2ND Workshop of the International Collaboration on Advanced vaccinology Training

Session 0: Setting the stage

In a preliminary "Setting the stage" session, three presenters gave their perspective on how COVID-19 changed the world (André Picard, Journalist, Globe and Mail, Canada), immunization from a global perspective (Kate O'Brien, Director Immunization Vaccines and Biologicals, WHO), or changed immunization in low- and middle-income countries (Narendra Arora, Director, INCLEN, India). This was followed by discussions that particularly revolved around the biggest challenges for immunization, and what courses could do to address some of these challenges as well as gaps and potential solutions.

According to André Picard, it will probably take years or even decades to know the answer to the question on how COVID has changed the world. The definitive book on the Spanish flu of 1918/19 called "The Great Influenza" by John Barry was not published until 2004. André pointed out that this is a blueprint that told us in advance of what would happen with COVID and everything in the book has been borne out. We are still living in the pandemic so as yet, there is no hindsight and we are trying to understand how we could have done things differently and hopefully, there will be lessons learned that can be used in the future.

Reflecting on the past years, he pointed out that pathogens exploit weaknesses in our immune system but that pandemic pathogens exploit weaknesses in our society – political, economic, social structures. This is what COVID-19 has done remarkably well. COVID-19 is not a particularly serious virus in the grand scheme of things – it is our response to that virus that has made it blow out of all proportion. Our first mistake was being slow to act. We fell behind immediately and the virus had already spread to other parts of the world before we recognized that it existed. André insisted that we have made the mistake of reacting slowly time and time again, wave after wave waiting to see if it was actually bad.

Further, he stressed that some groups are at a higher risk of infection not because of their biology but because of the social determinants of health and because of the environment in which they live – lack of housing, etc. This has also been a very important lesson of the pandemic. Those who were at the greatest risks were our elders, particularly frail elders who have been decimated around the world especially in the western world where they live in congregate settings. A lot of it is due to public health policies that left the elderly to fend for themselves thinking they were going to die anyhow, none of which was true. Others at risk were the essential workers - a term used in the west to describe people who are racialized - underpaid, under-protected and over-exploited in our societies. They suffered greatly and at the same time kept our societies operating during this crisis. Women also suffered greatly, particularly working women with children – their economic and social burden was much greater than normally. However, the greatest injustice of all was the inequity in the sharing of vaccines. The gap between developed and developing countries and the access to protection has been shameful. In Canada, over 85% of

the people have had at least two doses of vaccine and in Africa it is less than 17% across the continent and many of those receiving the vaccines are the elite and many people had only one shot if at all. In public health, there is a maxim – no one is safe until everyone is safe and we need to keep repeating that especially in the western world.

Eleven billion doses of vaccine delivered is impressive and unprecedented in history together with the rapidity of how the vaccine was rolled out and how well it has worked. Although some argue that that it is not a great vaccine, it is much better than we anticipated. We need to get our minds around the fact that it is a 3-dose vaccine and not a failed 2-dose vaccine.

The development and deployment of a COVID vaccine in less than a year is really one of the great scientific achievements of our time. Of course, it did not happen in a year – it truly happened with decades of work in the background, but it happened really quickly showing that when we put our minds to solving a problem no matter how big, we can do it.

Another key lesson of the pandemic is that science is not easy but getting the shots into the people is way more difficult. It reminded us that the single most important tool we have in public health, and in vaccinology in particular, is the most basic – good communication. The magic ingredient that pulled everything together is trust – if there is not the trust of the public you will never get them vaccinated. When you ask people to get a shot to protect them from something invisible you are asking them to make a leap of faith and that is important. To have faith, they need to have trust in you, in the science and in the messaging. The countries with some of the worst vaccination rates in the world are those where distrust is rampant.

The pandemic also reminded us of the fragility of the public health structure which we are all part of. All over the world we struggled to varying degrees to get populations vaccinated often for different reasons and all over the world there was collateral damage that will be felt for a long time. Central public health programmes fell by the wayside because public health was over-burdened – childhood vaccination programmes were badly affected even in wealthy countries. Tuberculosis infections and deaths have soared because they were neglected. Alcohol consumption increased, mental health programmes were overwhelmed and so on. The indirect burden on public health is going to be lasting and heavy.

COVID-19 was also the first pandemic of the social media age and that has been a significant issue. In addition to a pandemic virus, we witnessed a pandemic of misinformation from anti-vaccine propaganda to the promotion of dubious drugs, to conspiracy theories. André argued that one can be left with the impression that there has been a huge rise in anti-vaccine sentiment, but he did not think that there was any real evidence of it. Rather he thought that the evidence points towards allowing a minority to become louder – they have learned how to exploit tools and the answer to that is for public health to exploit these same tools even better to counter this information. In the world, about 12 organizations called the "Disinformation dozen" were responsible for two-thirds of all misinformation being spread in the media. Part of the spreading of lies and conspiracy theories is dogmatism, but the main reason for anti-vaccine propaganda is money – people who

are spreading this information are making a lot of money from so-called alternative medicines. When they criticize the pharmaceutical industry saying they are not in it for the money, they too are in it for the money. The conspiracy theories floating around are a reminder that people will believe almost anything, but they are also a testament to how poorly our education systems are preparing people to live in the real world with the internet. Science has never been more important in our lives than today but, paradoxically, scientific illiteracy is at an all-time high and we need to do a better job of teaching the basics to equip people to protect themselves. We need to teach people how to read and interpret evidence so that they can sort things out for themselves. We cannot correct information on the internet. People need to be able to figure it out. The young people are much smarter about this and more adept at using social media and understanding lies and misinformation.

The impact of the pandemic on the trajectory of vaccine hesitancy has not been told yet and we will not see the true impact for several years. A positive aspect is that some social media websites have taken some responsibility for truths and mistruths.

Lastly, André noted that we all want to return to normal, taking our masks off and putting the pandemic behind us. The pandemic has reminded us how easily humans can forget, how easily we can become inured to death. In the early months we were horrified when there were hundreds and thousands of deaths and, now, we have become indifferent to millions of deaths and more than a million cases a day – today we are acting as if everything is done. Over time we have learned to dismiss 1.5 million TB deaths in a year. Are we going to do the same with COVID or are we going to change our attitudes? In addition, when things go badly, and they have gone badly for two years, we want scapegoats – someone to pay, so who is going to be blamed for all of this – politicians, public health, scientists, vaccinologists, journalists. André thinks that we are all in for more COVID-related grief in the months and years to come and that science is going to take it particularly badly because the misinformation people have been emboldened.

Overall, the COVID-19 crisis has given many opportunities such as telemedicine, the development of immunization registries, capitalizing on the private sector in the delivery of immunization, attracting huge financial resources to deal with health issues, exposing many existing challenges that we did not talk about such as inequalities, social determinants of health, and the human resource challenge which may be the biggest one.

There are not enough people to provide the care needed. Kate O'Brien stressed that the countries struggling most with routine immunization and COVID vaccination are known to have rates of health workers for population that fall into the lowest strata. Yet not all health workers require the level of training that we expect for immunization, and several countries used the military to contribute to vaccination. Creating social movement would be important but we have a short window of opportunity, and it needs to be seized – in particular the need to engage youth in immunization platforms for which they have an important role to play.

A lot of youth in different countries such as medical students, paramedical students, nurse students, and even volunteers at the local level have engaged in immunization

platforms and this worked very well. People were happy to do something in a positive way after the pandemic.
Narendra highlighted that to supplement the resources in the health sector, teachers were another resource which can be really effective. In India, overnight they recruited half a million medical (final year and interns) and nursing students to help.

Countries have leveraged trillions of dollars to address a global security threat. The more we recognize where immunization is positioned as a global security threat, the more it unlocks resources not constrained from health budgets.

We need to tell the story in another way with compelling narrative and analytics about how immunization is front and centre in pandemic preparedness and response. We have to be firmly at the centre of conversations about health security because it takes it outside our remit and realm of health budgeting. Regarding politics and the return on investment – the most powerful actor for immunization is the Minister of Finance and we have not recognized this sufficiently – we need to be more able to make arguments that are responsive to the language and metrics of Ministers of Finance. The key message is that health and wealth go together. Actually, Finance and Prime Ministers are both important. Indeed, during the COVID crisis, because the economics were seriously impacted, the investments came overnight.

In spite of billions of dollars to eradicate polio we continue to see that cVDPVs emerge from places where routine immunization has been weak, illustrating that there are parts of the world and countries with low immunization rates and they have a disproportionate contribution to overflow risk into countries that have higher immunization rates but not sufficiently high to be resilient to what is happening in other countries. We cannot immunize our way out as one country alone – we are in a globally connected world and cannot protect borders around people.

Narendra also stressed the importance of the culture of microplanning in LMICs, and the importance of local vaccine and vaccine devices' production. A list of global, regional and national challenges, some closely related to each other, as well as gaps and solutions identified from a brainstorming evening session are listed in Table 1. Some of the solutions can in part be addressed by advanced vaccinology courses and some have bearing on courses. This table includes some of the overwhelming challenges mentioned above. Also, it should be noted that although some of the solutions are accessible, others would be potentially quite challenging to implement.

Table 1

Challenges	**Gaps**	**Solutions**
<u>Global</u> Vaccine access and supply inequity Public health infrastructures Regulatory capacity Vaccine awareness Communications	Expert knowledge Knowledge of professionals and future ones Education: training of young teachers in high schools, religious	NITAG and decision-making Improve communications • Improve communication, messaging i.e. paying attention to safety of yourself and your family

Antivaccine lobbies Trust of populations and vaccine hesitancy (which may be more of a problem in high income countries where the antivaccine lobbies have a loud voice) Misinformation regarding vaccines Healthcare infrastructure especially in LMICs Lack of human resources Vaccination coverage Lack of funding Inadequate immunization data Interaction between science and politics Territories with difficult access Political will Corruption Courses tend to favour anglophones. This excludes other language speaking groups especially French/Spanish speaking countries/groups. <u>Regional</u> International migration/displacement of people (within and between countries) Different recommendations per country Mismatch between regional needs and the supply/support for the programmes Lack of funding <u>Country</u> Vaccination coverage Catch-up of children who were missed Different recommendations by different advisory groups Lack of funding	associations community, social media, influencers Investment and facilities Fellowships Specialized courses Computer literacy Multi-linguistic issues Funding and sustainability Financing and related vaccine inequity Education – the speed and scale of knowledge does not translate to all Need tailored education packages At the country level: need culturally appropriate, context-specific (based on local epidemiology) – policies, practices and education are needed Integration of systems and learnings from COVID into routine immunisation – integration by design not by necessity is needed (This may extend to systems but also to the involvement of other sectors to support workforce such as military and civil society)	• Media training as is being done in many courses to increase awareness • Better network of communication – (digital way – personal message) • Document impact of vaccination and make data easily available (real time data for the whole population) • Focus on preventative versus curative, starting early in life • Local awareness of disease - vaccine preventable diseases and impact on severe forms of disease • Make positive impact with true information using social media to counter the false information that is circulated in the social media • Target different groups in the society e.g. politicians, educators, public etc. to create awareness about the benefits of immunization • Provision of adaptable information and knowledge – for e.g. through NITAG resource centre. Addressing funding gaps – more donors - interaction with donors and governments Improve training • Train the next generation of vaccinologists • Courses addressing media, sociological aspects – need for multidisciplinary experts • Tailoring courses – in-country courses (e.g. epidemiology/local context) • Specialized courses tailored to audience needs – for politicians, manufacturers, regulators and health care workers

		• Increase amount of educational hours in vaccines and vaccination and related benefits in the basic curriculum • Training of healthcare workers to tackle vaccine hesitancy and promote vaccine benefits • Train the trainers • Training of manufacturing companies' staff in LMICs • Implement translations during courses in areas where there are more than one language groups represented. Modules need to be translated into the respective languages • Having online courses would enable greater participation from different groups. There could be multiple tailormade courses for different groups in the society e.g. policy makers, program managers, influential groups of the lay public e.g. teachers etc. • Cascade training may be one way of increasing the reach with these multiple groups • Improve local capacity building for courses, so that there is a greater pool of educators. • Develop case studies to learn from COVID – focus on implementation science and operational research • The multi-disciplinary nature helps build expertise amongst those who are working in vaccinology • The courses offer a pool of experts that can be tapped on for greater learning and discussion – build content area expertise • Collective action is needed from those organising courses and participating to demonstrate the value of

		these advanced courses and training – both for funding of courses and for institutions to support participation of trainees Address needs regarding vaccine supply inequity and regulatory capacity in terms of training Dialogue with people who are making the decision Addressing political will • Form an advocacy group from within the vaccinology experts that can lobby with the powers that be to make them aware of the importance of immunization Improving public health infrastructures, specifically human resources • Recruit more personnel • Redeployment of non-healthcare staff during times of need e.g. during mass vaccination campaigns Equitable distribution of vaccines: • GAVI eligibility positioning can be re-looked at to enable many countries to continue their ongoing programmes and delay their graduation from being ineligible. • Enhance local production of vaccines with technology transfers

Session 1: Update on landscape analysis

In preparation for the second Global Workshop on Advanced Vaccinology Training a survey aiming to provide a thorough update of a landscape analysis on advanced vaccinology training that was conducted in 2018, and a look at the impact of the COVID-19 crisis, was implemented. This landscape analysis was designed as a cross-sectional survey of existing specific advanced vaccinology courses around the world, including short courses, post-graduate courses and Master programs. All courses pre-identified in 2018 were contacted and an exhaustive search for additional courses on the web using vaccinology training keywords and via publications was implemented. An attempt was also made to contact courses listed in publications, and various professional networks asking for the identification of vaccinology courses at national level were contacted. This included the Global NITAG Network and partners from the Network for Education and Support in Immunisation. Course Directors and various experts were also asked to contribute to the identification of additional courses. University-based undergraduate (i.e. pre-service) courses that only focused on one specific issue/area of vaccinology, and periodic courses or symposia on vaccinology were excluded. The Course Directors of the identified courses were asked to complete a standardized questionnaire which was based on the questionnaire from 2018, including additional questions related specifically to any recent change or challenge which would have occurred since 2018. Detailed methodology and results can be found in "Advanced vaccinology training globally: update and impact of the COVID-19 crisis" by Carine Dochez et al. submitted for publication to ***Vaccine*.** Carine briefly presented the salient results of the landscape analysis.

Thirty-three courses were identified and course organizers were asked to respond to a survey to provide information on their respective course(s). Of those, 17 courses are short courses, 11 post-graduate courses and 5 are Master level courses. Most courses are organized on an annual basis. Even though some courses were not sustained over time, the number of courses has been increasing during the last few years, and at least one vaccinology course is now being offered in each WHO region. Although the training capacity has increased tremendously, the need still exceeds the capacity, and many courses have many more applicants than they can select. The most frequent challenges reported included sustainable funding and identifying faculty. The COVID-19 pandemic impacted the delivery of several vaccinology courses which have been postponed or reformatted to an online or hybrid training event.

During the discussion that ensued it was clear that for some courses, particularly for short courses, it is a real challenge to attract funding. Courses such as the India vaccinology courses are not publicly funded. In public programmes, there is money for vaccines and their delivery but not surveillance and other ancillary tasks/training and it was suggested that the Collaboration advocates to have public funding for vaccinology courses. The discussion also flagged some important elements of a

course that would help to secure funds such as accreditation, demonstration of need and impact, and sustainability. It would be useful to identify potential sources of funding for courses.

It was also noted that in Africa most courses are provided for people in the public sector. The landscape analysis did not specifically look at the number of vaccinologists trained that would be working in the private versus the public sector. However, some courses are clearly accessible to vaccinologists and health providers working in the private sector.

Most courses have evaluation systems in place. A growing number of courses have post-course evaluations in place that measure the impact of the course. For some courses, as part of the application process, candidates have to indicate how they will implement the information/knowledge learned in their day-to-day work.

Session 2: Supporting virtual training

In preparation for the workshop and to support courses, Jane Tipping was asked to develop a guide “Adapting to virtual teaching and learning” which was shared with participants ahead of the meetings. In addition, a summary of the pros and cons of shifting to virtual training based on the experience shared by courses had been circulated.

Jean-Pierre Kraehenbuhl presented an introduction to e-Learning/e-Training. He also described the successful experience of the Health Sciences e-Training Foundation and of the International Master of Vaccinology (IMVACC). This was followed by two students presenting their IMMVAC experience: Nivashnee Naicker from South Africa and Nicolas Peyraud from Switzerland.

e-Learning/e-Training refers to computer-enhanced learning. It uses internet technologies to deliver a broad array of approaches that enhance learners’ knowledge and performance. It is usually associated with the field of advanced learning technology which deals with both the technologies and associated methodologies in learning using the network and/or multimedia.

More recent developments include:

1. Massive Open Online Courses (MOOCs) such as that organized by the Institut Pasteur. The first MOOC was created in Canada in 2008 (George Siemens and Steven Downes). It is based on the theory of connectivism which favors collaboration and interaction between participants.
2. Inverted classroom or flipping the lecture in which the students must follow online lectures and carry out the associated assignments and quiz before a face-to-face session
3. Customized OnLine Training (COLT)

Jean-Pierre presented a comparison of the respective advantages and disadvantages of three modes of teaching: 100% face-to-face, mixed or blended, and 100% online. He highlighted how HSeT moved beyond electronic textbooks by using: high quality animation to convey complex concepts, novel pedagogical

techniques, e-Learning blended with face-to-face teaching, and a highly adaptable Learning Management System Internet has revolutionized teaching and training by allowing learners to have direct access to knowledge and to new pedagogical approaches.

Electronic tools offer increasingly immense opportunity to provide a virtual learning experience of great quality (all the way to the metaverse and virtual reality environment).

There is a natural trend to increase e-courses which has enormously accelerated through the pandemic constraints. It improves flexibility and accessibility of the course for new audiences. Two-thirds of the courses that were face-to-face envisage incorporating elements of virtual training in the future. Several courses that were pushed to virtual mode want to stay virtual and one has to review the implications.

The design and tailoring of e-learning courses needs to be done carefully taking into account the target audience (young or more advanced students), the duration of the course (long and short courses do not have at all the same constraints), technological tools and preparation. Virtualization of a face-to-face course is not the same as virtual courses by initial design.

Real time virtual classes require stable and reliable internet on the day of the training There is more and more of a continuum between fully face-to-face to fully virtual courses. This needs to be tailored to the objective, format, duration of the course The on-the-spot switch from face-to-face to virtual in 2020/2021 showed that this is possible but that there are a number of challenges and not thought-through problems. The use of virtual training in short courses might be more problematic in particular on the networking and social aspects of the training than for long term courses.

Hybrid trainings with part of the audience in face-to-face and part attending remotely is prone to create substantial differences in the learning experience.

Management of alumni can be empowered by virtual tools with opportunities for more frequent touch-bases.

The following lists the comments and ideas which were stimulated by the presentation and comments from the other courses:

Institut Pasteur provided a free virtual course with a reduced number of participants and only afternoon sessions – participants had to present at end of course to panel. This worked well.

It was argued that one could not fully replace in-person courses. Loss of networking is certainly a challenge. Questioning after face-to-face sessions, does not happen in the context of a virtual course. Conversation is lost (back and forth).

When people are working as a group, they get to know each other and at the end their behavior is different. There is an exchange of cultures, knowledge, friendships. Having both virtual and face-to-face is probably a way to go.

The experience of the virtual ADVAC course is that connection problems were mainly with lecturers in high income countries who did not feel that it was necessary to make sure the technology would work. This showed that indeed it is important to make sure the system works.

Virtual training has the challenge to be matched with the availability of people (time zones, etc.) which for global courses is a real challenge.

Chat box questions can be more concrete during a virtual course with people less shy to ask questions in writing, which is an advantage. On the contrary, it was also felt that people in the audience are more likely to speak whereas in virtual they are silent listeners.

Different ages and cultures deal with virtual training differently although it seems that this is not a major issue. Gradually everyone opens up.

There is a need to train faculty on how to engage in virtual interactive training.

Sonia Pagliusi from DCVMN mentioned how her organization used Virtual Reality technology mimicking work in the laboratory and providing hands-on training, which in done in a laboratory would have has safety and insurance issues

Session 3: Needs assesment

Although the COVID-crisis and intervening priorities made it challenging to collect this information in preparation for the workshop, various organizations provided some insights on the needs of their constituents in terms of training. This was shared ahead of time with the workshop participants.

Varsetile Nkwinika briefly presented a summary of NITAG training needs on vaccinology based on a survey conducted as a joint project of the WHO Regional Office for Europe and the Robert Koch Institute (Germany) on strengthening NITAGs in middle-income countries in the WHO European Region. Answers were contributed by five NITAGs (Albania, Armenia, Belarus, Uzbekistan and Turkmenistan). The three topics of most interest for NITAGs were: (1) new vaccines and evidence-based introduction of new vaccines in immunization programs; (2) requirements for vaccination strategies in special conditions (neonate, pregnancy, elderly, risk groups and outbreak setting); and (3) immunology.
She then highlighted the impact of the COVID-19 crisis and major challenges faced by courses as derived from the landscape analysis alluded to in Session 1.

The critical needs flagged by courses were the following:

- Finding faculty that have enough time available to give lectures, finding new faculty on specific areas and bringing in international speakers
- Adapting and improving teaching methods
- Ensuring course content was updated
- Sharing of lectures (risks and benefits)
- Fitting the program to the context
- Identifying funding sources (risks and benefits)

- Development of tools (websites, portals, official summaries)
- Establishing and maintaining credibility
- Building an effective alumni network

This was then followed by a presentation from Pierre Van Damme on a project related to the trust in health care providers and need for training. Assessment of the trust in different sources of communication conducted by the University of Antwerp in collaboration with Vaxcom and the Vaccine Confidence Project pointed to the health care providers as being the most trustworthy communicators. He then presented a vaccine training barometer developed under EU-Joint Action on Vaccination, showing that a substantial proportion of those health care providers were not comfortable to answer some specific vaccination related questions. This was put in the context of the limited training on vaccinology included in the curriculum of health professionals. They were, however, quite willing to take additional related training to be able to communicate specific content. The Vaccine Training Barometer is a valuable and sustainable tool for monitoring the need for training amongst healthcare providers involved in vaccines delivery. As a result, a Standardized training curriculum and guidelines for learning outcomes and workload of in-service and pre-service vaccine training has been developed that was successfully pilot tested.

Some key issues identified with respect to the immunization programs and training needs as identified within the Session on Setting the stage include the following:

- Inequity - Vaccine supply; vaccine access and funding
- Infrastructure, implementation and rollout - Vaccine catch-up programs/coverage of hard-to-reach areas
- Improve vaccine training to address needs which are continuous or which emerge, such as emergency preparedness
- Training needed for different routine immunization related tasks
- How to communicate with different audiences from children to politicians, especially Ministers of Finance.

Some of these were then the object of a brainstorming session in break groups whose output is presented below. Some of it has bearing on the curriculum of advanced vaccinology courses but some of it extends beyond to more general vaccinology training and related initiatives.

Louise Henaff from WHO reported that NITAG training needs have been assessed through online surveys and the most common needs are related to conducting literature review, evidence-to-recommendation process, understanding modelling and strategies around addressing vaccine hesitancy and making sense of health economics data.

Vaccinology courses are particularly important for NITAG members coming from social sciences and this need may grow as more and more NITAGs welcome participation of these experts.

There are different needs depending on the audience, especially for NITAG secretariats versus core members: NITAG secretariats need trainings on the evidence-to-recommendation process and synthesizing the evidence, while core members need more training on understanding the evidence.

Proposed solutions include:

- Clarification of core competencies expected from NITAG members and how these can be acquired by trainings
- Twinning between NITAGs (although it is unclear if it possible to conduct these virtually)
- Online learner pathway through a questionnaire that proposes the adequate training available based on responses of the trainee
- Systematic orientation of new NITAG members
- Continuing to offer both e-courses and face-to-face workshops – pre e-course before a face-to-face workshop is better than post virtual resources or e-courses
- Trainings should not be too extensive (a training can be divided into two different levels to follow a stepwise approach)
- Trainers should ensure learnings can be applied soon after the training.

Specifically, with respect to the contribution of NITAGs to emergency situations and emergency preparedness, the following gaps were identified:

- Long delays/timelines to make policies, leaving inadequate flexibility and adjustability in policies during crisis time yet time matters in emergencies
- The amount of information and speed with which it reaches NITAGs is inadequate
- Lack of preparedness and prepared sites for clinical trials during times of emergencies
- Lack of experts for NITAGs - most of them are engaged in different assignments or government work. The selection criteria for the members of the NITAG are not always clear
- Lack of clarity on what the NITAG priorities or contribution should be during emergencies which makes it hard for governments to engage with them (lack of political involvement and awareness)
- Frequent lack of government/politician dialogue or education about the NITAG, their role and responsibilities
- Lack of clarity on the audiences and the messages of the NITAGs
- Lack of clarity on what the contribution of the NITAG to communication should be (at times during the last pandemic they have been invisible or not vocal)
- Gathering lessons learnt from past emergencies.

As a result, the following needs were identified:

- NITAGs should be able to communicate with the public and the media during emergency times
- Carry the lessons learnt and gained knowledge for the next emergencies
- NITAGs policies that are flexible and adjustable as time is a factor during emergencies
- Rapid exchange and active dialogue between the NITAGs and other stakeholders such as manufacturers, scientists etc. as it is with SAGE. This would help in decision making. How fast this information reaches NITAGs matters. There should be access to data in real time.
- Because there are different types of emergencies, clinical trial sites have to be prepared ahead of time should there be another pandemic or crisis

- A list of stakeholders and interested partners should be generated to facilitate earlier engagement and dialogue
- Expert direct contact with NITAGs is important during emergency. This gives the NITAGs an opportunity to hear from the experts and discuss with them on what data is available. This would ensure that the NITAGs are well involved in their country's decision making and can guide the country better.
- Experts within the countries, regions, and globally to come together with specific targets on how to prepare for the next emergency. It is important to know the elements of action and priorities ahead of time because time is critical during pandemics
- Vaccinology courses to help break the wall of connection to the NITAGs by creating a continuum of dialogue and information
- Clear communication that decisions taken and what we do during emergencies should not affect other aspects of vaccination
- Clear definition of the NITAGs
- Governments to use NITAG knowledge and expertise, as well as be educated about the NITAGs and their role

To improve emergency preparedness, it is important that the following groups be trained:

- Decision-makers: Ministry of Health/ Department of Health; NITAGs/ RITAGs,
- Implementers: EPI managers, clinicians, epidemiologists, NGOs
- Communication experts

As soon as possible, 4 essential basic modules should be developed covering:

1. Basics of public health
2. Regulatory and vaccine science
3. Preparedness and planning
4. Communication

These could be a combination of webinars, MOOCs, and online courses. One could create slide deck templates which can be adapted for each ‘Disease X’ with 3-4 slides on basic epidemiological principles (R0 number, transmission, outbreaks), template slides which can be filled in with information on pathogen and disease, prevention methods (overview of pathogen, overview of disease caused, mode of transmission, transmissibility, methods of prevention/vaccines licenced…). Series of checklists can be prepared and coordinated.

With respect to health care professionals, they need first to be convinced themselves of the importance of vaccination. Training of healthcare workers and continuous education is a priority and the project presented by Pierre on the barometer could be very useful.

There is a need to focus on target groups and what is required, and training should be tailor made.

There should be short module requirements on basic training on vaccine delivery and how to improve immunization as well as on regulatory, ethical, and legal aspects.

Session 4: Course accreditation

The principles of accreditation in the context of continuous medical education were presented by Jane Tipping. This included a description of the criteria for accreditation and the justification for these criteria. Although accreditation can vary from one accreditation body to another, the common accreditation criteria include:

- Identification of the target audience
- Planned activity based on identified needs (perceived/unperceived)
- Program with clear objectives
- Educational methods are appropriate for achieving the objectives
- The audience can participate actively
- Participants can evaluate the activity
- The activity respects the code of ethics that govern sponsorship and funding with declarations of interest by the planning group and the faculty
- The budget and financing are adequate for the event
- Related social activities do not interfere with the scientific content

These criteria are important in view of the desire to create and maintain effective learning for professionals based on lessons learned from adult learning theory and the need to maintain integrity between health professionals and industry.

Philippe Duclos then presented the practical experience of ADVAC with its accreditation to the European Accreditation Council for Continuing Medical Education (EACCME). Accreditation is one of the several factors that builds credibility of the course and can result in higher interest for participants even if they do not need to claim the credits, higher acceptance for faculty, and higher interest for the sponsors with increased chances of funding.

Accreditation can be secured both for face-to-face or virtual events, acknowledging that non-interactive virtual training activities are treated differently compared with the live interactive events virtual. One could also request accreditation for webinars and update/refreshers activities.

Accreditation processes have changed over the years and continue to evolve and tend to look more and more on e.g. impact on patient health, patient engagement and incorporation into needs assessment. It is important that the planning committee for the event is representative of the target audience. Considering that most vaccinees are healthy people and that vaccination concerns the entire population, this is challenging. One needs to look at how to include representatives of healthy people and manage the advantages and challenges with patient engagement. There is also an evolution towards harmonization of accreditation criteria.

If one course is accredited with a given accreditation body, even if there were no direct agreements with another accreditation body in place, it is very likely that based on the program of the activity and accreditation, all professional bodies will recognize the CMEs awarded. As such, a course needs to be accredited to one and only accreditation institution. Even if there is no accreditation body in a country,

accreditation could be secured from other accreditation institution. As an example, EACCME accredits events organized in non-European countries.

Although it was initially anticipated that WHO's training academy may offer a structure for courses' accreditations, this will not be the case in the foreseeable future.

Courses which are members of the Collaboration offering short courses that are not yet accredited are strongly encouraged to start a process allowing for accreditation.

Session 5: Course evaluations

Jane Tipping introduced the session with an overview of program evaluations highlighting a few of the points covered in the evaluation handbook that she had developed for courses ahead of the meeting. She first stressed the difference between Assessment and Program Evaluation. Assessment generally addresses and evaluates what, how much and to what level learners have met predetermined levels of knowledge, skill or professional standards whereas program evaluation addresses effectiveness and impact of educational interventions (can include learner assessment as a measurement). Her key messages were that:

- There are different levels and purposes of evaluation
- There are differing levels of evaluation beginning with participant satisfaction and moving along the scale to impact on patient health
- The first step is to have clarity on what needs to be measured in the evaluation
- Next is choosing appropriate evaluation methods based on goals and objectives of the program
- Availability of resources impacts the ability to address more complex levels of evaluation
- Consider use of multiple methods of evaluation for any one program

She reminded all that no matter what the level of evaluation, questions related to logistics and future learning needs provide important information. A question often neglected is one that provides information on what may have interfered with participants' learning.
The presentation ended with a brief discussion on common challenges and tips for addressing those challenges.

The session then continued with breakout group discussions around three main questions:

- What are the main challenges with course evaluations and what are the main opportunities and threats?
- What does success mean for a course and how can we measure impact?
- How long after the trainings should we measure the impact: shortly after, 3 years, 5 years or 10 years?
- How can we measure the impact of multiple training on students? We have many students that participate in several vaccinology courses.
- Should we evaluate the need to do another training after the first one?

The following presents the consolidated output of the discussions.

Challenges, opportunities and threats identified are listed in Table 2 below.

Main challenges of evaluation	**Opportunities in support of and derived from the evaluations**	**Threats to evaluation**
How can we attribute the results to the course (over-ambitious expectations) – need to take into consideration other factors including environment/context Quantitative metrics do not exist for measuring the long-term impact as so many factors impinge, hence a need to be qualitative. During the course, right at its end or in the short-term there are difficulties to show the change No opportunity to show the change while at the course/end of course Changing behaviors is a long-term process Teachers cannot differentiate between output and outcomes, so they need to be oriented to know how to do this Retainment to measure the performances – participants often change jobs making it difficult to assess impact /outcomes in an evaluation Adaptation to different means of learning (online vs in person), context and different format of learning, constant update to situation/context and evolving of courses Non-response to evaluation increasing over time Development of the questions to conduct reliable evaluations and assess impact	Task shifting after training and more empowerment Training can improve skills and mobilize more resources – write proposals and obtain more funding The use and frequent engagement with alumni groups, social media-LinkedIn, WhatsApp The Global Collaboration on Advanced Vaccinology training network can help construct evaluations or create guidance/ frameworks for evaluation of impact. Pre-attendance evaluation improves understanding of trainees' baseline knowledge, competency. Automation of the evaluation process Engagements with funders and marketing reasons – way to make funders more comfortable with program and facilitate funding and sustainability. Lack of evaluation results in decreased credibility Allows to identify areas requiring improvements Good explanation of the need/rationale to evaluate will improve completion	Only one real threat was identified, i.e. the potential negative impact on level of funding if the results of the evaluation show that the course is of poor quality/impact or not needed. However, as the results should be used to improve and better target the program, this should not be an excuse for not implementing evaluations

Resource constraints to conduct impact evaluations over time Uses of evaluation results		

How can we measure the impact?
This depends on the nature of the content and the need to evaluate different parts of training as well as the course duration e.g., a few days or weeks vs a master's degree course. This also depends on the type of skills that one is trying to look at as well as the aim of the training i.e. if for a person or the system and the pre-enrollment conditions (where, what participants were doing before enrolment).

Ultimately, one would like to evaluate the change in practice as a measure of impact, but it is hard to look at reduced incidence of VPDs and link it to the training offered. For advanced vaccinology courses targeting vaccinologists, it is difficult to look at the skills and look at actual practice.

With respect to the timing, the evaluation can be:

- Short-term: knowledge, competencies (a few weeks),
- Midterm: Concrete behaviour changes and implementation of commitment to change can be assessed within 3-4 months
- Intermediate – after six months: to ensure that the knowledge and competencies are still there and if not used, will be used.
- Long term: Impact of these behaviours. After one year, one can turn to qualitative case studies on impact. On the longer term it seems that qualitative evaluations might yield better results by asking questions about how the training may have affected career options, job opportunities, becoming members of national, regional or global immunization/vaccination decision-making bodies (NITAGs, RITAGs, SAGE). This may be helpful for the next

generation of faculty members for the vaccinology courses, conveners of vaccinology courses, individual case studies and stories of how it impacted their life, etc. Beyond 5 years, the specificity of the training impact becomes more difficult to measure, and the longer the time the more difficult it is to measure.

The evaluation can be more direct (evaluation of knowledge, skills and attitudes of learners, numbers of participants who receive certificate) or indirect: achievement of learner's own objective (doing their job better, improving through their career journey).

The impact of a course can also be measured by:

- Mentoring follow-up: interviews with learners
- Self-assessment throughout year
- Measurement of alumni network interactions/connectivity (platform, social media)
- Higher demand for training
- Implementation of cascade or additional training activities by the participants
- Suggest yearly follow-up, until 3 to 5 years

Impact evaluation for train-the-trainer courses could be done in a more quantifiable manner with indicators.

It was argued that improved vaccine confidence could be measured within 3 years.

Many courses already conduct evaluations to measure course's impact and it was proposed that those who do not have an evaluation, could go over these evaluations and adopt what might be beneficial for their programs. This could help them construct one which would also be a networking project.

Impact of multiple trainings that may have been attended by courses' participants

A variable proportion of courses' candidates and participants have already attended other advanced vaccinology courses. This poses challenges in the evaluation of the applications. The effect may be positive as participants may be better prepared to follow the new course. The effect could also be negative. If a participant has already had an opportunity to attend a course what are the priorities in choosing who attends if affordability is an issue? When there are more applicants than available seats, should new applicants have priority over those asking to attend for a second time?

Some of the interest in attending other courses may be due to attending a course with different emphasis (more specialized versus general, complementary trainings), need for a refresher course after some years, or interest in expanding the networking.

There can indeed be an additive value to attend multiple training. Students attending multiple courses that have similar typology (course design and contents) are likely not to have any incremental benefits. However, this may be different for students attending courses that build on the knowledge of the previous courses. It is

therefore important to have clear and transparent selection criteria when assessing candidates to avoid overlapping/duplication and looking at cumulative experience (justified if new science, good performance, building on person's experience).

Knowledge is additive and facilitators and barriers to this are individual, i.e. context matters. Baseline in advanced courses is very different so impact of an individual course versus another one as well as the additive effect is difficult to measure. So looking at the differential impact of multiple training is very difficult, and one should actually look at the contribution of a course soon after it is held.

Perhaps one could directly ask participants "do you think this course impacted your trajectory/career?" though the answer may depend on where they are in their career.

Other comments and recommendations for the evaluations

- Faculty are often neglected in the evaluation process
- The logistics of the course and creating a pleasant environment to facilitate learning are very important and the evaluation should look at the identification of logistic factors that would impede learning
- Questions can be added on the contribution of participants e.g. What was your own contribution? Will this lead to a change in your practice? If not, why not?
- Numbers are helpful and can give an immediate sense of where the program sits
- Evaluations should be anonymous.
- When there are language problems, it may be better to interview people rather than asking them to complete an evaluation in writing or this could be additional. This of course would not be compatible with a fully anonymous evaluation

Session 6: Cascade Training

Advanced Vaccinology Training programs transfer knowledge and skills to participants and want to see participants utilize these in their work situations and share these with others either informally or formally.

Cascade Training can be defined as "a series of training processes, each occurring as the result of the one before". It is widely utilized in the diffusion of information and expertise in health and social care, education, and industry (Cheese J. Programmed Learning. 1986;23:248–52. Gask et al., BMC Health Services Research 2019; 19:588).

This session, illustrated by examples of what constitutes true cascade training (or not), was aimed at presenting what cascade training is really about and what it entails. Naveen Thacker presented the development of a two-day basic vaccinology course developed for state level immunization managers and private paediatricians derived from a seven-day national level advanced vaccinology course in India as well as the development of various presential or online short courses by the International Paediatric Association. Christoph Steffen then presented some critical

elements of WHO's efforts to support NITAGs training. By the nature of the NITAG training is provided to a limited number of NITAG secretariat and members, WHO assumed that the training content "cascades down" to a broader NITAG audience informally in countries. However, the current NITAG training material which is publicly available on the GNN website, has not been designed for cascade training. There are different audiences within the NITAGs. WHO engages with the trainers and the materials are adapted to the different situations depending on regions or perhaps more country focused. It is more the NITAG Chairs and secretariat that are participating in "full" NITAG 5-day trainings. Eventually, NITAG members need to know what the chairs and secretariat have learned but WHO does not really know if the information trickles down. There are modules for the 5-day training programs but what is used depends on the maturity of the NITAG. Conceptual way of addressing training needs include face-to-face, virtual, at regional level or going to the country. To be done seriously, it is important to have an expert who has done this training on the subject and who can answer difficult questions especially for disease, vaccine or program specific issues but sometimes the trainer does not have this expertise. In order to address that at global level, WHO has tried to maintain an up-to-date reservoir of training material which can be adapted. WHO is planning on having a menu where it is possible to decide on time available, topic, and target audiences but this is still in the making. The main body of material now consists of a five-day training. From the interaction with NITAG Chairs, it seems that often the Chair takes an hour or less to onboard new NITAG members, conveying the most important points.

The session helped course organizers understand that when they think they are doing cascade training, in fact they are not really doing it at all - what they are doing is very informal training. Formal cascade training is complex. To do cascade training seriously, one has to plan it, think about what is needed, and have the right resources to support it. Quality assurance and fidelity with respect to the original training materials are particularly challenging. One has to credit the original documents and look at what can be lost in the adaptation and downsizing, lost in translation (figuratively and literally), what could be misinterpreted or misrepresented with altered emphasis. Further, if materials are not properly adapted, they may not fit context, culture, and resources. Participants commented that many faculty would not like their slides to be adapted.

The examples presented did show the challenges of scaling up training with shorter training timeframes. Five-day modules are not going to work if the next level participants only join for one hour or so at most. One could address fidelity, but this has to be well prepared and planned.

Lectures and teaching material could also quickly become obsolete, and one needs to see if they are still valid when used in the cascade training or if they need updating. Further, there may be a challenge with faculty if their materials are made public and this could have legal implications.

If one decides to do cascade training from their courses, one needs to look at the relevance of the training – look at the participants – decide if one wants to do formalized cascade training and think about what it is and explain to course participants who will cascade out. Participants who want to "cascade" what they

have learned at an advanced course need to understand fidelity, issues of being out of date, issues around having enough background to appropriately discuss the slides presented. Moving to formal cascade training also implies a uniformity of the audience.

Sometimes informal cascading is better than nothing when there are no other options in some countries or regions. However, not everyone is prepared to cascade.

It is possible to have basic vaccinology training modules (e.g. platforms that vaccines are being built on; or communication) that can be cascaded but for advanced courses this may be too complex.

There was consensus among participants that for advanced vaccinology courses engaging in formal cascade training was risky and that they should limit themselves to supporting the development of other courses/seeding courses and leave the organization of basic courses and mass training to others involved with it.

More thoughts are needed on how to get this more complex advanced vaccinology information out to people in a way it is going to work- where can be fidelity etc.

Session 7: COVID impact and related remaining training needs

Ahn Wartel presented on the impact of COVID-19 and the remaining COVID-related training needs based on the example of the IVI course.

The COVID-19 pandemic has impacted vaccinology course format, timing, and modules.
Tremendous knowledge on SARS-CoV-2/COVID19 has been generated from observational and interventional studies. The need to emphasize some topics of interest in the vaccinology courses has been highlighted (e.g. communication skills, behavioural and social sciences, vaccine access and vaccine hesitancy).

The COVID-19 pandemic has revealed a new vaccine platform, its performance and its potential (i.e. m-RNA platform. COVID-19 vaccine development has been a scientific breakthrough in less than 1 year – we now have the know-how!).

Vaccine inequity has triggered a great effort from WHO to transfer the technology to LMICs, as part of a global push to increase manufacturing of COVID-19 vaccines in LMICs for under-served nations, more trainings programs are being put in place.

WHO announced the partnership of WHO's training academy with South Korea to develop a global bio-manufacturing training hub for LMICs. IVI has designed an 80 hrs. course including a biomanufacturing component, 2 weeks, with 300 international participants targeting Governments and vaccine manufacturers from LMICs and 150 Korean participants. They have a team looking into the criteria for the countries or for vaccine manufacturers to apply, and then to deploy the program over the summer. There will be some on-site sessions as there are limitations to online training. The idea is to select one country and then go to other countries afterwards. Interest has already been expressed by Bangladesh.

Narendra mentioned that COVID has taught us that we need to change how we communicate on vaccine efficacy. Saying that vaccine has 95%/75% efficacy actually has no meaning. Each vaccine has three types of efficacy/effectiveness that should be looked at and communicated upon:

1. Prevention of infection
2. Prevention of symptomatic disease
3. Prevention of severe disease and death

Indeed, today almost all vaccines available against COVID-19 have very similar efficacy or effectiveness against severe disease or death but variability for the other two and this concept needs to be emphasized as a major communication point. This is part of the issues that lead to vaccine hesitancy.

The other issue to be communicated is the concept of bridging studies which has never been so much in the forefront of ethical issues and now new vaccines have to go through bridging studies. This is another dimension that needs to be told – how bridging studies are done and the whole concept behind it.

Considering the impressive presentation from IVI in terms of the increase in participation in its course (total of 7,478 registered participants from a total of 165 countries, on average 3,041 per day attended (42%), and 1,114 participants awarded a vaccinology course certificate if they had attended 90% each day online for 90% of the time), it was queried if one could compare the impact of the online training with the face-to-face and if there will be a follow up of participants. Ahn answered that this was one of the key challenges with COVID-19 and moving forward with what are the learnings for further improvement and in the context of training gives an opportunity to tease out the development process and where improvements can be made. This shows that there are lots of opportunities for training and interaction and showing that there is not one way to do it. There are plenty of improvements in terms of vaccine development.

Paul-Henri Lambert commented that it is possible to expand the numbers of participants in a course but the interaction between participants then becomes more difficult. Ahn agreed that the interaction was reduced but to keep some proximity with the participants, a link was opened a few days before to raise questions, and during some sessions, tried to foster some live interaction with some lecturers participating virtually to take questions but they received very few questions in advance.

During the discussion, Sonia Pagliusi gave an example of online training and indicated that more people were trained during the COVID crisis as more applied for courses online and we need to keep up the momentum. Those who received certificates benefitted but also those who did not as some only wanted to select certain modules of personal interest.

The budgetary aspect is also important as the costs of online courses is very low.

Session 8: Refresher courses

Since 2005, the Annual African Vaccinology Course (AAVC), a 5-day course offered to diverse audiences, has trained around 1000 participants from 48 African countries.
In 2011 and 2016, CHF-INCLEN organized the Advanced Vaccinology Course (Indian ADVAC) which is a 7-day course and in 2017, the Essential Vaccinology Course (EVAC) which is 3.5-day course. A total of 167 participants were trained across India. Conveners of these courses noticed an increased interest by the alumni, applying to come back for refresher vaccinology training. In February 2022, in preparation for the global workshop, conveners of these courses conducted an online survey to understand the rationale for the increased interest of refresher vaccinology courses by the alumni.

A short google form questionnaire was sent via email to alumni asking the following:

- if there was a need for refresher training
- reasons for wanting a refresher training
- the preferred means of conducting refresher training
- attendance of any vaccinology course/s after attending AAVC or CHF INCLEN courses
- whether they would be open to attending other online vaccinology courses for refresher training.
-

Overall, 547 AAVC alumni from 2011-2020 and 167 CHF-INCLEN alumni for 2011, 2016 and 2017 were surveyed. Responses were obtained from 100 (18%) AAVC and 27 (16%) CHF-INCLEN alumni. Most alumni had not attended other vaccinology courses after attending AAVC or CHF-INCLEN courses

The conclusions from the survey were that:

- Alumni need refresher vaccinology courses
- Reasons for refresher training are to update, refresh and reinforce knowledge, provide an opportunity to network and share ideas
- Refresher training should be focused on specific topics
- Most alumni are open to attending an online vaccinology course for refresher training.

The presentation was followed by a discussion around the following themes:

- Considering that the course conveners' perspective was not surveyed, do the course conveners see the need to provide refresher vaccinology training and why? Is any convener already providing refresher vaccinology training?
- What challenges do conveners need to overcome to provide refresher vaccinology training in the context of funding/resource realities, and of the huge pool of potential participants still in need of a first vaccinology course?
- How do the conveners overcome different challenges to provide refresher vaccinology training to the alumni e.g. pooling of resources, leveraging on vaccinology networks?

As an example of refresher activities conducted, Philippe indicated that ADVAC implements regular alumni meetings and now webinars on topics of interest – these are hot topics with some on recent vaccine developments, so they do contribute to updating knowledge. In the future, when face-to-face meetings resume, ADVAC will

continue its alumni events in dual mode with virtual and face-to-face participation. ADVAC also gave the possibility to other interested parties to attend these meetings and webinars e.g. NITAG members, members of IABS. During the pandemic most of the webinar topics were related to COVID. Webinars are now systematically recorded, and the recordings are posted on the ADVAC website. The recordings have also been shared with all vaccinology courses involved in the Collaboration.

In addition, at the end of each ADVAC course there is now a Highlights presentation of the main features of the course and the main developments over the past year and that is a way for previous alumni to update their knowledge more easily. Up to 2019, all presentations were posted on the alumni password protected platform of the ADVAC website and since 2021 all recordings of the lectures and discussions are also posted on the alumni website.

Benjamin has designed a series of webinars for AAVC alumni and he is looking to see if he can share his webinars with other courses. One of his challenges is the contracts/confidentiality agreements signed with industry-affiliated participants.

In South Africa, SAVIC also pre-records lectures mostly for the two-day short courses. When they received requests for refresher courses, all the recorded lectures were deposited into an online base like Dropbox and the alumni have access to these lectures.

One important question is if courses' faculty are interested in doing refresher courses or not as this represents additional work without compensation. Naveen clarified that in India, most of those interested in refresher courses are actually directly involved in disseminating knowledge. They do the courses online.

Noni stressed that we need to be clear that refreshers and updates are important. It is not about refreshing the knowledge of individuals – it is about what the persons do with the updated knowledge in their job and the impact it has globally. We need to help funders to understand why this is so important because vaccinology is not stagnant. It is critical that refreshers' opportunities are easy, not expensive, come in different formats, and we need funders who can make that happen.

One queried how we can make the webinars more engaging so that the alumni may have more incentive to use these recordings, e.g. we can have a global repository that collates all these webinars that can be accessed by alumni. It was also proposed that designers could make them more attractive – appealing and user-friendly.

Clare recommended to expand and register series of webinars on continuous medical education platforms and to have accreditation for them or a certificate.

Naveen contributed that when IPA organizes webinars, although many register, many less actually participate on the day. Twenty percent is considered to be a good attendance of those who actually registered. When they then proposed an IPA certificate, the attendance increased to 50/60%. This supports the idea of incentives, certificates or CME credits. An important difference between registration and participation was also observed with ADVAC alumni webinars. This may be related

to interest as well as intervening work-related priorities. For ADVAC an added constraint is the challenge of scheduling these meetings as alumni come from all around the world. Some recordings however, have been watched by over 5000 interested parties.

Noni suggested that there should be easy access to different webinars on different topics and that after the webinar participants could be asked if they would like to be part of a network to further discuss. This would encourage people to engage.

Benjamin pointed to the importance of how these refreshers translate into impact – it is a good idea of having a network that would engage the alumni even more with these webinars and resources that would be made available to them.

It was also proposed to interest the alumni more with designing webinars in a more gainful way, e.g. watching a lecture followed by a quiz that allows them to obtain a certificate of completion of the module and which allows them to continue to the next level. This could be fun and more interactive.

It was also queried if it could be left to alumni to lead these webinars. Philippe indicated that ADVAC alumni have been engaged in alumni webinars and meetings and that ADVAC intends to empower its alumni to organize their own regional webinars - meeting and exchanging more locally/regionally which could facilitate participation in terms of time zones and topics of interest.

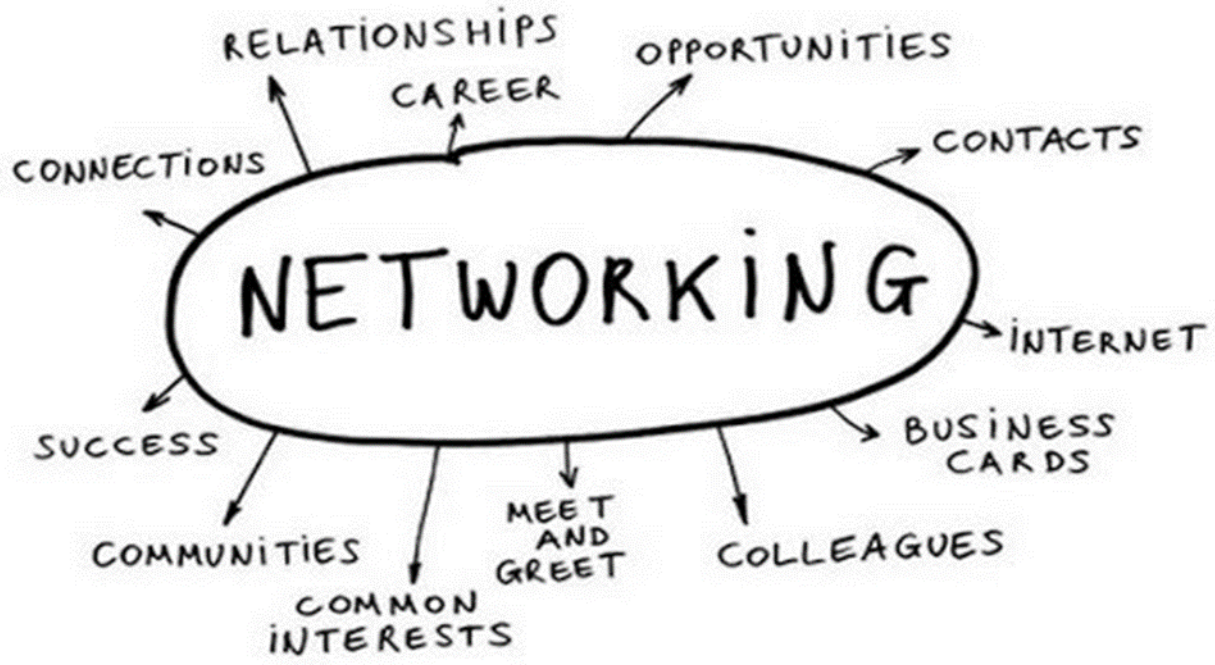
Noni added that one could have webinars on “how to do” – experts speaking on background knowledge, but translating that into action the alumni can actually do a better job than the experts on how to make it work. This could be done through a follow-up webinar of “this is how I made that work”. For those in the field, that is more practical.

It was queried if it would be operationally feasible if ADVAC could expand face-to-face meetings beyond ADVAC alumni only. Philippe indicated that this was possible if there is a big enough room available – ADVAC has always opened the door to other interested participants. As ADVAC does not have the financial resources to pay for the travel of alumni, it takes advantage of large conferences where many of the alumni are in attendance (SAGE, ESPID). Philippe did not see an objection to opening these meetings to others but cautioned that he could not be over-ambitious with regard to the financial and manpower implications.

Session 9: Facilitation of networking

Rodolfo Villena introduced the session with some general principles of networking illustrated by Figure 1 and indicated why it is important to network

Figure 1:



https://www.dreamstime.com/royalty-free-stock-photo-networking-concept-image8015555

He then highlighted what one needs to do before, during and after the course to facilitate networking and make participants feel part of a network with privileged exchanges including on a bilateral basis.

He then presented the results of a survey implemented in February 2022 when questionnaires were sent to the alumni of the CHF-INCLEN in India and the Chilean vaccinology course in Latin America. In total 38 alumni completed the questionnaire (28 in India and 13 in Latin America). The conclusion of the surveys is that alumni want networking; facilitation for exchange of knowledge and best practices are considered of value; workshops, seminars or conferences are preferred for networking; time constraints are certainly an issue; on-line meetings (virtual or hybrid) at least quarterly are desirable.

He concluded by stating that achieving the goals of the Immunization Agenda 2030 is a commitment and that a well-trained workforce will help/enhance immunization programs and decision-making processes. Networking in advanced courses will improve courses and continuous-educational efforts. There is a unique opportunity for the networking-enrichment process and this should be included from the design of the course and during the course, and tailor-made post-course activities should be designed and implemented. Knowledge could fade or change but networking will prevail!!

Paul-Henri commented that we are all convinced that networking is one of the most important outputs of our courses and he therefore queried specifically on how we can increase networking during virtual courses because this is a real challenge compared with face-to-face courses.

Naveen indicated that in some conferences, a site has been created where participants can network. There are ways where participants can connect and we will get more and more used to these ways of connecting and networking should improve. The common hesitancy to use Zoom, etc. seems to have disappeared and everyone is comfortable using these platforms. He expected that networking will gradually develop but it will never replace face-to-face opportunities.

Denise Naniche also mentioned the MeetUp networking that is all over the world (professional and social activity network). Wherever you go you can see if people are organizing local events or you can organize one online or face-to-face.

We now have the tools to network virtually and as these are developing, in some years we may have different and more effective tools.

There was consensus that networking virtually is easier if one has at least met once. To exchange WhatsApp details, etc. one may not want to do so if one has not met before.

One worry is that there are so many virtual networks! The question being how the vaccinology network ends up being privileged and that with only virtual tools. Further, the new generation may actually miss the human element that facilitates trust and open exchange between people.

Rajinder Suri commented on the possibility to create meeting rooms where people could be one-to-one in a totally protected environment – also to do one-to-many and there are possibilities existing on various platforms. He nevertheless also remains a strong advocate of physical meetings – initially everyone wears a professional "mask". It is important to break these barriers and to get to know each other really well and that can be done one-to-one over a coffee. When shaking hands, one is sharing vibrations which are important to create real trust and build the bond of a relationship. Barriers are broken and one can interact freely, understand each other and negotiate. He advocated that we should now start planning more personal interactions whenever possible. This is particularly important when courses give the opportunity to people from different backgrounds to meet each other and have an open discussion.

Melinda Wharton was struck with the similarity to some of the social capital research that talks about bonding social capital which seems to be in a group with people that you have a lot in common with. Bridging social capital with people who have less in common and with weaker links tends to be the really important social capital for giving access to opportunities and information they would not otherwise have. In thinking about these courses, it does feel like it is a really unique opportunity for participants to develop cross-sector connections that otherwise would potentially be more difficult.

Noni MacDonald commented that general networking before, during and after a virtual course works but people do not feel committed to it, and to have a strong network they need to have a sense of value added by being there and participating, and as Melinda said - when you hang out with people like you, you tend to talk about the same things over and over but you do not gain. If there was a way to nurture

problem-based networks – people working on a different area/aspect to solve a problem – give them a task and ask them to report back, that can stimulate more positiveness. From her experience it was the topic-focussed networking rather than the general that worked best. In virtual meetings, the more opportunities that people have to talk together in smaller groups, the more bonding keeps increasing.

Winsley Rose commented that when we meet face-to-face, networking often happens on side-lines of meetings and that is not provided for in virtual meetings. Maybe we should think about a way to facilitate these side-lines such as breakout sessions which help people to get to know each other in smaller groups or as Noni suggested, to have a topic to discuss without a specific agenda.

Narendra Arora commented that INCLEN is a network itself and they have realized that even when they have face-to-face meetings the network is sustained if linked to gainful activity professionally and personally. If that is not there, the network fades and for virtual meetings, it will fade even faster. Time constraint is not the real problem - it is the interest and value the person gives for investment in an activity that will drive the person to find the time or not. Networking can only work if it is a win-win situation for everybody at the organizational and professional level.

Rodolfo agreed that face-to-face is best for networking but that sometimes you do not have the opportunity e.g. if funding is not there and virtual courses are the only option. The ideal is to have face-to-face courses followed by virtual meetings to maintain the link, e.g. for refreshers and keep people updated. There is a challenge for courses that have been online since the beginning, and they need to evaluate if they can build the trust relationships among participants.

Participants liked the idea of incorporating networking into evaluation and of formally evaluating networks after courses.

Rachel Afaayo suggested that if vaccinology courses give people an opportunity to interact with each other after the course within their countries or regions – it may be easier for them and in time they could interact globally. Philippe responded that indeed ADVAC would like to promote regional ownership by the alumni. ADVAC alumni also have access to the email addresses of other ADVAC alumni so they can take initiative to communicate. ADVAC also plans to have regional virtual meetings. At times it is certainly a challenge to find a time slot for a webinar. One needs to identify these venues as well as funding and infrastructure.

Session 10: Sharing of information and resources between courses

A 13-question questionnaire on the Sharing of information and resources between courses was sent to 30 directors representing 33 courses, and results of the survey were presented by Carine Dochez.

Responses were secured from 27 (90%) respondents with 24 (89%) indicating the need to have access to additional resources: case studies or exercises (92% of those stating needs), evaluation tools (79%), video lecture recordings (67%), Powerpoint slides (63%), list of potential lecturers (63%), and background documents (54%). Twenty-two respondents (81%) were willing to share

presentations/case studies/other materials on the password protected e-portal of the Global Collaboration on Advanced Vaccinology Training. Most of those unwilling to share resources were MSc Programmes and amongst the reasons for not sharing were company/sponsor agreements. About one-third of the respondents spontaneously mentioned the need for approval from authors/presenters. Twenty-three respondents mentioned that the resources can be used if properly acknowledged. Twenty-two (81%) respondents agreed that a code of conduct should be developed for sharing resources between courses. It was notably stated that this should be a document highlighting the basics with clear internal regulations. It should state good practices to adhere to, and not be prescriptive. Developers of resources should be acknowledged, and it should be stated that the purpose of sharing is for educational purposes, and not for publication or commercial use.

Feedback was also provided on what respondents considered as good practice and this was used for the development of a Code of Conduct on the sharing of information which was presented to participants by Naveen Thacker.

By far the preferred way for the sharing of information by the courses is the password protected area of the e-portal of the Global Collaboration followed by emails or links to the websites. Dropbox links, WhatsApp groups and other discussion forums were the least preferred ways.

Twenty-one (78%) were in favour of developing a discussion platform on the e-portal to include: experiences, challenges, gaps, best practices with course organization, course content including case studies, trending topics, innovations, creation of new learning activities, course marketing, and legal issues regarding sharing resources.

Following the presentation of the Draft Code of Conduct, and some active discussion and clarifications, there was consensus on the proposed content of Code of Conduct.

It was pointed out that a lot of issues on the sharing of documents are actually covered in Creative Commons. However, the Code of Conduct was essential as a simpler reference document. The reference to Creative Commons and agreement of the Code of Conduct with Creative Commons could possibly be referenced in the Code of Conduct itself.

It is fine to use case studies and adapt to different contexts/cultures. In view of the speed with which some shared resources may become obsolete/need updating, the Code of Conduct should also mention that it is the responsibility of the person using shared materials to ensure that they were up-to-date. The Collaboration cannot take responsibility for the cost of updating and/or adjusting to the sensitivities of local environments.

During the discussion that ensued, it was suggested that one could organize a webinar on copyright issues and how this relates to the Code of Conduct. Many participants expressed interest in attending such a webinar. Noni proposed that a former ADVAC participant who is a lawyer (Shawn Harmon, Dalhousie University) may be willing to help develop a webinar with her and Jean-Pierre Kraehenbuhl. This would cover Creative Commons.

It was also suggested that one could develop a standardized form to facilitate the sharing of resources.

Participants also proposed the potential development of a refresher course for the Collaboration. This would be for one or two days with a selection of a few lecturers from various courses in the name of the Collaboration and use as a Refresher Course. This would be a pragmatic implementation of sharing of resources and at the same time a useful refresher course for all courses' alumni. One could organize a poll of subjects that could be included in the refresher course. It could be organized virtually with regional poles of people meeting locally. This would also be a good opportunity to engage the alumni again.

Session 11: e-portal

The session started with a review of the features of the e-portal and an analysis of its use based on Google analytics for the one-year period between 15 March 2021 and 15 March 2022.

The aims of the e-portal established after the first global workshop were to: (1) provide a listing of existing advanced vaccinology training courses, of varying durations and training modalities (in-person, online, blended) and an easy search process for interested parties; (2) give more visibility to existing vaccinology training courses; and (3) allow for sharing of information between vaccinology training courses.

The e-portal was developed as a separate independent website, easy and cheap to maintain and develop. Developments to date reflect work and consensus of the e-portal workstream and further insight and requests from the Global Collaboration via teleconferences and emails. The site is available in 6 languages (English, French, Spanish, Chinese, Arabic and Russian). For the time being, 31 courses are listed in the search module and specific information on courses of interest can be accessed via web links. Some information/documents are freely accessible whilst others can only be accessed by authorized users.

During the one-year period under review there were about 6000 users, mostly new users. The access was relatively stable over time and came from a total of 144 countries. Not surprisingly, the search page for courses was the most commonly accessed. The vast majority of access was in English (84%) followed by French (7.6%) and then by Spanish (3.7%), Chinese (2.3%), Arabic (1;4%) and Russian (0.9%). Access to the site is direct in 47.5% of cases which points to the circulation of the URL for direct access. Organic searches account for another 37.0% of access whilst 17.6% come from referrals from course websites (by decreasing order of frequency ADVAC, CNVAC, ALIVE, Pasteur, ECAVI, IMMVAC, Sabin, CIFV, and SAVIC).

Over the last two years there were limited developments and postings in part due to the COVID situation and limited sharing of information and resources between courses. The hope is to list all courses of the Collaboration and to have the cross referencing of the e-portal by members of the Collaboration systematized to give

more visibility to the portal and members' sites. The goal is not to increase access for the sake of increasing access but rather to make sure that those who may need access know where to find it.

There is both a need for the development/strengthening of some of the courses' websites/pages and a need to further develop the portal, building on achievements and expectations from this workshop.

The discussion focused on suggestions for the further development of the portal.

Suggestions included the need to add attractive features and to make the site more "alive" and entice visitors to return to the site. On the front page, this could include highlighting of activities, webinars and other documents, use of pictures to show diversity, adverts for courses, and a news and events section.

Other ideas to make the site more lively included the use of alumni testimonies, having a dashboard to visualize critical information, indicating the number of people trained through the Collaboration in WHO Regions, providing an overview of all courses in central location, highlight on topics trending, advertising of the Collaboration and why we are doing it and possibly career opportunities.

It was suggested that the e-portal should be restructured with two sub-domains (intranet/internet) - one for people looking for vaccinology courses and other interested parties, and one for members of the Collaboration. The registration form for courses should not be made visible to all users.

With respect to the sharing of resources section, it was suggested to implement a search option for key words and how we enter them. There was a request for lectures from other courses. It remains important that lectures to be shared would not become obsolete too quickly. A list of potential sponsors could be useful.

Information on fellowships for participants would be useful information for those interested to attend vaccinology courses but there would be challenges to maintain this on the e-portal and it is best that this be given visibility on the respective courses' websites.

Although it was suggested that giving access to basic epidemiology courses, which could be in open access, would be nice it was also stressed that one should rather focus on vaccinology training. Links to other vaccinology courses not part of the Collaboration could be further developed, as well as a section providing links to key vaccinology published literature and basic material for vaccinology, with directions to trusted resources.

Having the dates of courses to be organized for the year with deadlines to apply as a table would be useful to potential course participants but difficult to maintain as dates might change or be decided upon only a few months ahead of courses. Once a year, organizers would be expected to give information on courses with the necessity for them to provide amendments proactively, if necessary. Dates of courses could also be slotted into the news section.

It was stressed that, if new sections are developed on the portal, they will have to be sustained and that it will therefore be important to count on all members of the Collaboration to provide news/information/updates.

More information on the portal and the Collaboration could be circulated via social media individually by members but investing on social media by the Collaboration secretariat would be too time consuming.

Finally, the discussion focused on the need to keep monitoring and evaluating the e-portal and that a small survey of users would be useful asking them what they would want to be changed and if they found what they were looking for?

To proceed optimally with the further development of the e-portal, explore feasibility and prioritize developments, an e-portal workstream will be established. The group will be composed of Lizzelot Anderson, Erika Berghman, Clare Cutland, Philippe Duclos, Lisbeth Soederberg, and Naveen Thacker.

Session 12: Formalization of the collaboration

Noni MacDonald presented the results of a survey on the formalization of the Collaboration conducted in preparation for the Workshop. Thirty representatives of active courses including representatives of multiple courses organized by the same institutions were solicited for an interview with preplanned questions conducted by KA, an MBA student considered as a neutral party.
A total of 19 (63%) course representatives participated, covering all regions and representing longstanding to relatively new courses of various kinds.

Eighteen of the responders wished for a more formalized collaboration to facilitate the exchange of information and help them address issues of concern.
Issues of concern included program related issues (finding faculty with enough time to give lectures, identifying new faculty on specific areas, bringing in international speakers, concerns about adapting and improving teaching methods, ensuring course content was updated, fitting the program to the context, potential for sharing lectures (risks and benefits) as well as issues related to the infrastructure (need for help in gathering funding (risks and benefits), recruitment of participants, development of tools (websites, portals, official summaries), establishing and maintaining credibility, and building an effective alumni network.

Responders listed the following important needs in the formalization of Collaboration:

- Clear statement of aims
- Defining membership criteria as well as noting benefits and obligations
- Ensuring that the Collaboration has flexibility built in
- Outlining how the Collaboration would be funded with an objection to any membership fees
- Defining the governance structure with support for a steering committee
- Essential not to control courses and keep their sovereignty and independence.

Narendra Arora then reviewed the rationale and principles for a Collaboration stressing the need for equal partnership and the importance of trust among partners.

Participants were then given a chance to review and discuss the key points from the draft charter that was circulated ahead of the workshop and built on the results of the above-mentioned survey. Participants agreed with the proposed charter and the formalization of the Collaboration along those terms with the following comments and clarifications:

Participants agreed that the aim for the Collaboration should be to foster collaborations between courses and create opportunities for pooling resources and increasing effectiveness through sharing experiences, lessons learned, and documentation.

The major principle is that all courses have their own specificities, independence and sovereignty. Adhering to the Global Collaboration will in no way alter this and impede their autonomy.

Participants insisted that a section should be developed on the core values of the Collaboration building on the presentation delivered by Narendra Arora.

Collaboration's specific functions:

Although there was agreement with the Collaboration's specific functions, it was agreed that enhancing credibility and visibility for the various courses, and facilitating access to a global list of courses for interested audiences should be given more prominence.

One important function is to help identifying training gaps and supporting seeding of new courses where there is need.

Steering Committee:

The proposal to have a committee of 7 members was inspired by the equivalent existing Charter for the Global NITAG Network with a limited number of members while allowing for a diversity of courses and geographic regions represented. It was suggested that starting with a total of 5 members included the chairperson might be enough for a small group like the Collaboration and easier to handle. This could be adjusted over time if this was not sufficient.

SC members will be appointed and serve in their individual capacity with the assumption that the member will be supported by his/her organization to devote the necessary time.

The challenges and advantages of making decisions by consensus were highlighted and it was made clear that one would mostly rely on consensus as the deliberations would be on issues of the Collaboration and where a decision has to be taken and not on technical issues. However, if no consensus could be reached then one could resort to vote.

The proposed term of service for the chairperson should be increased from 2 to 3 years.

Secretariat:

The Secretariat will be provided by ADVAC for a period of 3 years from this workshop with funding from the Bill & Melinda Gates Foundation.

Although the proposed clauses for the potential moving of the Secretariat over time to another institution were appreciated and it was fair to have such clauses, many expressed the view that it was desirable to ensure some stability in the Secretariat unless there would be major issues justifying a change.

Although the Collaboration itself should be a facilitating factor for its members to identify funding, the Secretariat should only fundraise for supporting the Collaboration itself, but it will not fundraise for specific courses.

The Secretariat and the Collaboration itself should not start a process of accreditation of its members.

Membership:

Although there was agreement with the criteria for membership it was pointed out that some courses may not be formally accredited yet and that formal accreditation might take time. A grandfathering clause was therefore agreed for the founding members of the Collaboration with the expectation that the courses would secure accreditation within a maximum of 5 years from the date of this workshop. Local and national accreditations would be accepted.

Membership of the Collaboration implies agreement with the Code of Conduct for the sharing of information.

The course as a whole (or groups of courses when several are organized by the same institution(s)) is/are a member of the Collaboration and all those in charge (to a limit of up to 3 persons per course leadership is set, and if courses are organized by two or more partners, it is the responsibility of the course leadership to determine who the representatives are) of the organization of the course are invited to participate in the Collaboration. To ensure equity between courses only one vote will be accepted for each course (group of courses). It is the responsibility of the courses to identify the voting party/main member.

It was then questioned if partner organizations versus members could be given access to the restricted area of the e-portal. However, the nature of some partner organizations as well as the conditions for the sharing of information even if partners were to sign the Code of Conduct do bring some issues and this will have to be discussed by the Steering Committee when established before partners could be granted access.

It was then suggested that the charter be reviewed by a lawyer before its finalization, and it was suggested that consideration should be given to the addition of a non-liability clause. It was further questioned if the Collaboration should be registered or not, and the pros and cons of such a registration for an entity like the Collaboration, and this issue will be carefully reviewed before making a final decision.

Summary of the meeting and closing comments

Noni summarized that we covered a wide number and range of issues which was facilitated by real evidence and data gathered in preparation for the meeting.

First of all, we looked at COVID and how it has changed the world, followed by the Global and LMIC perspectives of how COVID has changed immunization.

We looked at a number of reports of surveys that have been done – we had our own data to see what the needs are. It is important to have these markers of local evidence which give an indication of how we need to go forward.

There was a good discussion on a number of topics starting with the three biggest challenges in immunization – globally, regionally and by country.

There was also a very good discussion on virtual training with IVI presenting how, because of COVID, they moved to virtual training and also how they used COVID experiences and built them into the course as examples.

In the Needs discussion, many issues were raised such as equity, infrastructure, training areas, communication. It was clear that there is a real need for basic vaccinology courses and that courses and the Collaboration need to see how they/we can support groups to make this happen. Gaps in training were identified such as emergency preparedness and there are a lot of gaps in organization of courses, infrastructure and content.

There were good educational sessions on accreditation, evaluation and cascade training. It is important in the future to see that the Collaboration continues with educational sessions that help all of us enhance what we know and do not know. As an example, there was some surprise at cascade training and the implications but best to know beforehand to avoid failing.

Facilitation of networks – need for refreshers especially for regions where they have different constraints such as funding or the inability to easily leave their work to do a course. We need to think about that and how to do refreshers in a more “refreshing” way. This is something that deserves more attention on how to make it work.

With regard to the e-portal – there was a brave but harsh discussion in places and we now understand better our responsibilities and what we need to do to make it work.

There was a good discussion on sharing of resources and the code of conduct. We will need to have a lawyer look at the issues of copyright.

The discussion on the Formalization of the Collaboration highlighted the importance of getting it right as it will undermine the Collaboration in the future if not done properly

Thoughtful comments were shared on all presentations. There were lots of questions which opened the eyes of everyone in the room including the presenters. There was a lot of sharing of experience including best practices and we need to have more best practices to move forward. Having best practices on refresher courses may be something to be considered for the future. The response rate to surveys was impressive.

The Collaboration has come a long way from the first meeting and we are way ahead of where we were from the previous meeting.

The meeting enforced the view that there was real enthusiasm and commitment for the International Collaboration and its core values.

All presentations and materials shared are in the Dropbox and will be posted on the e-portal of the Collaboration.

André Picard, in his closing comments stated that he carefully listened to the needs – money, training, technical issues – but queried how these align with the needs of the public, politicians, policy makers. He stressed that it is important to look at the needs of the others when we are speaking.

For needs, what is the ultimate goal: to get as many people as possible vaccinated at the right time and place. One needs to step back and talk about it, ask the question about how you do that, how you use your voice to do this.

Single biggest issue in this domain is not how to put a needle in someone's arm but how to get them there. Countering the misinformation is essential. The public desperately needs a trusted voice and you in the room are those trusted voices. The correct communication is extremely important. There is a lot of contradictory information – people are untrusting, skeptical and scared.

It is important to communicate plainly in a different way. There are different ways to communicate – there is no one way to do.
This may depend on one's role, if facing the public or if in the back room. There is no right answer to that, and it depends on resources and willingness – but one should not forget that the real simple stuff is important to get the right message out.

Lastly, he cautioned about websites – from his media environment experience, websites are very costly, and it is labour-intensive to keep them up-to-date and no-one wants to do it. It is better to have nothing on the website than have outdated or obsolete material.

Annex 1: List of participants in attendance either in person or virtually

Rachel AFAAYO NKATUGGA, Vaccinology course for Health Professionals, East Africa Centre for Vaccines and Immunization, Uganda;

Magid AL-GUNAID, NITAG Vaccinology Course, GHD|EMPHNET, Jordan;

Lizzelott ANDERSSON, Latin America Online Vaccinology Course, Carlos Slim Foundation, with endorsement of the National Autonomous University of Mexico, Mexico;

Sandra ANGELE, Fondation Mérieux, France;

Narendra ARORA, Child Foundation/INCLEN, India;

Nyambath BATMUNKH, WHO Regional Office for the Western Pacific;

Erica BERGHMAN, Certificat Interuniversitaire en Vaccinologie, Université libre de Bruxelles, Belgium ;

Paolo BONANNI, Vaccine and Vaccination Strategy, University of Florence, Italy;

Marc BONNEVILLE, Fondation Mérieux, France;

Mohammed BOUSKRAOUI, Inter-University Diploma in Vaccinology, Faculty of medicine University Cadi Ayyad, Morocco;

Cheikh S B BOYE, International Course on Vaccinology, Université de Dakar, Senegal;

Nyasha CHIN'OMBE, Master of Science in Vaccinology, University of Zimbabwe; Zimbabwe;

Joanna COLBOURNE, Clinical Vaccinology Course, National Foundation for Infectious Diseases (NFID), United States of America;

Béhazine COMBADIERE, MOOCS Vaccinology and Institut Pasteur International Vaccinology Course, INSERM, France;

Clare CUTLAND, African Leadership in Vaccinology Expertise (Alive), University of the Witwatersrand, South Africa;

Tarik DERROUGH, European Center for Disease Control, Sweden;

Arnaud DIDIERLAURENT, University of Geneva, Switzerland;

Carine DOCHEZ, University of Antwerp, Belgium;

Philippe DUCLOS, ADVAC Advanced Course of Vaccinology, University of Geneva, Switzerland;

Esra EKINCI, Summer Course on Vaccinology for Students, University of Antwerp, Vaccine and Infectious Diseases Institute, Belgium;

Quamrul HASSAN, WHO Regional Office for the Eastern Mediterranean, Egypt;

Louis HENAFF, World Health Organization, Switzerland;

Benjamin KAGINA, VACFA Annual African Vaccinology Course, University of Cape Town, South Africa;

Jean-Louis KOECK, CIFV, Direction Centrale du Service de Santé des Armées, France;

Jean-Pierre KRAEHENBUHL, IMVACC, Health Sciences E-training Foundation, Switzerland;

Wiebe KÜELPER-SCHIEK, Robert Koch Institute, Germany;

Paul-Henri LAMBERT, University of Geneva, Switzerland;

Ann LINDSTRAND, World Health Organization, Switzerland;

Noni E MACDONALD, Dalhousie University, Canada;

Alice MALACHANE, WHO, Academy, France;

Oliver Ombeva MALANDE, Vaccinology Course for Health Professionals, East Africa Centre for Vaccines and Immunization (ECAVI), Uganda & Kenya;

Liudmila MOSINA, WHO Regional Office for Europe, Denmark;

Nivashnee NAICKER, Centre for the AIDS Programme of Research in South Africa, South Africa;

Sidy NDIAYE, WHO Regional Office for Africa, Denise NANICHE, Development and Application of Vaccines in Global Health, ISGlobal-Barcelona Institute for Global Health, Hospital Clinic, University of Barcelona, Spain;

Varsetile NKWINIKA, SAVIC Higher Certificate in Vaccinology and Vaccinology Short Course, Sefako Makgatho Health Sciences University, South Africa;

Hanna NOHYNEK, Finnish Institute for Health and Welfare, Finland;

Kate O'BRIEN, World Health Organization, Switzerland;

Sonia PAGLIUSI, Developing Country Vaccine Manufacturers Network, Switzerland;
Bénédicte PANSIER, Fondation Mérieux, France;

Stéphane PAUL, Leading International Vaccinology Education (LIVE), Université Jean Monet, France;

Nicolas PEYRAUD, Médecins Sans Frontières, Switzerland ;

Armelle PHALIPON, MOOCS Vaccinology and Institut Pasteur International Vaccinology Course, Institut Pasteur, France;

André PICARD, Globe and Mail, Canada;

Valentina PICOT, Mérieux Fondation, France;

Winsley ROSE, INDVAC, Christian Medical College, India;

Brian SHAW, Ciro de Quadros Vaccinology Course for Immunization managers in Latin America, Sabin Vaccine Institute, United States of America;

Jennifer SANWOGU, Pan American Health Organization, United States of America;

Melanie SAVILLE, Coalition for Epidemic Preparedness, UK;

Sarah SCHILLIE, Centers for Disease Control and Prevention, United States of America;

Meru SHEEL, Australia and Asia-Pacific Vaccinology Course, University of Sidney, Australia;

Anisur Rahman SIDDIQUE, UNICEF, United States of America;

Lisbeth SOEDERBERG, Oxford Vaccinology Course, University of Oxford/Jenner Institute, UK;

Christoph STEFFEN, World Health Organization, Switzerland;

Rajinder SURI, Developing Country Vaccine Manufacturers Network, Switzerland; Laura TEBLICK, Summer Course on vaccinology for students, University of Antwerp, Vaccine and Infectious Diseases Institute, Belgium;

Naveen THACKER, International Paediatric Association, India;

Jane TIPPING, Faculty of Medicine, University of Toronto, Canada;

Pierre VAN DAMME, Summer Course on Vaccinology for students, University of Antwerp, Vaccine and Infectious Diseases Institute, Belgium;

Rodolfo VILLENA MARTINEZ, International Advanced Vaccinology Course, University of Chile, Chile;

Likui WANG, Chinese Vaccinology Course, University of Chinese Academy of Sciences, China;

Anh WARTEL, IVI International Vaccinology Course, International Vaccine Institute, Korea;

Melinda WHARTON, US Centers for Disease Control and Prevention, United States of America;

Dace ZAVADSKA, Global NITAG Network, Lettonie.

Annex 2: Proposed logo for the collaboration submitted to the vote of participants

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The winning logo was the first one, which will be refined with adding more colours as requested during the workshop.