ICUIL has a thriving and rapidly growing community comprising developers of high power lasers, and scientists undertaking basic research and applying the lasers as secondary sources. The huge increase in the peak power and intensities achievable by lasers is being driven by their diverse applications, such as fusion, material sciences and medical applications. Laser facilities include both large international facilities and numerous smaller national facilities. They provide training in skills required to utilise the lasers and interpret data from experiments, and their presence has stimulated the establishment of numerous teams of theoreticians developing methods that underpin applications. High power lasers are now some of the largest instruments in existence, alongside accelerators and synchrotrons. The distinction between large accelerators and lasers is now blurring – laser-driven plasma accelerators can now exceed 10 GeV particle energies, produced in a few centimetres of plasma, as was recently demonstrated using the Texas Petawatt Laser. Field intensities as high as 10^{23} Wcm^{-2} have been demonstrated at the CoReLS facility in South Korea. At these intensities, matter is fully ionised and plasma becomes nonlinear due to the relativistic motion of electrons, large electromagnetic forces and rapid permittivity changes. At higher intensities still, as the Schwinger limit is approached, ion motion becomes relativistic and quantum electrodynamic phenomena become apparent. Next-generation high power lasers, such as the Extreme Light Infrastructure (ELI), XCELS, SIOM and Vulcan20-20, will explore this new and exciting ultra-high intensity regime, known as the intensity frontier. The realisation of high energy densities is now readily achievable using high power lasers, which is enabling studies of astrophysical phenomena in the laboratory and physics related to inertial fusion, and the development of next-generation accelerators for radiotherapy and radio-isotope production. Applications of high power lasers are making excellent progress as a basis for next-generation radiation sources with unique characteristics, such as attosecond pulse duration, coherence and photon energies in the MeV range, parameters that are complementary to existing synchrotron sources and free-electron lasers (FELs). Laser-plasma accelerator driven FELs have been demonstrated, which is a major breakthrough.

In a broader context and consistent with millennia of advancement of science and technology, next-generation lasers are providing tools for researchers to increase our knowledge and understanding of our immediate world and wider universe, and exploiting this knowledge for the betterment of society. Development of new technologies and their application improves people's lives by creating better quality environments that lead to healthier, longer and more interesting lives. It is clear that exploitation of new laser-based technologies could have a significant impact. While the world is a better place to live in – revolutions in food production, healthcare, communications, transport and education have raised the standard of living everywhere – it is also a more differentiated world, dividing the developed and lesser developed countries. ICUIL is striving to support this growth while making laser technologies more accessible and available to less technologically advanced nations.

One of ICUILs goals is to bring communities together by providing a forum for communication between scientists to nurture and promote the development and exploitation of high power lasers. The ICUIL community has formed unique global networks of advanced laser facilities, forged collaborations between scientists to exploit lasers and provided a training environment to produce the next generation of creative scientists. Scientists who have used high power lasers have made world-leading advances, which has been acknowledged by the award of the 2023 Nobel Prize in Physics to Anne L'Huillier, Pierre Agostini and Ferenc Krausz, for developing "experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter". Their advances have only been possible because of the development of lasers over the last half a century. Donna Strickland and Gérard Mourou were awarded the 2018 Nobel Prize for their ground-breaking invention of chirped pulse amplification, which is the major advance that has enabled the laser technology development necessary to produce high-intensity, ultra-short optical pulses.

The ICUIL community has recognised the benefits of advancing laser technology and applying it – over the last decade the number of laser facilities has trebled. The size and complexity of facilities is driving a need for

skilled staff to develop and exploit the lasers. Training is being provided through numerous graduate programmes to develop skills in experimental and theoretical methods, and engineering techniques. Lasers components are becoming very large and costly, with long delivery times, which is stimulating the development of new amplification methods e.g. by coherently combining multiple beams and creating new robust optical media based on plasma for manipulating high intensity ultra-high intensity laser beams that can result in significant reduction of the size of optical components. Many new diagnostics methods are being developed and the community regularly uses advanced artificial intelligence methods for the design and optimisation of experiments and data extraction.

The communities represented by ICUIL are versatile – they have taken advantage of the COVID-19 pandemic to develop new ways of working, such as remotely controlling experiments, which is offering a new way of reaching out to lesser developed areas of the world. This not only uncovers talent from around the world but helps transfer advanced technologies to remote countries, thus increasing the breadth and the depth of research undertaken around the world by the community.

The 2019 ICUIL General Assembly has elected Prof. Dino Jaroszynski (Strathclyde University, UK), Dr. Catherine Le Blanc (LULI, France) and Dr. Chang Hee Nam (CoReLS/IBS, KR) to be chair and co-chairs of the IUPAP WG7 ICUIL from the 1st of January, 2021. Since then, C. Le Blanc and the Secretary of the Working Group, Dr. Terrance Kessler (University of Rochester, USA), have resigned. A new Secretary was elected during the 2022 ICUIL conference: Dr. Jake Bromage (LLE, USA) while an electronic vote was organized on June 2023 to elect a new co-chair: Mrs Sylvie Jacquemot (LULI, FR).

Annual General Assemblies was organized online, on August 8, 2023, and in a hybrid mode on September 10, 2024. Priorities in terms of activities were set: organization of the ICUIL conference every two years, regular update of the website editorial content, new version of the ICUIL world map, editing of the annual newsletter, diversity and relations with other laser networks and organizations.

ICUIL working groups have been set up to accelerate progress by sharing information, exploring opportunities for joint effort, and exchanging equipment, ideas and personnel among laser laboratories world-wide. The working groups help promote diversity and attract students to high-field science through education and training, enabling interactions with prominent scientists, and providing access to facilities where they are exposed to new techniques and unique research tools. This is strengthening synergy with conventional accelerator-based free-electron lasers and medical application of accelerators.

As said, an important part of ICUIL is convening a bi-annual conference. After a two-year delay caused by the COVID-19 pandemic, the 9th ICUIL conference was held in 2022 on the island of Jeju off the South Korean coast, chaired by Chang-Hee Nam (South Korea) and Chris Barty (USA). It was dedicated to ultra-high-intensity lasers and their applications, and was a great success, attracting a record number of participants – 166 – at all career stages, from 22 countries – despite the pandemic. The 10th ICUIL conference is currently being held at the El Cozumeleño Beach Resort on the island of Cozumel off the Mexican coast and is chaired by Eric Rosas (Mexican Photonics Cluster, Mexico), Christian Schubert (Universidad Michoacana de San Nicolas de Hidalgo, Mexico) and Tsuneyuki Ozaki (INRS, Canada). It gathers around 120 participants.

This year, and for the first time, prizes were awarded at the conference for contributions to high power laser technology and applications; they were presented at the conference and the awardees gave plenary talks. The first of these prizes, the IUPAP ICUIL Yoshiaki Kato Prize, was awarded to Ulrich Schramm from Helmholtz-Zentrum Dresden-Rossendorf Dresden in Germany, for contributions to advancing high intensity laser-driven particle accelerators for applications. The second, the IUPAP ICUIL Early Career Scientist Prize, was awarded to Yang Wan from Zhengzhou University in China, “for outstanding contributions to developing advanced

diagnostics for revealing the key processes involved in laser-plasma wakefield acceleration and exploring the key physics of laser-plasma ion acceleration".

In addition to the bi-annual newsletters published by ICUIL, and a world map maintained on the ICUIL web site https://www.icuil.org/, these bi-annual conferences are excellent examples of ICUIL outreach efforts to promote application of high-intensity lasers in less well developed countries, which broadens the communities reach and scope.