

International Pierre Gy sampling association: The new beginning

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The International Pierre Gy Sampling Association (IPGSA) promotes the development and application of the theory of sampling (TOS) founded in the 1950s by Pierre Gy. Although the association is not a legally constituted body: the prime reason for its existence is promoting the interests of its members for the universal relevance and applicability of TOS across all sectors, disciplines and domains where sampling is used to make informed decisions. Although formally established in 2017, already since the first World Conference on Sampling and Blending (WCSB1, 2003 Esbjerg, Denmark) the need to exchange scientific and technological views and to foster an open dialogue started spontaneously among all interested parties. This interest continued and grew over time, until it finally matured into the official establishment of IPGSA.

Since 2017, IPGSA has developed into a well-organised 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. The purpose of this paper is to present the new IPGSA vision and workplan in all the specific areas and tasks of the association's activities. With 20+ years of experience, it is appropriate to raise sampling to the level of a comprehensive and fully recognised scientific discipline; IPGSA wishes to serve this worthwhile ambition and welcomes participation in this important work.

BACKGROUND

The founding of the theory of sampling (TOS) by Dr. Pierre Gy in the 1950s marked the start of a new era for key industrial sectors where sampling is applied, to facilitate informed decisions based on representative data. Initially, Gy's ground-breaking work was mainly valued in the economic-mining sector (exploration, extraction, mineral processing), where his nine books and hundreds of speeches provided a completely new framework to solving salient sampling issues and addressing the adverse effects caused by heterogeneity. Only 50 years later, around the turn of the millennium, the wider relevance and applicability of TOS came to the fore across a broad range of sectors, industries, disciplines, and domains where sampling is important for decision-making processes.

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

Finally, 2017 marked the official establishment of the International Pierre Gy Sampling Association (IPGSA), driven by two motivations: 1) to promote development and application of TOS across all relevant scientific 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-organised 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 initial momentum that promoted the establishment of IPGSA mellowed for several reasons:

- IPGSA's founders were, for the most part, sampling experts who applied their expertise in specific industrial sectors, mainly focused on mining, minerals processing, cement, and metals refining. But the steadily growing inclusion of sampling professionals from other sectors required the incorporation of new application challenges, the understanding of 'unfamiliar' sampling issues, and the development of new, more globalised, inclusive and scientific recognised sampling concepts. This evolution enriched IPGSA with a plurality of views fostering scientific growth and a healthy elaboration of new ideas, but also intruded into a high-level technical and detailed discussion-flow, which was the priority of just a small group of samplings experts operating mainly in the geoscience and process industry arenas, rather than the new global concepts required.
- 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 during the first two decades of the 2000s, IPGSA witnessed the arrival of the 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 exceptionally open state of mind, which may be difficult to attain after the accumulation of experience 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's continuous evolution, and a few others belonging to schools other than that of Gy's, who did not necessarily agree with all his work. These different backgrounds, in addition to the restrictions suffered during Covid, resulted in the fragmentation of IPGSA integrated forum.

However, the above did not stop IPGSA's success story. On the contrary, it helped IPGSA become a mature scientific association, capable of evolving and spearheading its transformational change to launch a series of initiatives for virtually a new beginning. We would like 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 recognised scientific discipline.

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 and industrial sectors."

At the outset, IPGSA focused on establishing its organisational rules, principles and governance. The association is headed by an inclusive council (from different disciplines) who prepared and adopted a constitution detailing its mission, membership roles and responsibilities, organisational structure and financial arrangements. The council also manages IPGSA's routine activities.

However, in 2019 and 2021 the effect of the Covid pandemic impacted IPGSA during the consolidation of a natural generational turnover, significantly slowing its activities. Fortunately, we are now getting back to normal and developing a better understanding, trust and confidence between the old and new

generation of sampling experts needed for the establishment of a smooth, refurbished IPGSA leadership, capable of unravelling any glitches and shaping a new outlook and workplan.

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

1. **Know-how development:** to guide and lead the developments of TOS, from both a theoretical and practical perspectives, across all sampling sectors 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 assist in offering, 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 continues to be the organisation and supervision of the 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 Brazil, 2009 South Africa, 2011 Chile, 2013 Peru, 2015 France, 2017 Australia, 2019 China, 2022 Norway and 2024 South Africa.

Over the past two decades, the WCSB has 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 WCSB's proceedings are a solid and well-recognised source of key papers and technical documents, providing in-depth information on sampling and TOS.

However, there are two sides to this issue: if the 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 troubling reality for the Council, even after the successful WCSB10 in Norway managed to re-inspire the international sampling community.

With a strong wish to remedy 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 for setting clear and sustainable goals supporting the achievement of the three macro-objectives. These WGs are operational throughout the year and report quarterly to the 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 2023, the *TOS Forum*, a free publication serving the sampling community as well as the educational *Sampling* column in the magazine *Spectroscopy Europe/World*, both edited by Prof. Kim H. Esbensen, have served the purpose outstandingly. Today *TOS Forum* and the *Sampling* column have passed the baton to *Sampling Science and Technology (SST)*. Although the reasons for this change are unfortunate, as explained by Prof. Esbensen elsewhere in this inaugural issue, on behalf of the IPGSA community we 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. Thank you, Kim!

2. **WG2 - Communication platform:** to refurbish, update and maintain 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 and 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, be they beginners or experts. IPGSA is also on LinkedIn to facilitate connecting sampling professionals, networking, exchanges and reaching out. This work is currently ongoing and we hope to meet you soon on LinkedIn or host you on the new IPGSA webpage.
3. **WG3 - Technical training:** to ensure competence building, knowledge transfer and preparing the future generations, IPGSA will be offering lectures, structured courses and training materials to private and public organisations, academia, research organisations and governmental bodies. With several decades of training experience, IPGSA can calibrate according to customers' 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 all be cared for in close collaboration with the SST journal. Through the IPGSA webpage and LinkedIn, IPGSA will make training material available to all interested parties.
4. **WG4 - Stakeholder management:** to engage 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 dialogue with key international regulatory bodies (e.g. IMO and ISO) and key players involved in the circular economy who require sampling solutions for new material streams. The already existing collaboration with academia and research institutions needs to grow and expand as the synergy with the agricultural, food, feed, and pharmaceutical sectors must consolidate to recover the time delay when TOS was the prerogative of the geo-sciences.
5. **WG5 - Budget:** to manage IPGSA's financial resources and secure future funding. IPGSA has currently no permanent source of income and its limited resources come from WCSB fees. Despite the tremendous goodwill of IPGSA members, who devote their 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 will hopefully facilitate effective brainstorming for fund raising.

CONCLUDING REMARKS

When thinking about the economic impact and the volume of decisions taken across all sectors worldwide that would have needed correct sampling to be properly informed, there may well be a 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, equal to e.g., engineering, statistics, and data analysis. The goal of sampling is to allow for making reliable inferences from limited samples and analytical data. If their representativity is not addressed, quantified and documented, all following inferences are based on nothing but 'specimens' not worth analysing. This simple fact is the reason why sampling deserves to be taught systematically in most of the world's universities.

Since its inception, IPGSA planned to open and promote a constructive dialogue across sampling experts to establish the TOS as a discipline that warrants global recognition, understanding and interpretation. It succeeded in the economically 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 had developed a false sense of confidence based on 'fit for purpose' data which was normally just assumed as representative. This situation has been worse in sectors such as agricultural and environmental sciences, food and feed safety, pharmaceuticals, and

ecological sustainability, where a culture valuing correct sampling practices has only started to develop in recent years. We 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. There were two options: a) focus on TOS's own community and developments without broadening outreach investment; and b) raise sampling to the level of a comprehensive scientific discipline and aim to get full recognition. The 2022 renewed IPGSA Council has chosen the latter way, and the new beginning summarised here is the first step in this collective journey.

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

- Establish and maintain 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 organisations to develop/revise/update relevant standards and guiding documents in all sectors where sampling is needed, explicitly or implicitly.
- Invest in the present and future through education and training. IPGSA makes available its experience to all interested parties, especially encouraging universities and technical academies to be in contact to explore collaborations.

The new IPGSA vision and workplan are ambitious and resources are limited, but motivation is high. The future of sampling depends on what we do today, and we are all accountable to the future generations. IPGSA is well aware of this responsibility and follows 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.



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In January 2006 she joined the GMO Unit of the European Food Safety Authority (EFSA) first as Team Leader and then as Deputy Head of the Unit.

In 2019 she was appointed manager of the program designed to reorganize all EFSA processes in preparation of the new European Law on food safety that came into force in March 2021. Currently she manages the EFSA programme designed to innovate risk assessment methodologies in all sectors of food and feed safety within the Authority remit.

She has been the Italian expert for the definition of the European Commission sampling standard for GMO detection in conventional seeds. She was the technical expert responsible for the definition of the EU grain standard sampling procedures that resulted in EU Rec. 787/2004, in support to EC Reg. 1830/2003. She coordinated the European sampling research projects KeLDA to assess the contaminations of large soybean kernel lots coming into the EU, and she has been the biometric officer of the EU Community Reference Laboratory for GMOs. She chaired the European Network of GMOs Laboratories (ENGL) Sampling Working Group established by EU MSs to develop reliable and sustainable methodologies to collect representative data for decisions on regulated food/feed products. She is expert consultant for ISO/IWA committees, OECD, CEN, the European Commission and FAO. She organised international training courses on food/feed safety for the European Commission, UNIDO, PHARE project and universities within and outside Europe. Since 2019 she is member of Georgofili Academia. She has over 90 contributions either as book chapters, or as peer-reviewed papers.