International Pierre Gy Sampling Association: A New Beginning

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1. Background

The founding of the Theory of Sampling (TOS) by Dr. Pierre Gy in the 1950's marked the start of a new era for key industrial sectors where sampling is applied to help taking informed decisions. Initially, Gy's ground-breaking work was mainly valued in the economic-geology sector (mining, exploration, mineral processing, metals, cement), where his nine books and hundreds of publications provided a completely new framework to start solving salient sampling issues and addressing the adverse effects caused by heterogeneity. Only fifty years later, around the turn of the millennium, the wider relevance and applicability of TOS across a broad range of societal sectors, disciplines, and domains where sampling is important for decision-making processes, came to the fore.

In 2003 the first World Conference on Sampling and Blending (WCSB1) was organised in Esbjerg, Denmark to honour Dr. Gy, to facilitate fruitful discussions surrounding TOS, and to exchange scientific and technological views around representative sampling practices. Time proved that WCSB1 was the start of an enduring success story that continues up until today with the biannual organization of the WCSB series around the globe, now preparing for its 11th edition. The last two decades have witnessed the continuous growing of TOS-applications within the traditional mainstream arenas, and a deliberate increasing drive to extend TOS-application beyond this boundary. This triggered a constructive, lively and spontaneous forum, developed largely without much organisational support other than the biannual WCSBs.

Finally, 2017 marked the official establishment of the *International Pierre Gy Sampling Association* (IPGSA), driven by two noble motivations: 1) to promote development and application of the Theory of Sampling (TOS) across all relevant scientific, societal, and industrial sectors; and 2) to offer science-based advice on all matters regarding proper sampling of heterogeneous materials, lots and processes of any nature and provenance. After its establishment, the compelling enthusiasm allowed IPGSA to develop into a well-organized association ready to promote, network, discuss and share the latest advances in the theory and practice of sampling and blending, including current scientific research and relevant technological developments. But, as always, reality is more complex than foreseen. The sparking momentum that promoted IPGSA establishment partially mellowed for several reasons:

- IPGSA's founders were, for the vast majority, sampling experts who applied their experience in specific industrial sectors focusing on mining, minerals processing, cement, and metals refining. But the steadily growing inclusion of sampling professionals from other sectors imposed the sharing and incorporation of new application challenges, the understanding of 'unfamiliar' sampling issues, and the development of a new culture to elevate sampling to the level of an inclusive, recognised objective scientific discipline. If on one hand this enriched IPGSA with a plurality of views fostering scientific growth and a healthy elaboration of new ideas, on the other it partly intruded into the high-level technical and detailed discussion flow, which was the priority of a small group of samplings experts operating mainly in the geoscience and process industry arenas.

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- IPGSA became operational during a natural generational turnover. The founding fathers of IPGSA were experts who grew up scientifically and technologically as Gy's fellows and, students starting their sampling careers under his supervision. But in the run of the first two decades of the 2000's, IPGSA witnessed the arrival of a next generation of sampling professionals, with partly novel ideas and distinctly novel challenges. Accepting change is always difficult, but passing the baton to a new generation requires an incredibly open state of mind, which may be difficult to reach after the experience cumulated over a successful life-time career.

- IPGSA welcomed and housed sampling experts from different schools: those who started their career understanding the practical benefits of Gy's theoretical work and built on this knowledge to ensure TOS' continuous evolution, and a few others belonging to schools other than that of Gy's, who did not necessarily agree with all his work. Nurturing an environment in which a range of perspectives are brought forward respectfully, allows growing towards deeper understanding of the scientific basis of the joint work pursued. It would be in the interest of the continuous evolution of the science of sampling, to enhance and facilitate fruitful exchange between opposing theoretical advocates. Unfortunately, this was not always the case, and occasionally personal controversies surfaced and to some degree influenced the joint forum.

However, the above did not stop IPGSA's success story. On the contrary! It helped IPGSA to become a mature scientific association, capable to evolve and spearhead its transformational change to launch a series of new initiatives and go through a virtual new beginning. Here I wish to present the highlights of this new beginning, illustrating the renewed societal vision and the workplan for the next few years. Building upon 20+ years of experience, IPGSA is now ready to help raising sampling science and technology to the next level of a comprehensive and fully recognized scientific discipline.

2. Vision, Structure & Objectives

In line with the motivating values that formed its establishment in 2017, IPGSA pinpointed its vision as '*becoming the internationally recognised scientific organisation guiding and advising on all matters regarding sampling of heterogeneous materials, lots, and processes across all relevant scientific, societal and industrial sectors.*'

At onset, IPGSA focused on establishing its organisational rules, principles and governance. The association is headed by a Council who prepared and adopted IPGSA constitution where mission, membership roles and responsibilities, organizational structure and financial arrangements are detailed. The Council also manages IPGSA routine activities.

Shortly after, 2019 and 2021 witnessed a significant slowing of IPGSA activities, mainly because the Covid pandemic changed worldwide the way colleagues could interact and collaborate, forcing all work settings to learn a new way of working together. Unfortunately, the effect of the pandemic hit IPGSA simultaneously with the delicate consolidation of a natural generational turnover: the impossibility to meet in person did not help the speed with which the necessary understanding, trust and confidence between the old and new generation of sampling-experts could be established to smoothly refurbish IPGSA leadership. But the strong will to ensure the future of the association allowed to unravel all glitches and to progress shaping a new outlook and workplan.

Rebooted by this energy, in 2022 IPGSA Council defined three key macro-objectives on which to focus expert-investment and to build its re-framed workprogramme:

1. **Know-how development:** to guide and lead the developments of TOS, from both theoretical and practical perspectives, across all sectors in need of sampling to take informed/optimal decisions.

2. **Advice and support:** to provide assistance on sampling matters across all sectors to any end-users relying on sampling to make inferences in commercial, industrial, academic, research and regulatory activities.

3. **Capability building:** to offer, or help to offer, competence building (training lectures and didactic material) to actively communicate and demonstrate TOS and its applications on a broad front, securing the continuous expertise-transfer necessary for the spread and perpetuation of correct sampling practices.

The most important IPGSA responsibility, supporting all three macro-objectives, was - and continuous to be - the organization and supervision of the World Conference on Sampling and Blending (WCSB) every two years. After the inaugural WCSB1 in Denmark, WCSBs moved around the globe covering all relevant continents, regions and important industrial sectors: 2005 Australia, 2007 Brasil, 2009 South Africa, 2011 Chile, 2013 Perù, 2015 France, 2017 Australia, 2019 China, 2022 Norway. The next world conference, in 2024, will be in South Africa.

Over the past two decades, the WCSB series established itself as an inclusive authoritative forum where a wide range of topics within the realm of applied TOS, as well as several theoretical overviews and new developments are presented and discussed, serving as a unique and enriching educational platform. Over the years attendance has grown steadily: scientists, consultants, technicians, industry, and regulatory bodies representatives actively participate, establishing stimulating interactions and collaborations. The accumulated archives of the WCSBs' proceedings are a solid and well-recognised source of key papers and technical documents providing in-depth information on sampling and TOS.

But there are two sides to this issue: If WCSB series is a success story ranking at the top of IPGSA priorities, the time between conferences, characterised by an almost complete lack of activities, has been a worrisome reality for the Council, even after the successful WCSB10 in Norway managed to re-inspire the international sampling community. With a strong wish to fix the situation and the awareness that a new beginning is always possible, IPGSA's newly elected Council (2022) decided to re-think its way of working, to develop an association work-programme and to establish a strategy for its implementation. In 2023, to secure continuity of initiatives over time, IPGSA launched *ad hoc* operational Working Groups (WGs) coordinated by WG Leaders, normally members of the Council, responsible to set clear and sustainable goals supporting the achievement of the three macro-objectives. These WGs are operational throughout the year and report quarterly to IPGSA Council.

Currently there are five WGs:

1. WG1 - Scientific platform: to ensure a scientific platform for all those interested in the theory and practice of representative sampling and blending, and especially to disseminate awareness of proper sampling practices to other interested parties in science, technology, industry and society at large. From 2013 until today, the *TOS forum*, a free publication at the service of the sampling community as well as the enduring educational *SAMPLING* column in the magazine Spectroscopy Europe/World, both edited by Prof. Kim H. Esbensen, have outstandingly served the purpose. Today *TOS forum* and the *SAMPLING* column pass the baton to *Sampling Science and Technology* (SST). Although the reasons for this change are sad as explained by Prof. Esbensen elsewhere in this inaugural issue, on behalf of IPGSA community, I wish SST the best of luck to continue growing and admirably serving the scientific sampling community, which will be continued under the solid editorial experience of Prof. Esbensen. Thanks Kim!

2. WG2 - Communication platform: to refurbish and maintain up to date the IPGSA webpage, offering a digital platform where key papers, technical documents, active links, blogs and library sections are available to provide in-depth information on sampling & TOS. The webpage will be re-structured in a multi-tiered fashion to address the needs of all stakeholders, regardless of their level of sampling experience, may them be beginners or experts. IPGSA is also on LinkedIn to facilitate connecting sampling professionals, networking, exchanges and reaching out. This work is currently on-going and we hope to meet you soon on LinkedIn or host you on IPGSA new webpage.

3. WG3 - Technical training: to ensure competence building and knowledge transfer, IPGSA shall offer lectures, structured courses and training materials to private and public organizations, academia, research organizations and governmental bodies. With several decades of training experience, IPGSA can calibrate on costumers' needs and offers educational excellence at all levels from building TOS know-how, to addressing specific and unique complex sampling issues, to establishing the background knowledge necessary to appreciate the relevance of sampling in different frameworks; this will be cared for in close collaboration with SST. Through IPGSA webpage and LinkedIn IPGSA will make training material available to all interested parties.

4. WG4 - Stakeholder Management: to start engaging with stakeholders, IPGSA adopted a stepwise approach starting from identifying stakeholders and analysing their needs and expectations, to planning and implementing targeted initiatives and tasks.

IPGSA wishes to consolidate an open dialog with key international regulatory bodies (e.g. IMO, ISO) and key players involved in circular economy who require sampling solutions for new material streams. The already existing collaboration with academia and research institutions needs to grow further and expand as the synergy with the agricultural, food, feed, pharmaceutical sectors must consolidate to recover the delay cumulated when TOS was prerogative of the geo-sciences.

5. WG5 - Budget: to manage IPGSA financial resources and secure future fundings. IPGSA has currently no permanent source of income and its limited resources come from WCSBs fees. Despite the unlimited good will of IPGSA members, who devote time and energies to the many initiatives of the IPGSA work-programme, the association needs a secure annual minimum budget to ensure its functioning and coverage of active costs. The search for funding opportunities is pressing and continuous. The establishment of a dedicated WG hopefully will facilitate effective brainstorming for fund raising.

3. Concluding remarks

If we think about the volume of decisions taken across all sectors worldwide that would have needed correct sampling to be properly informed, we get frightened imagining the high price the world is paying for failing to ensure correct sampling practices across all affected sectors. Historically sampling remained the priority of small, highly technical scientific-lounges and was never elevated to the level of a recognised objective scientific discipline, co-equal with e.g. engineering, statistics, data analysis. The goal of sampling is to allow making reliable inferences from limited samples and analytical data. If their representativity is not documented, all following inferences are based on *nothing* but 'specimens' not worth analysing. This simple universally true fact is the reason why sampling deserves to be taught systematically in most world's universities.

Since its start, IPGSA wanted to open and promote a constructive dialog across sampling experts to establish the Theory of Sampling as a discipline that warrants global recognition, understanding and interpretation. It succeeded in the economically most important mining, minerals and metals sectors, although even here IPGSA occasionally faced inertia and resistance when trying to explain the benefits offered by TOS: communities and individuals are comfortable and familiar with existing routine sampling procedures, and do not see obvious advantages in changing a beloved *status quo*. This situation is much worse in other sectors such as agricultural and environmental sciences, food and feed safety, pharmaceuticals, ecological sustainability where a culture valuing correct sampling practices is starting to develop lately. I believe many years are still needed before the merit of sampling is fully recognised.

After Covid, to remain relevant, IPGSA had to decide how to invest in the future. Two options: a) focus on TOS' own community and TOS developments without broadening outreach investment; b) raise sampling to the level of a comprehensive scientific discipline and work hard for getting full recognition. The 2022 renewed IPGSA Council chose the latter way, and the new beginning summarised here is the first step of this collective journey.

The three ambitious macro-objectives *know-how development*, *advice and support* and *capability building* will frame the milestones IPGSA wishes to reach in the next five years, namely:

- Establish, and keep a constructive dialogue among all sampling experts, as a plurality of views is essential for scientific growth and elaboration of innovative ideas.

- Collaborate with/support other international organizations to develop/revise/update relevant standards and guiding documents in all sectors where sampling is needed, explicitly or implicitly.

- Invest in education and training. IPGSA makes available its experience to everybody interested, especially encouraging universities, technical academies to get in touch to explore collaborations.

The new IPGSA vision and workplan are very ambitious and resources are very limited. But motivation is high. The future of sampling depends on what we do today, and we are all accountable towards the future generations. IPGSA is well aware of this responsibility and has decided to follow the advice of a wise man: *Be the change you wish to see in the world* (Mahatma Gandhi).

DISCLAIMER

Claudia Paoletti is employed by the European Food Safety Authority (EFSA). The position and opinion presented in this article are those of the author and do not necessarily represent the views or scientific works of EFSA. The author declares that she has no conflict of interest.