



A Perspective on Chemistry and Society

A Column on the Occasion of the 75th Anniversary of CHIMIA

Division of Analytical Sciences of the Swiss Chemical Society

Perspectives and Future Directions of the Division of Analytical Sciences of the Swiss Chemical Society

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From left to right: Eric Bakker, Davide Bleiner and Ksenia Groh.

Happy 75th birthday, CHIMIA! Switzerland is a traditional powerhouse in the analytical sciences and has been at the forefront of X-ray and magnetic resonance spectroscopy and imaging, mass spectrometry, chemical sensing, microfluidics, separation science, environmental trace analysis and bioanalytics, to name but a few examples. The instrumentation developed and the scientific insights obtained within these fields have had a profound impact on our understanding of the world and brought tremendous advantages to society as a whole. Of course, most natural sciences absolutely rely on the routine use of analytical tools to make progress. The 2020 IUPAC survey states that as much as 50% of the top ten emerging technologies in Chemistry are related to the measurement sciences, including nanosensors, rapid diagnostics for testing, liquid gating, and aggregation-induced emission.^[1]

A sizable community has made the invention and further development of analytical methodologies and their practical application a core aspect of their professional passion. The Division of Analytical Sciences (DAS) of the Swiss Chemical Society (SCS) counts over 500 members and is the place where analytical science in Switzerland finds a united voice. It is a highly diverse division because analytical science has become a core component of many disciplines including chemistry, biology, health science, environmental science, food science, and process control. The DAS unites actors from traditional universities and universities of applied sciences, national research institutes and centers, and industry organizations. It is a stimulating and diverse environment to be part of. However, this diversity also makes it a challenge to forge a sense of community. This latter point is a primary motivation behind many activities of the DAS and the SCS as a whole.

The core tasks of the DAS are performed by a board that consists of an active group of more than a dozen representatives

from a wide range of scientific organizations and fields. The main missions of the DAS team involve networking, education, dissemination and recognition. This column is authored by the current DAS president, Eric Bakker (University of Geneva), and the two newest additions to the DAS board, Davide Bleiner (Empa) and Ksenia Groh (Eawag). While Walter Giger just in 2017 recounted the history of the DAS on the occasion of its 25th anniversary,^[2] we aim here to discuss the opportunities and challenges facing us in the future.

Together We Are Stronger: A Unifying Effort of the SCS

A major development within the Swiss Chemical Society has been to aim for a more unified presentation toward a wide range of potential stakeholders, and the DAS is playing a significant role in this development. Relationships with industrial partners are now increasingly sought at the SCS level, which allows their voice to be heard while also providing for recurring support of various activities and events held by different divisions. Most awards, including the METAS prize in metrology, are now selected by an SCS awards committee, with the exception of the bi-annual Simon Widmer Award given by DAS, which is handled by an international committee. Another major change involves the continuing education program (see below), which is being topically broadened and rebranded, and its administration newly integrated into the SCS head office. The reader may have also already seen the new face of the SCS website, which has been set up to allow for an easier navigation by reducing the traditional compartmentalization by each SCS division. The result of this modification is a fresh, modern appearance of the DAS that projects to be a core part of the SCS while serving its own community as effectively and professionally as possible.

Nurturing Networks of Analytical Scientists

In this (hopefully finite) period of Covid-19 and endless online meetings, building new connections has become so much harder, especially for young researchers. The most important recurring event organized by the DAS is *CHanalysis*, which for the coming years will be under the main responsibility of Davide Bleiner. It is an annual spring meeting that specifically aims for Swiss-based researchers in the analytical sciences to get to know each other. This conference is traditionally held in Beatenberg, Bernese Oberland, and features high-quality invited speakers and contributed talks. However, the major emphasis is placed on poster presentations and informal discussions, because the main goal of this recurring meeting is to build a strong sense of community and facilitate the exchange of scientific ideas, while showcasing the amazing diversity of the analytical science landscape in Switzerland. In the first few years, *CHanalysis* was mainly cross-financed by the continuing education program of the DAS, but by now the event benefits from company sponsors and thus has sufficiently matured for it to become cost neutral. The next meeting is scheduled for spring 2022. While this decision might evolve, we currently feel that the networking aspect is central to this event so that we will only hold it as an in-person meeting. Please join us!

The DAS is also actively involved with the annual Fall Meeting of the SCS, with Eric Bakker, Ksenia Groh, and Hanspeter Andres (METAS) playing organizing roles. The aim is complementary

to *CH*analysis, *i.e.* to have a stronger representation for the dissemination of advanced analytical impact. A major draw for students is the possibility of receiving a prize for best poster or oral presentation and, of course, the broad exposure to other fields of science.

As the representing body of the analytical scientists in Switzerland, DAS is well positioned to organize major events hosted in Swiss cities, as it has done in the past decade with ANAKON 2011 (in Zurich), IMSC 2014 and HPLC 2015 (both in Geneva). The next such major event will be Euroanalysis 2023, again in Geneva, with Franka Kalman (HES Sion), Bodo Hattendorf (ETH) and Eric Bakker as chairpersons. Such events also showcase the connection of DAS to European organizations, in this case the Division of Analytical Chemistry of the European Chemical Society (EuChemS), where Franka Kalman is our representative.

We mention here also the Highlights in Analytical Chemistry column in CHIMIA, tirelessly put together by the DAS board member Veronika Meyer. These 1-page descriptions appear in most CHIMIA issues and offer stimulating insights into analytical problems and discoveries. Please use this opportunity to highlight your research and support the continuation of this column. It is a citable item that speaks to non-specialists and is therefore a great addition to your typical research paper.

Education and the Future of Analytical Science in Switzerland

Analytical science is everywhere, but where is it in the educational curricula? An observed trend is that analytical experts tend to be increasingly single-method specialists while the present challenges in industry and society require a much broader analytical expertise. To fill this gap, a sub-committee of the DAS has been working since 1999 to offer vocational training courses on broad subjects in the analytical sciences, with an emphasis on a wide range of analytical techniques as well as regulatory education, for example in quality control. As already mentioned above, a major ongoing development of the training program of the DAS is its integration into a new SCS-wide platform, termed SCS Academy. This will allow one to find programs of a much broader topical diversity, all marketed in a unified manner by the SCS. To assist the SCS, the DAS has moved the education office (Esther Wolff) away from Dübendorf to the SCS head office, with a unified email and billing address. For DAS, like other SCS divisions, this will allow us to place more focus on content rather than administration. Importantly, this development also eliminates financial risk to our division. The DAS is quite excited about this structural optimization and confidently looks into the future of our continuing education program.

As for the future of education in analytical science at Swiss Universities, it seems that we are now experiencing both very rich and rather poor times simultaneously. Analytical science in general is flourishing and many new hires in Switzerland are in fact active analytical scientists. Most of them, however, are not hired as pure analytical scientists but rather as bioengineers, environmental scientists, microbiologists, or organic, physical or biological chemists. So, while the research landscape remains very active, the branding of our discipline has become less identifiable. Is this part of our success, with the measurement sciences becoming such an integral part of making scientific progress that we no longer need to worry about promoting it as a separate discipline of its own? Yet, one could also argue that

we need to maintain this identity because, compared to some other scientific branches, analytical science requires a different, more holistic way of thinking about, first, quantifying and then interpreting the collected measurement data. Maintaining and further developing an analytical science identity becomes particularly important in the face of the rapid developments and novel challenges that have presented themselves in the recent years. Modern analytical sciences struggle to accommodate divergent trends fueled by diverse societal demands, not infrequently standing in opposition to each other. For example, the current trends towards miniaturization, portable devices and mobile laboratories may not always be able to simultaneously provide for the highest standards of analytical selectivity and sensitivity. Thus, certain tradeoffs may need to be accepted in exchange for the ability to gain a better spatial and temporal resolution of obtained monitoring data. The growing demand for a more sustainable, greener chemistry, with minimized use of hazardous substances and maximized safety for both the workers and the environment, may on the one hand be supported by the ongoing developments towards miniaturization. On the other hand, certain innovations, such as those based on nanotechnology, still need to be evaluated and properly managed with regard to their environmental risks. As yet another example of opposing demands, the increasing complexity of analytical instruments and measurement workflows often requires extensive training on the part of operators, resulting in an ever-narrowing specialization. This in turn might hamper answering the simultaneously ongoing call for more collaborations and open sharing of research results and even raw data. The latter should ideally be presented in formats understandable and usable by scientists from other fields or even by non-specialists. Apropos the research data, the ever-increasing volumes created by sophisticated analytical platforms generate a unique need for broader involvement of data scientists, able to foster artificial intelligence to help collect, curate, mine, and interpret the analytical data, as well as to enable seamless data sharing across platforms and disciplines.

The utilization of large shared user facilities and their increasing openness to the broader community provides a host of new opportunities. The Swiss Roadmap for Research Infrastructures is updated every four years: the State Secretariat for Education, Research and Innovation (SERI) is strengthening the view of the research community throughout the process leading to the Swiss roadmap. Therefore, SERI gave a mandate to the Swiss Academy of Sciences (SCNAT) to produce discipline specific roadmaps by March 2021.^[3] These disciplinary roadmaps will provide insights for decision-making on the allocation of university and federal funding for costly research infrastructures over the period 2025–2028. The future of discovery hinges on the innovation of today's measurement tools.

Whatever the future brings, a community organization such as the DAS continues to realize an important mission of helping to define an analytical science identity, able to unite a diverse array of researchers scattered across various disciplines. This unifying effort is likely the most important challenge that we face. So please join our ranks and make us strong.

[1] <https://iupac.org/what-we-do/top-ten/> (accessed 19 April 2021)

[2] W. Giger, *CHIMIA* **2017**, *71*, 861.

[3] https://scnat.ch/en/for_a_solid_science/networks_and_infrastructures/research_infrastructures (accessed 19 April 2021)