and activities in relation to finding solutions and a sustainable future. In the planning and execution of the event, we paid attention to sustainability for example regarding transportation, catering, avoiding pet bottles, or choice of sustainable giveaways.

TOGETHERNESS

In today's world, solutions to our global challenges can only be found together, it always takes a team working towards a goal. Therefore, we wanted to show in our communication how togetherness was experienced during the preparation and execution of IChO 2023, showing how togetherness fosters connecting and uniting. In text, images, and videos we tried to consistently transport this key message. Therefore, we kept the visibility of national affiliations like flags low, tried not to focus on single country teams, but showed participants from different countries together. Also, we interviewed or photographed individuals as little as possible.

SWITZERLAND & ZURICH

The above-mentioned two key messages have also been focused on the communication around the topics Switzerland and Zurich. We communicated appropriate sustainability themes without becoming dogmatic or losing lightness. Typical Swiss and Zurich clichés have been used with a simple twist of sustainability, togetherness, and/or finding solutions.

ETH ZURICH AND D-CHAB

ETH Zurich and D-CHAB have been indispensable partners for IChO 2023 – not only financially, but also in terms of personnel, infrastructure, and knowledge transfer. And of course, we wanted to show the key partners as possible study, research, and work place not just for the participants but for all involved persons and the global audience. Not to forget to mention that for ETH Zurich the commitment to sustainability is in its core areas of research, education, campus life, and its dialogue with society.

CHALLENGES

- To get awareness of key messages across all team members of all committees needs a lot of effort. Looking back, it was worth to repeat the key messages in meetings and even hold workshops to involve all team members and make their potential to contribute with their field of work visible.

- To organise a global event of the size as the IChO sustainably in every aspect is not easy. Especially when it comes to travel and food. We tried our best and are convinced also small steps towards a better future are important.

RECOMMENDATION

- We are all facing global challenges that encompass environmental, social, and economic dimensions. We strongly recommend to all upcoming organisers to focus on sustainability and togetherness and in that way contribute to a better world. The Sustainable Development Goals of the United Nations are a good signpost and supporter to create awareness and steps for implementation.

Catalyzer 22/07

International Chemistry Olympiad, Zurich, Switzerland

**22 July 2023
Today's Weather**

25°C

Schedule

Students
07:00 – 22:15 Excursion to Valais, Lonza and Bern, by train

Mentors and observers
08:00 – 18:00 Corrections, Crowne Plaza
20:00 – 24:00 Jury Meeting 3, Crowne Plaza

Excursion Barometer

Students   Mentors

Happy Birthday

Nobody's birthday at IChO today, but: Happy International Hammok Day!

What a Day!

Yesterday was a very busy day: the second exam took place and with it the academic competition of the IChO ended. The mentors visited Eastern Switzerland and in the evening the great reunion happened.

The theoretical exam also lasted 5 hours and especially the time management seemed to be a challenge for the students: "The exam actually went by so quickly, I can't even explain it! Time flies when you are so concentrated. I started the exam, then raised my head to look at the clock and two and a half hours were already gone. The time limit is one of the main challenges at IChO. Unfortunately, I didn't manage it correctly", said Andrea from Georgia. The Vietnam team found the exam very difficult and was very tired afterwards: "We did our best, but we are not exactly happy with how it went. No matter what, the exam was still fun and we are glad that we were able to participate." For Tomás from Argentina the practical exam was more tiring than the theoretical one: "The exam

met my expectations. However, I don't know what results to expect, mainly because I don't know how the rest of the students did. I just know that I did my best and the outcome will reflect what I know. "

Now the hard part is over and the students are waiting for the results. However, the long wait is shortened by a very varied programme, e.g. the Reunion Party, which took place last night and at which mentors and students met again for the first time since Monday. Finally, the stress of the exams could be put aside.

While the students had to work hard and think a lot, the mentors visited Eastern Switzerland. The programm included an excursion to Mount Säntis and a visit to Metrohm, an IChO Partner and an international active Swiss manufacturer of precision insruments for chemical analysis, especially for ion analysis. (lh/sa)

Schwingen

Schwingen, also known as Swiss Wrestling, is a traditional sport that originated in Switzerland. It is a style of folk wrestling that has been practiced for centuries.

The "Schwinger" compete on a circular sawdust-covered platform and wear short pants made of jute over their clothes which allow for easy grappling. They hold each other by these pants and try to throw the opponent onto their back with both shoulders touching the ground. Unlike other wrestling styles, there are no points in Schwingen. The match is judged by three referees, one of whom stands in the ring. There are no weight classes nor any other categories. Usually, though, "Schwinger" are big men, over 180 cm tall and weighing in excess of 100 kg. "Schwinger" places a strong emphasis on fair play and sportsmanship. It is deeply rooted in Swiss culture and tradition and is a popular attraction at regional festivals and events. (al)

Richard Ernst - Toolmaker, Musician, Researcher

Richard Ernst (1933-2021) received the Nobel prize for chemistry in 1991 for his contributions to the development of the methodology of high resolution nuclear magnetic resonance (NMR) spectroscopy.

He was born in Winterthur, Switzerland, and studied chemistry at ETH. After his PhD he joined a company in the US that worked on commercialising NMR. In 1968 he returned to ETH, where he soon started to focus on the development of multi-dimensional spectroscopy. Prof. Ernst was a member of various committees, editor for numerous journals and continued to lecture on many topics all over the world after his retirement in 1991. (Eva Vandaele)

Question of the Day:

Which chemistry Nobel prize winner was on the betting sheet of the Simpsons in 2010?

A. Ben Feringa   B. Richard Zare   C. Omar Yaghi   D. Ada Yonath

Yesterday's solution: C: Stephanie Kwolek discovered poly-paraphenylene terephthalamide fibers while working at DuPont. She won multiple awards for her work in polymer chemistry.

Yesterday in Pictures

You're currently reading the short version of the daily Catalyzer. Find more articles online.

Find more photos and videos online.

Editorial Team:
Andrea Leu (al), Chiara Brändli (cb), Lea Hasler (lh), Lena Frölich (lf), Saulé Akavickyté (volunteer) (sa)
Pictures: various sources

6.3   NEWSLETTER CATALYZER

Starting from January 2023, we published a monthly pre-event online newsletter with a total of six issues (*Catalyzers* 0.1 to 0.6). The content concept contained the following:
• Link to website
• Claim headline: Let's Find Solutions Together!
• Countdown to Opening Ceremony
• Behind the scenes stories of both Scientific and Organising Committee
• Portraits of the committee people
• Articles from and about ETH Zurich and D-CHAB
• Articles from and about the Swiss Science Olympiad organisation
• Stories about Switzerland, Zurich and IChO's event programme
• Reportages from partners
• Thank you to the partners

During the IChO, we published a daily online *Catalyzer* newsletter from 16 to 25 July with the following structure:
• Link to website
• Claim headline: Let's Find Solutions Together!
• Categories: Today's Weather, IChO Barometer, Happy Birthday

• Main article containing the major activity of the previous day
• Typically Swiss and Swiss facts
• Daily video: link to the video summary of the previous day
• Yesterday in pictures with a selection and link to the online photo management application Flickr
• Art of chemistry (pictures and text on the chemical art exhibition of D-CHAB)
• Articles by youngSCS (Swiss Chemical Society), i.e. about Nobel Prize winners
• Head of the day of the event and the Committees
• Videos or articles from ETH Zurich and partners
• Thank you to the partners

Let's Find Solutions Together!

Dear Readers

Women in science are still in the minority in Switzerland and many other countries. In this issue of the Catalyzer, we take a look at the history of women at ETH Zurich and present two female chemists and their fields of activity as well as a dedicated female member of the IChO organising committee. Sustainable food, the "water city" Zurich and the motivation of young people for chemistry are further topics.

To promote the IChO and the *Catalyzer*, we used the "Mailchimp" software. All *Catalyzers* were sent to our database. Our database consisted of people who subscribed independently to our newsletter via the website and imported contacts (mentors, volunteers, sponsors, etc.). Here are some key figures:

- 1,727 contacts
- Open rate: 57%.
- 2,771 emails sent
- Click rate: 19%

These newsletters have an excellent open and click rate. This confirms the IChO community's interest in receiving regular information by e-mail. It was also a good way of sharing content created during the Olympics and promoting it further.

During previous on-site IChOs, a printed version of these *Catalyzers* was distributed. While we chose to focus on an electronic version of the *Catalyzers*, the students did not have their communication devices until the end of the exam period. Therefore, we decided to create a daily printed 2-page version of the *Catalyzer*. Every evening, 200 copies have been delivered to the students' hotel and 100 copies to the mentors' hotel. The content was the following:
- Categories: Today's Weather, Schedule, IChO Barometer, Happy Birthday
- Short version of the main article containing the major activity of the previous day
- Short version of Typical Swiss
- Short version of the Head of the day
- Yesterday in pictures with link to Flickr
- Chemistry quiz with question of the day
- QR code to online version of *Catalyzer*
- Photos and videos on website

Of course, all newsletters transported always our four key messages.
All the newsletters can be found on the website → https://www.icho2023.ch/catalyzers

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CHALLENGES

- We were not sure how the participants reacted to the fully electronic version of the *Catalyzer*, and to not getting the whole *Catalyzer* printed out like in the past. To our surprise, we only got positive feedbacks.

- Creating current content requires a lot of resources. Therefore, our concept was to go with around 80% pre-written articles. It worked out well, however, everyday from 4 to 9 pm, team members have been busy writing, editing, doing the layout and printing of the *Catalyzer*.

RECOMMENDATIONS

- We saved more than 20,000 sheets of paper focusing on the electronic *Catalyzer*. To contribute to a better future by saving resources, we recommend online *Catalyzers* as main content source supplemented with a 2-page version for students during the exam period.

- The articles with most readers and clicks have been the ones with contents on the event and their participants. Therefore, we recommend to focus on such current content, to write about the excursions and events, and to integrate statements of students, mentors and staff to complete the articles in a personal way.

6.4 WEBSITE AND SOCIAL MEDIA

WEBSITE

For communication around IChO 2023, we have developed a website using the platform WiX (www.wix.com). This user-friendly platform makes it easy to create a website, even without special knowledge in web programming. It is important that the visual identity of the event is recognisable on the website. The website is often the first contact with participants, mentors or delegations. Everyone should be able to easily find the relevant information and understand the vision and mission of the upcoming event.

Before the website gets created, it is important to define the structure of the website. It is key that both the Scientific Committee and the Organising Committee specify their needs and are also part of the process. The development of the menu bar is important. It should reflect the upcoming event and allow an easy navigation. Of course there are pages that should not evolve much and remain from one IChO to the next, but other main menus can be added. For example, at IChO 2023, the claim of the event was "Let's Find Solutions Together". Therefore, we added a specific tab with submenus to provide more information on this key topic.

CHALLENGES

- Visitors expect a self-evident web management with an easy structure with max. three levels and a responsive web design.

- Keeping the website updated and dynamic with the latest information and news or educational content. Especially during the event, there are a lot of news to be published online every day.

- During the IChO week, the website was visited by more than 3,000 people every day. If the website performance is not optimised, visitors will have difficulty downloading content or accessing your website.

RECOMMENDATIONS

- Use pop-ups to convey important information or latest news like newsletter subscription, important deadlines, streaming of Closing Ceremony.

- The website needs to be a facilitator for all your other communication platforms. It should be linked to social media platforms and promote the created content.

- To be efficient, the modification of the website should just be manageable by a person of the team.

SOCIAL MEDIA

The use of social networks plays an important role in promoting the event, creating an engaged online community and sharing information in real time. For and during IChO 2023, we mainly used the following platforms:

- Instagram: posts with photos and videos in feed and stories
- Facebook: posts with photos and videos in feed and stories
- YouTube: videos
- Twitter: photos and content
  (target group: partners and sponsors)

The following were our activities

- Event promotion: Before the start of the competition, we promoted the event and attracted the attention of students, teachers and the general public. No paid campaign was used to promote the event. We mainly relied on our sponsors and embassies abroad to share information and reach out to new people.
- Sharing information and news: We did inform the audience about the latest news and updates about IChO 2023. We tried not to focus on single delegations but to show "Togetherness" by capturing protagonists from different continents and countries. It was important to us to try capturing the diversity of participants (places of origins, gender…)
- Interaction with participants: We encouraged students and mentors to share their experiences. Q&A sessions can also be held with organisers and alumni to create a sense of connection and support in the run-up to the Olympiad. It was important to us to show the complexity of the event, so we focused on all aspects that were needed to create the event (students, mentors, committees, volunteers…)
- Online community management: It is important to respond to all or as many comments or private messages as possible. Due to lack of resources, this was not always possible during the event. In addition, we re-shared interesting content from sponsors to give them extra visibility.
- Live broadcast and real-time coverage: We did live streaming of the Closing Ceremony what was highly appreciated by the audience. We also shared this information on all our communication channels like website and social media to ensure that as many people as possible have access to this broadcast.

CHALLENGES

- We started nine months prior the event with the communication. For example, we created videos in regard to our claim "Let's Find Solutions Together". This required a lot of resources. Unfortunately, the interest of the audience prior to the event was not as big as during the event itself.

- During the event the management of the various channels took a lot of time. Our resources were constrained and primarily adequate to fulfill our own core tasks and responsibilities. Additional staff who helps to upload content and interacts with the community would have been needed.

RECOMMENDATIONS

- Key messages: Stay always aware of the key messages of the event. Show different cultures and cultural features and present your country as a host.

- People stories: prior to the event: Content about the people organizing such a huge event are of a big interest. Behind the scenes stories will be appreciated. During the event: The audience likes portraits and stories not only about students, but also about mentors, volunteers, staff of hosts. Behind the scenes and making-off elements are always a plus. As well as quotes by the protagonists.

- Use only the latest news and inform daily. Try to publish two posts per day with carousel photos. Do not forget to mention the main partners/sponsors on the photos. Upload content (newsletters, photos, etc.) immediately to websites and share on social media. To keep the audience interested, use different formats like interviews, profiles, articles, pictures, and videos.

KEY FIGURES

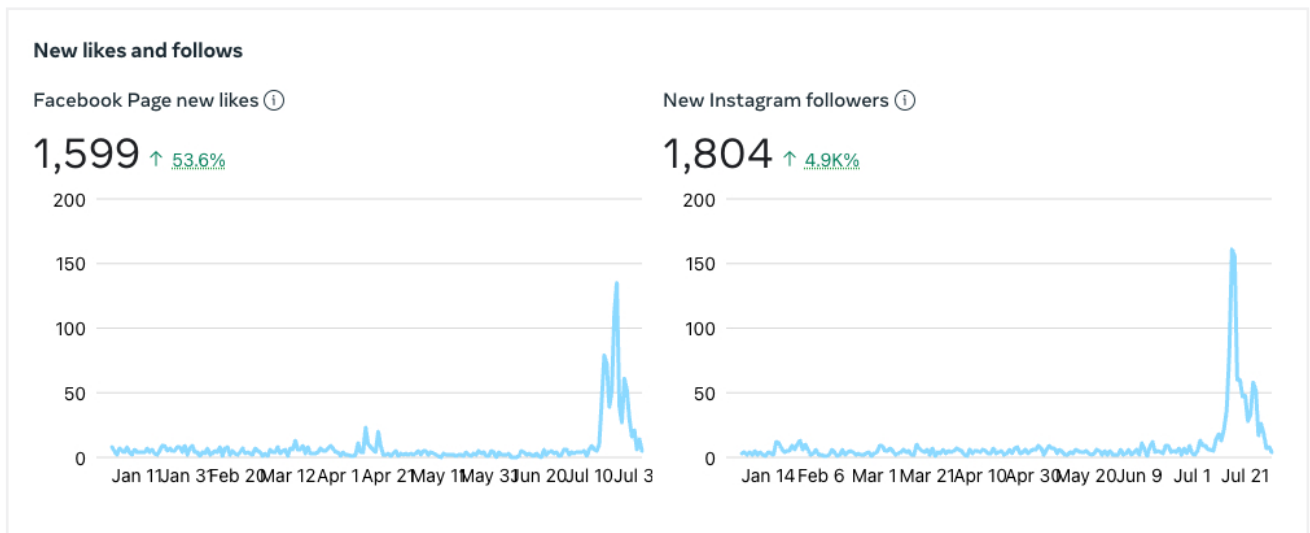By using a global social media communication, we were able to reach many people around the world.

Instagram	Facebook	YouTube	Website
• 16,600 accounts reached	• 119,000 people reached	• 60,000 views	• 50,000 visits (during the IChO 2023)
• 23,000 profile visits	• 56,000 visit	• 1,000 likes	
• 2,000 new followers	• 1,500 new likes	• 950 new subscribers	

SOCIAL MEDIA (FACEBOOK AND INSTAGRAM)

Page and profile visits

Facebook visits (i)

59,787 ↑ 284.1%

Instagram profile visits (i)

25,007 ↑ 628.4%

New likes and follows

Facebook Page new likes (i)

1,599 ↑ 53.6%

New Instagram followers (i)

1,804 ↑ 4.9K%

WEBSITE

Traffic over Time (comp line)

Select a time period is from 2023/01/01 until 2023/09/19   Compare to is None   Group by is Day   Select a measure is Site sessions   Exclude bots is Yes

Generated by Looker on September 18, 2023 at 1:39 PM UTC

6.5 PHOTOS AND VIDEOS

Photos and videos are indispensable nowadays when it comes to communicate international events. From the first day when over 180 volunteers came on board until the day with the Closing Ceremony and the farewell dinner, the marketing and communication team was working.

Our team consisted of the Head Marketing and Communication, the Manager Communication, two professional filmmakers as well as five volunteers. Even if we did online meetings and briefings before the event, it took a moment to bring the team on board and make them understand the complexity of the event. In addition, the volunteers had different levels of experience with communication and openness to learn.

It was important that we could rely on exceptional hardware like cameras, flashes, microphones and tripods either owned by the professional film teams or by borrowing them through the organiser ETH Zurich.

The aim was to make IChO 2023 a visual experience for the participants and their friends and families at home, but also for the organisers, supporters, fundraising partners and the general public.

PHOTOS

All selected images were edited and uploaded twice a day to a Flickr account, taking more time that excepted and leading to several night shifts.

https://www.icho2023.ch/photos-videos-icho-2023

The best photos were published in the online *Catalyzer* and the printed 2-page version and on our social media channels.

DAILY VIDEOS

In addition to the pictures, the two filmmakers produced videos summarising each day in between 3 and 5 minutes resulting also in a 10-minute summary shown at the Closing Ceremony. All the videos have been uploaded to our YouTube channel.

https://www.icho2023.ch/photos-videos-icho-2023

The two filmmakers organised a schedule to cover all the major activities. On some days, one filmmaker accompanied the mentors and observers while the other was with the students. They started editing the videos mostly only at 10 pm after their return from the events, also leading to night shifts. The videos were then released at 8 am the next day.

SMALL TALKS

One of the volunteers was responsible for the so-called "Small Talks". These videos were interviews with students and mentors about their days, for example what they learned, what they discovered, what they liked best. In total, 46 such videos have been produced during IChO 2023. They have been uploaded on our YouTube channel.

https://www.icho2023.ch/photos-videos-icho-2023

LIVE STREAMING OF THE CLOSING CEREMONY

The two ceremonies were filmed by our own film team. In addition, a film team of the respective venues did film the events to be broadcasted on big screens on stage in the ceremony venues, but they also did a live streaming of the Closing Ceremony with big appreciation by spectators.

CHALLENGES

- Due to the different schedules of the various groups involved, many events took place simultaneously in different locations, such as exams, field trips, jury meetings, presentations, etc.

- Beside the demanding programme and long days for the team, it was important to us to maintain a balance between the various groups like students, mentors, volunteers, and staff. And in addition, we wanted to show a balanced diversity of people's places of origin and genders.

- The "Small Talks" required a lot of preparation to ask interesting questions that led to spontaneous and sometimes humorous answers. An empathic as well as spontaneous interviewer is therefore a big plus.

RECOMMENDATIONS

• Engage whenever possible three professional filmmakers and three professional photographers. That way, they can rotate shifts for production and postproduction during evenings and nights. For the Closing Ceremony, define a photo spot at the handover of medals to take good photos of the happy students.

• Good planning and prioritisation is crucial. Start defining the story concept. Talk to those in charge in advance to identify the key moments of excursions and programme points. For example, talk directly to location partners and venues to find out what you can film and what might be forbidden. Anticipate who will play an interesting role in which moment and then portray them. Tell personal stories, show participants (preferably interactions between cultures and places of origins), show what they are doing, get close to them and tell a story through your pictures. The pictures should convey emotions.

• Make it easy for the audience to access your images. flickr.com works very well, keep in mind that the free account covers only a maximum of 1,000 pictures.

6.6 MEDIA RELATIONS

In the twelve months leading up to IChO 2023, monthly meetings were held involving media and communications staff from IChO, ETH Zurich, D-CHAB, and Science Olympiads to coordinate media relations with the aim of making IChO and ETH Zurich's chemistry research known among the public, promoting the recognition of the talent and effort of participants and organisers and generating positive coverage on ETH Zurich and Science Olympiad as organisers as well as chemistry as a discipline.

The media relations work for IChO 2023 began in April surrounding the national final of the Swiss Chemistry Olympiad. In the national press invitation and release before and after the event, the upcoming IChO 2023 was announced together with the final results to various national and regional Swiss media.

Around three weeks before IChO 2023, a press invitation was distributed by ETH Zurich to 374 Swiss and 91 international media, together with a media kit (https://www. icho2023.ch/media) containing the most important information which remained accessible online. In the lead-up to IChO 2023, both ETH Zurich and the Science Olympiad made sustained contact with more specific media, such as individual journalists who had reported on previous International Olympiads.

Seven media teams visited during the IChO 2023 and conducted interviews with Swiss and international students as well as Prof. Günther Dissertori, Rector of ETH Zurich and President of the IChO 2023, and Prof. Wendelin Stark, Head of the Scientific Committee. The media teams visited the Opening and Closing Ceremonies as well as the practical exams and were accompanied by media staff from the Science Olympiad and ETH Zurich. The practical exam visit was enabled by members of the Swiss Chemistry Olympiad who briefed media teams on

safety and led them to unused labs for additional footage and organiser interviews as well as to the exam labs where they were able to film their students of interest. The direct involvement of exam organisers in this procedure proved indispensable.

After IChO 2023, a press release on the results was published and distributed by ETH Zurich in German to 374 media in Switzerland, Germany, and Austria, as well as in English to 91 members of the international media who have written about IChO in the past few years or who cover topics related to chemistry or work for publications related to chemistry or science.

Nationally, there were around 35 reports about IChO both prior, during, and after the event. On the radio, IChO 2023 was reported by the German and Italian speaking national radio stations SRF and RSI both on the national level prior and on regional levels during the event. IChO 2023 was also featured on the landing page of the SRF News website. There were TV reports about IChO 2023 by regional TV stations RSI Telegiornale, TeleZüri, Tele-Basel, and TeleBärn, each featuring their respective regional Swiss participant. In addition, a number of articles appeared in a range of regional newspapers both in print and online.

Internationally, media monitoring reports more than 960 articles (including articles in Switzerland, Germany, and Austria). While such monitoring services are not 100% accurate, the search terms for the media alerts in our coverage report included: IChO 2023, 2023 IChO, International Chemistry Olympiad, and the German translation "Internationale Chemie-Olympiade".[3] The vast majority of the articles were reports on local or regional teams or medallists with 55% (527 articles coming out of Asia – 300 or so out of Southeast Asian publications), European articles numbered about 145, North American articles 71 and so on. The following chart shows the global distribution of the media coverage.

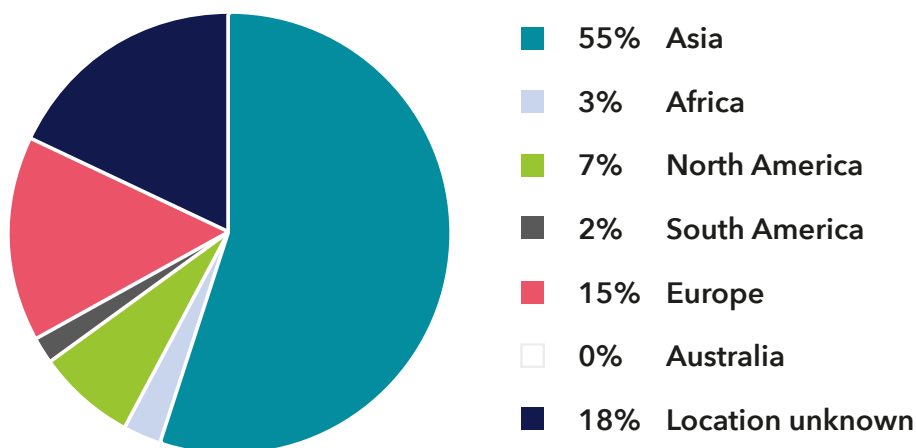3 https://muckrack.com/presentations/O7nQqjUVEe6A47WvA53xeg/view

CHALLENGES

- Nationally, despite sustained efforts and direct contact of known media contact both by ETH Zurich and Science Olympiad, it proved very difficult to gain media interest on a level other than regional news outlets. Most focused on their local Swiss or our home country participants. One challenge that can be easily managed but came as a surprise to media staff is the rule that teams had to stay together, such candidate-specific media engagements had to be organised in a way that did not require any candidate to be separated.

- There too is a slight conflict of interest between media and student wellness which needs to be carefully managed. Despite announcing interviews in advance and asking student's consent, it was generally not a pleasant situation for them to be interviewed in the settings that the media are most interested in, such as directly before or after exams.

- Due to compartmentalisation of the organisation and the two different entities involved in media efforts (ETH Zurich and Science Olympiad), the information flow proved occasionally difficult.

RECOMMENDATIONS

- Offer onsite visits for a few selected events of special interest. Providing access to an exam, if available a practical exam, is a must. For such complex or delicate events, media staff and exam organisers should get together in advance to develop a plan on how and when the different media teams will be able to move through facilities in order to gather material on their persons of interest and conduct interviews (i.e. before an exam, after an exam, during an exam for organisers), and in order to lay down rules of conduct for media teams.

- Enable a prompt flow of information to the media staff by holding regular meetings between all relevant persons and giving media staff access to documentation since seemingly superfluous details may become relevant at short notice with media requests (such as the layout of an exam room, the contact number of a team guide, etc.)

- Take professional photos of the Swiss (or host country) delegation and perhaps the organising team and the setting before of the event in order to illustrate press invitations.

- Provide content in advance to IChO participants' team leaders to relay to local media.

2023 IChO Distribution of Global Media Articles

- 55% Asia
- 3% Africa
- 7% North America
- 2% South America
- 15% Europe
- 0% Australia
- 18% Location unknown

6.7 GIFTS AND GIVEAWAYS

Giveaways are an integral part of every event – as is the case with the IChO 2023. Generally, and as part of the sustainability initiative, emphasis was placed on the following factors:
• Quality and sustainability of materials and products
• Abstaining from providing partner and sponsor gifts (as Finding Solution's Fair was an opportunity to personally hand out a giveaway)
• All materials in event branding or with a clear Switzerland / Zurich connection (materials from "Presence Switzerland" and "Zurich Tourism")

Only Huawei as a partner of the International Chemistry Olympiad Endowment Fund was granted to contribute a gift in the goodie bag. Huawei provided the branded notebook.

The following items were included in the goodie bag:
• Drawstring gym bag (not a backpack)
• Name tag for labelling the identical bags ("Presence Switzerland")
• Cap (Presence Switzerland)
• "I love chemistry" button
• Pen with logo
• Pencil and Post-it notes (Zurich Tourism)
• Reusable and quality water bottle from SIGG (also refer to the Food and Beverages section)
• Notebook (Huawei partnership)
• Zurich city map
• One bar of chocolate (Zurich Tourism)
• Sunscreen (Ultrasun AG)

Besides the goodie bag, the following items were provided:
• Lab coat (Lonza partnership)
• Laboratory goggles (Roche partnership)
• Calculator
• Postcards (various tourism organisations, postage was covered)
• National flags (20 x 30 cm, one per student and one per team guide)
• Lanyard (with badge)

During the IChO 2023, there were additional opportunities for participants to receive gifts. The Finding Solutions Fair is worth mentioning, where many partners were represented, as well as the "Reunion Event" hosted by the University of Zurich.

CHALLENGES

• The worldwide scarcity of resources and supply chain and delivery issues forced the IChO organising committee to order early and decide on quantities without knowing the final participant, staff, and volunteer numbers.

• A adaption of the Coroprate Design (adding additional event colours) six months before the event delayed internal design and production processes. Although the event design became more appealing, additional efforts were needed to adapt the gift design to the new CD.

• Finding a balance between the sustainability goals and the necessity or IChO tradition to provide gifts and event merchandise to the participants was not always an easy task.

• Responsibility for and the process of distributing gifts to staff, volunteers and supporters of the event was not planned in advance in full detail which resulted in additional efforts onsite.

RECOMMENDATIONS

• Concentrate on quality of the gifts rather than on quantity.

• Use items that might be required during the IChO. Many students bought alarm clocks for the time without their devices. Including an alarm clock in the goodie bag might have been a useful gift.

• Set up clear production and timing processes internally and with the production partners, order items early enough to avoid last minute stress.

• Clearly define who will receive which kind of gifts for staff, volunteers, and supporters and plan the distribution well in advance, including groups active before the IChO, like lab set-up or exam test persons.

6.8   T-SHIRTS

Event T-shirts play a crucial role in IChO events for several reasons.
• They serve as a uniform, aiding in the recognition of volunteers and staff.
• They contribute to event branding, fostering a sense of belonging among participants and staff/volunteers alike.
• T-shirts have PR purposes, as they appear in pictures and videos, garnering attention.
• Additionally, they serve as keepsakes for students, mentors, observers, guests, and staff/volunteers.

The following quantities and colours per person were planned:
• Students, mentors, observers, guests: petrol/ blue, one per person
• Team and mentor guides: red, three per person
• Staff and other volunteers: green, one to three per person, based on the number of working days

A contingency of 10% was factored in, and unisex T-shirts were chosen to enhance flexibility for contingencies. These T-shirts were produced to align with the event colours (Pantone), and delivery was expected approximately twelve weeks after the final order placement. Notably, team and mentor guides were assigned the most conspicuous colour to facilitate their identification by those seeking assistance. This distinction also proved beneficial during bus boarding, as the guides' red T-shirts made the delegation easily recognisable.

To address laundry needs during IChO, a service was established, catering to washing and ironing of the shirts within 24 hours.

Owing to a scarcity of resources and complications in the supply chain, it became necessary to place orders for IChO 2023 T-Shirts well in advance, despite lacking clarity on the required sizes, as the orders had to be placed well before most participants or volunteers were known and had registered their T-shirt sizes. The projection and preparation re-

lied on the size distribution from past events. However, the expected sizes of the ordered T-Shirts did not fully align with the actual sizes needed.

CHALLENGES

• The order had to be confirmed without insight into final numbers or required sizes.

• Due to a programming mistake, T-shirt sizes were not mandatory fields on the registration form, and even after the registration deadline, missing data persisted.

• Production posed difficulties due to disparities between Pantone and CMYK colours for the IChO 2023 event colours.

• Accommodating everyone's fit posed a challenge. While a unisex cut aided backup management, distinct male and female cuts could enhance comfort.

RECOMMENDATIONS

• Acquire cutting patterns for the ordered T-shirts and determine the necessity of male/female cuts.

• Allocate various colours based on functions.

• T-shirts in event colours are potent branding tools. Strive to match these colours as closely as possible. We decided to dye our T-shirts rather than buying standard colours, prolonging the production process. If the logo is the sole print requirement on a standard T-shirt, production could be shortened and orders could be placed after securing detailed sizes, minimising backup T-shirts and associated costs.

Category	XXS	XS	S	M	L	XL	XXL	XXXL	Total	Target group
Colour 1: petrol/blue	10	50	130	220	220	90	40	10	770	Students and mentors
Colour 2: red	0	40	65	120	70	40	10	10	355	Guides
Colour 3: green	0	60	120	200	160	60	10	10	620	Staff and volunteers
TOTAL									1,745	

6.9 PRINT MATERIALS, BRANDING AND SIGNAGE

BADGE

- Format A5, folded into A6 size
- Front side with name, delegation and role, backside with access code for public transport
- Inside of the badge: emergency numbers and possibility to fill in the emergency medical information individually
- Exam seating information included on the inside for students only
- Colour bar corresponding to t-shirt colour, representing group category
- Badges in transparent badge holders on branded event lanyards
- Badge holders also contained the pocket programme (see below)

CHALLENGES

- Printing can only be done at a very late stage due to missing information in the registration system. Also, names supplied during registration sometimes had spelling mistakes that needed later corrections. Plan enough resources.

- Correct and complete data is very important to pre-print a full set of badges. A database also for volunteers and staff is required.

- An error in printing did mix up the seating information for students which resulted in a manual allocation of students and delayed start for the practical exam.

- Printing of pictures was originally planned but had to be dismissed due to lack of quality of images in the database (not for every participant a portrait was uploaded) and due to complexity in design serial print preparations.

RECOMMENDATIONS

- Put all relevant personalised information on the outside page of the badge to avoid mistakes in mismatching inside and outside pages.

- Choose an event design in which re-prints of badges can easily be done onsite, and have a template and printer ready.

- Also have staff and volunteer data available in full to be able to prepare the badges for this group.

POCKET PROGRAMME

- Leporello format, A7 size (folded accordion-pleat style)
- Nine pages, one side for students' schedule, other for mentors' programme
- Distributed inside badge holder upon arrival to participants, volunteers, and staff

CHALLENGES

- At the time of printing, all precise time points need to be fixed. Thus, the ability to adjust the programme at short notice is lost.

- It is challenging to find the balance between printing only the most important information and still offering all information needed by all participants. With the Telegram groups and the option to inform mentors and students on the daily programme digitally, the importance of the pocket programme might decrease in the future.

RECOMMENDATIONS

- Plan enough time for the first draft of the pocket programme. Internal processes and fine-tuning took up quite some time shortly before the event.

- Set the printing for the latest date possible to maintain flexibility for changes in the programme schedule.

OTHER PRINT PRODUCTS

For sustainability reasons, the number of print products was reduced to the minimum.

SIGNAGE AND BRANDING
ETH BRANDING

The ETH offers various communication channels that were booked for the event.

The following were implemented, presenting the event logo, event design, and event claim "Let's Find Solutions Together!":
• Two banners at the ETH main building (200 x 500 cm) and at ETH Hönggerberg (275 x 565 cm)
• One large poster (A0) at the Polyterrasse at the ETH centre campus
• Screens in the ETH buildings

BEACH FLAGS / ROLL-UPS

For flexible branding in the hotels and other event venues, eight beach flags and eight roll-ups were produced. The metal structure was rented and only the print was specifically produced. The roll-ups were moved between venues, which was part of the transportation logistics onsite.

Two roll-ups displayed all partner logos.

SIGNAGE TEMPLATES

Signage templates were created for adaptation based on venue, programme, or event.
• As various team members and agencies were responsible for the different venues, events, and programme points, the templates could be adapted based on the individual needs.
• Templates helped to create a coherent event design while at the same time reducing branding efforts for marketing/communications staff.

CHALLENGES

• Finding the balance between sustainability (reduction of materials) and required event branding was a challenging task.

• Signage required a knowledge of the programme schedules, routes and important meeting points. Responsibility for signage should lie with the person organising the specific programme point.

• Signage is often one of the final tasks to be organised, therefore taking place shortly before the event.

RECOMMENDATIONS

• Working with templates was a good option to create a consistent event branding while providing all staff to plan for their signage.

• Find a good balance between the amount of branding and sustainability.

ORGANISERS

ETH zürich

D CHAB

SCIENCE.
OLYMPIAD.CH
WISSENSCHAFTS-OLYMPIADE
OLYMPIADES DE LA SCIENCE
OLIMPIADI DELLA SCIENZA

CHEMISTRY.
OLYMPIAD.CH
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SCS
Swiss Chemical
Society

PARTNERS

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

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Education and Research EAER
**State Secretariat for Education,
Research and Innovation SERI**

Metrohm
Metrohm Stiftung

LONZA

ERNST GÖHNER
STIFTUNG

DIMITRIS N.
CHORAFAS
FOUNDATION

fondation Claude & Giuliana
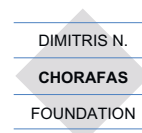
Givaudan

OPO STIFTUNG

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Roche

NOVARTIS

Adrian Weiss Stiftung

NCCR
Catalysis

Swiss National
Science Foundation

The National Centres of Competence
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Gemeinnütziger Fonds

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GEBAUER STIFTUNG

SwissLife
Stiftung Perspektiven

SWISSLOS
Kanton Aargau

Kanton St.Gallen

SWISSLOS

Hans Huber Stiftung
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Merck

SIMPLY
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LEISTER

AMGEN

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SUPPORTERS

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