



The Chemistry of a Resilient Nation

Prof. **Gregor Anderluh**, PhD, Director of The National Institute of Chemistry

Slovenia has always been proud of its scientific minds. In your view, are Slovenians truly an innovative nation, and what makes our innovation system unique or different?

Slovenia is undoubtedly a nation with a rich scientific and innovation tradition. We can be proud of the pioneers in their fields who have enriched our national treasure trove of knowledge. Let me highlight the Nobel laureate of Slovenian origin, Fridrik Pregl, a physician and chemist, who devoted his life to the development of quantitative organic micro-analysis. We Slovenians are a small nation, but this is our advantage, as it encourages creativity, adaptability, and the search for innovative solutions. Another of our key strengths is our openness and willingness to collaborate, resulting in our scientists being strongly integrated into the European and global research environment.

Which fields could become Slovenia's strongest innovation engines in the coming decade?

Naturally, Slovenia will not be able to develop all fields and will have to focus on the most promising ones in the future. There are several research and innovation areas in which Slovenia is strong and, with sufficient determination and the courage to assert its knowledge and advantages, it

can become one of the driving forces of the European area in those areas. Among the key fields which have been developed at the Institute are research aimed at promoting health, sustainable development, and the transition to a low-carbon society. These involve biomedical research and the development of new therapies for rare genetic diseases, as well as zero carbon technologies, advanced battery systems, and hydrogen technologies. Together with the development of high-performance computing and artificial intelligence, these fields form a strong innovation ecosystem.

Even though funding for science and research is improving, long-term cooperation between business and academia remains a challenge. Where do you see the biggest obstacle – and where the greatest opportunity?

I believe that Slovenia's greatest opportunity lies in small and medium-sized enterprises that develop high-tech products. Even today, there are several excellent examples of companies which, after many years of development, have reached a value comparable to companies a hundred times larger in terms of revenue and size. In Slovenia, we must create an environment in which such companies can develop more rapidly and in which they can receive help from research organizations quickly and effectively, when needed.

Research organizations can make an important contribution to the development of such companies. In relation of commercialization of our knowledge, we operate in two ways: First, we assist companies in their development activities. Mechanisms supporting this type of collaboration would be very welcome here, such as joint innovation projects or the development of areas of interest to companies within the framework of doctoral dissertations. Years ago, we had a hugely successful mechanism of young researchers in the business sector, which we cannot seem to re-establish despite exceptionally favorable assessments from both the business sector and research organizations. Second, we commercialize our own knowledge, and in this area, we should continue building an innovation system that encourages the development of innovations in spin-offs. In recent years, we have taken decisive steps in this direction by establishing the Vesna venture capital fund, which supports precisely such companies. Research organizations themselves should be more active in building an entrepreneurial culture. At the Institute, we will therefore encourage and support researchers who wish to develop innovations in this way.

Can you share some good practices that have emerged from the National Institute of Chemistry's cooperation with business, academia, and the public sector?

“THROUGH SUCH OPEN DIALOGUE, WE CONTRIBUTE TO MORE INFORMED DECISION-MAKING OF INDIVIDUALS AND COMMUNITIES.”

- GREGOR ANDERLUH

Traditionally, we have cooperated well with the pharmaceutical industry in Slovenia. A very good example of close collaboration is the development research carried out by researchers from a pharmaceutical company at the Institute, making them part of our tightly interwoven innovation system. This collaboration lasted for many years. We have established similarly long-term cooperation with a Japanese automotive company, and we also collaborate with a British high-tech biotechnology company. Unfortunately, Slovenian companies rarely opt for such cooperation, as it requires substantial resources while the outcomes are uncertain. Nevertheless, we have achieved very good results in numerous joint projects. We always respond to the needs of industry and help when they face challenges they can no longer solve on their own. For example, we helped a Slovenian company resolve a development challenge related to an adhesive-related process. The successful solution helped launch a production process that involved several dozen people.

Should Europe reshape its innovation system to compete more effectively with the United States, China, and other countries that invest significantly more in research and innovation?

Significant progress has been achieved with the establishment of the European Innovation Council, which successfully supports breakthrough innovations in research environments and spin-off companies. Competitors such as the USA, China, and Japan invest considerably more in research and development than most European countries, but increasing financial resources alone will not resolve all challenges. It is crucial to strategically transform the innovation system, which has strong foundations in a high-quality scientific environment, high standard of education, and international cooperation. Europe has excellent fundamental science, but lags behind in transferring achievements into prac-

“IN SLOVENIA, WE MUST CREATE AN ENVIRONMENT IN WHICH SUCH COMPANIES CAN DEVELOP MORE RAPIDLY AND IN WHICH THEY CAN RECEIVE HELP FROM RESEARCH ORGANIZATIONS QUICKLY AND EFFECTIVELY, WHEN NEEDED.”

- GREGOR ANDERLUH

tice, where our rivals are more successful. This should become the main focus of future efforts. It is also necessary to reduce administrative barriers that hinder the development of certain technologies and to strengthen the links between universities, research institutions, and the industry, particularly by establishing technological infrastructure that supports the development of products and technologies at intermediate stages of technological maturity.

In recent years, science communication has gained new importance, especially amid growing misinformation. How can we build awareness that there's real chemistry between trust, knowledge, and responsibility – and that this is what makes communities resilient? What changes are needed to better connect researchers and the public in scientific dialogue?

In a world flooded with information, it increasingly seems that trust in science is waning. People find it difficult to distinguish between verified facts and biased content, which leads to confusion and skepticism. Strengthening trust requires open and consistent communication that goes beyond merely presenting results. Scientists therefore need to clearly explain to the public how we arrive at our findings, which methods we use, and what the limitations of our research are, while also listening to the public and understanding what interests and concerns them. It is also important to disseminate information through different channels. Through such open dialogue, we contribute to more informed decision-making of individuals and communities. ¶

