Science Transcending Borders: Reflections from the 75th Lindau Nobel Laureate Meeting

"Science Transcending Borders" was the motto of the 75th Lindau Nobel Laureate Meeting—and by the end of an unforgettable week in Lindau, I realized that it described far more than science alone.

At first, I interpreted the theme in the obvious sense: science crosses disciplinary boundaries, connecting ideas from different fields to inspire new discoveries. Throughout the meeting, however, the phrase took on a much broader meaning. Science also transcends geographical, cultural, and personal borders. Bringing together more than 600 outstanding early-career researchers from over 90 countries alongside more than 70 Nobel Laureates, the meeting created an atmosphere in which curiosity became a common language. Despite our diverse backgrounds and research interests, we shared a common ambition: to understand the world and contribute to society through science.

A particular highlight was presenting my research during a Next-Generation Science Session. Being selected as one of only 53 young researchers to present—and opening the session as its first speaker—was both a great honor and an exciting challenge. Presenting to such an interdisciplinary audience reminded me how important it is to communicate beyond the boundaries of my own field. Some of the most insightful questions came from researchers with completely different backgrounds, including John Jumper, whose perspective offered a valuable new way of looking at my work.

Equally memorable were the conversations beyond the lecture halls. During coffee breaks, walks around Mainau Island, and evening discussions, I had the opportunity to exchange ideas with fellow young scientists and Nobel Laureates. One of the most striking things I noticed was that, despite their extraordinary achievements, Nobel Laureates are above all curious and remarkably normal human beings and researchers. They ask questions, admit when they do not know something, and become genuinely excited about new ideas.

They also openly shared their concerns and vulnerabilities. Michael Kosterlitz, for example, spoke about his concerns regarding the increasing pressure on the freedom of research and the political environment surrounding science. Others shared deeply personal stories about moments of doubt, failure or lack of funding like Katalin Kariko or Dan Shechtman. Frederick Ramsdell described how his research had at times felt like a dead end and how he himself initially struggled to believe that he had really received the Nobel Prize. These kind of insights were perhaps as inspiring as their scientific achievements. They showed that even the most successful researchers experience uncertainty, setbacks, and self-doubt. Seeing this human side of scientists whose names I had previously encountered mainly in textbooks was both humbling and motivating.

A recurring question throughout the meeting was: *How can scientific discoveries create lasting value for society?* One strong message from the Nobel Laureates was that transformative innovations often begin with curiosity-driven research rather than a specific application. Yet discoveries can achieve their greatest impact when they eventually find their

way into technologies and solutions that improve people's lives. Ben Feringa captured this beautifully with the metaphor of turning a pigeon into an airplane: understanding something as fundamental as why a pigeon can fly may, through many unexpected steps, ultimately contribute to technologies that fundamentally change society.

This naturally led to discussions about entrepreneurship and commercialization. I had the opportunity to discuss the pros and cons of founding a startup with John Martinis. One idea he emphasized particularly stayed with me: *the better an idea becomes with time, the more it is worth pursuing.* His own experience also highlighted that innovation is inseparable from failure. Not every scientific discovery needs to become a company, but an idea that continues to become stronger, more compelling, and more useful may deserve to be pursued beyond the laboratory. Finding the right balance between scientific freedom, curiosity, entrepreneurship, and real-world impact is an important challenge for the next generation of researchers.

The interdisciplinary character of the meeting reinforced this perspective. Whether in physics, chemistry, biology, medicine, or engineering, researchers face similar questions about responsible innovation, sustainability, public trust, and international collaboration. Discussions with distinguished guests, including German President Frank-Walter Steinmeier and former Chancellor Angela Merkel, further highlighted the importance of connecting science, politics, industry, and society.

I came away thinking of science and society as two systems constantly evolving together. Science changes society through new knowledge and technologies, while society shapes science through its needs, values, and questions. Like two currents that continuously influence each other's direction, neither can evolve completely independently. Building bridges between researchers, policymakers, industry, and the public is therefore essential to ensure that scientific progress translates into sustainable societal progress.

Looking back, the Lindau Nobel Laureate Meeting reminded me that science is, above all, a profoundly human endeavor. Breakthroughs emerge not only from experiments, simulations, and sophisticated technologies, but also from conversations, collaboration, perseverance, and the willingness to learn from people with different experiences and perspectives. From Nobel Laureates sharing moments of doubt to young researchers supported by entire communities, I was repeatedly reminded that behind scientific progress are people, their curiosity, and their belief in what knowledge can make possible.

The meeting's motto—*Science Transcending Borders*—proved true in every sense: across disciplines, cultures, generations, and between fundamental research and real-world impact.

I am deeply grateful to the Lindau Nobel Laureate Meetings for this exceptional opportunity and to Forschungszentrum Jülich and TRR404 Active-3D for supporting my participation. The experience has strengthened my conviction that excellent science not only advances knowledge but also carries the responsibility to create lasting benefits for society.