I was on a Zoom meeting, my third of the day, when I realized our world has changed forever.

It happened to be a virtual INMM Nonproliferation and Arms Control (NAC) Technical Division meeting, and as usual, some of the conversation focused on how everything had changed since the global pandemic first turned the world upside down, and how nice it would be to get back to "normal."

New vaccine science (which began to demonstrate breakthrough solutions at the beginning of the millennium) has apparently succeeded in producing multiple solutions to stem the spread of the virus, unlike the slow recovery from the pandemic that struck the global community a little more than 100 years ago. However, despite this apparent success, there is growing concern that the world, as we have known it, has changed forever.

Organizations such as the United Nations are now creating long-range plans not only for a path to recovery, but also plans to operate in a new world, as reality sets in that we all must adapt to a new way of doing things. Fortunately, humans have proven to be resilient over the millennia, and able to adapt to new environments.

Those of us who are "essential workers" in nuclear careers have experienced the changes firsthand, in real time, while others, in different situations, have had to deal with these changes at an even more fundamental level that has disrupted socio-economic stability.

**INMM’s New World**

Certainly, the most direct impact to INMM last year was the necessity of holding a virtual Annual Meeting, originally scheduled to be held at the Inner Harbor in Baltimore, Maryland. And this year, after careful consideration, the INMM/ESARDA Annual Meeting Committee and the Executive Committee of INMM have announced plans to proceed with a virtual Annual Meeting for this August, rescheduling the use of the Vienna venue for 2023.

As we look across the nuclear community that the INMM operates within, we find many activities that have been re-imagined to meet mission requirements, resulting in an extraordinary evolution of technology products, internet access improvements, and other dramatic developments. These changes will bring new perspectives in a post-pandemic world, and potentially change the fundamental ways of performing work. Some of the issues that have changed our world, and the impact they will have on all that we do include:

- **INMM**—The Institute successfully implemented a multi-faceted Annual Meeting using a special technology platform coordinated by our Executive Committee and Association Headquarters (AH), INMM’s professional management organization. Subsequently, regular business of the Institute, including Executive Committee meetings, Technical Division meetings, and workshops have been conducted using various virtual platforms, with experimentation in using chat rooms and other tools to create a more realistic environment for discussions and interactions. One benefit of the virtual platform for the Annual Meeting was that we had over 700 participants this year, including 330 first-timers, 323 non-members, and 81 students. By most accounts, the event created a new era of participation with the ability to go back and review paper presentations and Q&As that might have been missed the first time around (the presentations will now be online for attendees through June of 2021). Most notably, sponsoring organizations realized significant savings in travel costs, although the virtual environment does not allow for the important professional and social interactions that often create critical information exchanges. However, many organizations are already beginning to question the effectiveness of returning to the "old way" of participating in large conferences and meetings, and we may see some reductions placed on travel for such activities in the future, even when the current restrictions are lifted.

- **International Atomic Energy Agency (IAEA) Activities**—With the disruption to international travel
and the variable restrictions placed on travelers by individual country mandates, the IAEA has been challenged to continue their critical role of inspections for various treaties and agreements. However, they have implemented effective plans to ensure that critical activities can be continued.\(^5\) This included the use of charter airplanes where necessary to get inspectors into and out of countries. In a post-pandemic environment, one might envision a growing reliance on remote monitoring activities and the use of virtual platforms to conduct activities, although there will always be a need for onsite inspection and verification activity.\(^6\)

- **National and International Meetings**—The pandemic has disrupted long-scheduled meetings of many organizations, including the IAEA, the European Safeguards Research and Development Association (ESARDA), the World Institute for Nuclear Security (WINS), and the U.S. Nuclear Industry Council (NIC), all collaborators with the INMM. Many technical and scientific societies and organizations have also faced dramatic changes to their normal operating calendar. This situation has caused the virtual meeting platform “world” to dramatically expand, as various vendors have added to their product lines and offerings, and a new environment of virtual meeting management companies has emerged. There is a dizzying array of product from the highly popular Zoom to Cisco Webex, Microsoft Teams, Google Meet, Adobe Connect, GoToMeeting, and many, many others.\(^7\) Once global pandemic virtual meetings became commonplace, cybersecurity issues arose and continue to be an issue in many environments, although vendors are increasing the capability of platforms to provide a higher level of security, including passwords and other verification measures. One can imagine in a post-pandemic world that, at a minimum, there may be a high demand for a virtual platform offered to individuals who cannot travel, whether restricted because of funding, scheduling, or other issues.

- **Nuclear Power Plant and Facility Operations**—Much of the work that must be done at nuclear sites requires the physical presence of people. This also extends to environmental remediation activities and new construction, as well as other critical infrastructure support efforts. During the pandemic, nuclear power plant construction has continued unabated around the world. The U.S. Nuclear Regulatory Commission (NRC) has implemented extraordinary actions designed to allow the continuous operation of U.S. Nuclear Power Plants (NPPs) under COVID-19 restrictions (such as reducing regulatory burdens and streamlining approval processes) and continues to monitor that environment, as do other global regulatory organizations, to ensure safe operations during these extraordinary times.\(^8\) As with the activities of the IAEA, one could envision a movement in a post-pandemic world to a greater reliance on remote monitoring and virtual meeting platforms.

- **Training, Certifications, and Education**—This has become a global issue as educational institutions (and students, parents, companies, regulatory agencies, and government offices) have had to adjust to a new virtual learning environment. The issues associated with adapting to the new pandemic social distancing requirements have put technology and internet access under the magnifying glass, as remote learning has become a necessity. These challenges become particularly acute when dealing with training that requires physical activities, such as Protective Force Training. Cybersecurity has also become a difficult issue to deal with as many employers implement teleworking. As an example of the extraordinary efforts underway, the Energy Facility Contractors Group (EFCOG), working with the Department of Energy and National Nuclear Security Administration, has engaged the expertise of the large National Laboratory Management & Operating (M&O) contractors and others to bring nationwide expertise together to share lessons learned and other information to meet the training and certification requirements of the Nuclear Security Enterprise, as well as other DOE Office of Science Laboratories.\(^9\) Similar issues exist worldwide for nuclear facility operators. Similarly, public and higher education institutions have made dramatic changes during this period to migrate their educational offerings to remote access, including the need to provide additional training to teachers and professors to provide them the tools to operate in this new environment. In a post-pandemic world, one might envision a significantly different interaction
with students across the globe, and the design of new curriculums and degree programs using virtual reality to supplement the normal lab and field learning environments.

• New Technology and Internet Access—The pandemic-driven requirements of virtual meetings and remote learning have demonstrated the need for multiple solutions to obtain high-bandwidth internet access, particularly to remote geographic areas. It has also shined a light on the disparity of access in remote areas across the globe, including Native American pueblos and reservations in the U.S., and similar situations in economically-deprived countries. Many new solutions to global access include such technology breakthroughs as the SpaceX Starlink, Sceye and other dirigible-based or long-endurance, solar powered drones; and enhanced fiber and Wi-Fi connectivity through the deployment of new 5G technologies. As these new technologies are deployed to solve the virtual environment issues, the world will see even greater connectivity than it has—connectivity that can lead to social unrest (as expressed by the author are not necessarily endorsed by the Institute but are intended to stimulate and encourage JNMM readers to actively participate in strategic discussions. Please provide your thoughts and ideas to the Institute’s leadership on these and other issues of importance. With your feedback, we hope to create an environment of open dialogue, addressing the critical uncertainties that lie ahead for the world, and identify the possible paths to the future based on those uncertainties that can be influenced by the Institute. Jack Jekowski can be contacted at jjjekowski@aol.com.

Endnotes
1. See https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1123275/ for an early discussion of using engineered DNA sequences to evoke an immune response.
2. See https://www.sciencemag.org/news/2020/12/messenger-rna-gave-us-covid-19-vaccine-will-it-treat-diseases-too (12-2020), that discusses the use of messenger RNA (mRNA) to not only create a vaccine for COVID-19 but may potentially be effective in treating many other diseases.
4. To access recorded sessions, simply log into the virtual meeting platform with the same credentials you used to login to the meeting in July. Attendees who registered for the full event will continue to have access to all recorded sessions. Attendees who registered for single days will have access to the sessions available from those days.
5. See https://www.iaea.org/covid-19 (12-20-20) and the various links on that page for more detailed information on IAEA activities during this global pandemic.
7. See https://www.techfunnel.com/information-technology/11-best-virtual-meeting-platforms-for-business/ as one example of a list of popular virtual platforms available today.
8. See https://www.nrc.gov/about-nrc/covid-19/index.html for more information on the actions taken by the NRC, including temporary flexibilities offered to licensees, reductions in non-essential maintenance, and streamlining other
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regulatory processes.

9. See https://efcog.org/efcog-covid-19-lessons-learned-discussions/ (12-20-20) for more information on EFCOG’s, overall COVID-19 assistance to the DOE/NNSA, and https://efcog.org/training/ (12-20-20) for more information on the efforts to coordinate training and certification activities with the DOE National Training Center.


11. See https://www.abqjournal.com/1487318/sceye-inc-to-build-stratospheric-airships-in-nm.html for more information on a pilot program being implemented in New Mexico on the Navajo reservations.


