

THE UK GAS ANALYSIS AND SENSING GROUP (GASG) - THE FIRST 30 YEARS

The following article is an adapted and updated version of earlier items^{1,2} and has been written to mark the 30th Anniversary of the inauguration of GASG.

Joe Watson & Martin Willett, July 2023.



Foundation

During the 1980s and 90s considerable interest developed in sensors and transducers as a subject in its own right. Digital technology was burgeoning and the acquisition of digital information from a fundamentally analog world presented significant challenges. Work on A-D conversion was complemented by the development of signal acquisition circuitry that could accommodate the wide range of phenomena addressed by a rapidly expanding suite of physical, chemical and biological sensors (to detect the presence of gases) and transducers (to provide meaningful measurements).

The need for a professional organisation in the UK to facilitate information sharing on sensors and transducers was soon apparent, and around this time several attempts were made to set up an appropriate body. However, accommodating the breadth of science, technology and application methods necessary for a comprehensive approach proved challenging. As a result some initiatives were unsuccessful, although the UKSG (United Kingdom Sensors Group) was a notable exception. Early sensor conferences suffered from similar drawbacks, frequently offering programmes covering such widely divergent topics that many delegates found only a small fraction of relevance to their own interests. However, the annual Eurosensors Conference series, which began in Cambridge in 1987 and continues to thrive, demonstrated that with dedicated effort these issues could be successfully addressed.

Nevertheless, it was apparent that a more focussed approach would be beneficial. Gas detection was an obvious choice given that the UK already had significant and expanding activity in that area. The academic, industrial and commercial organisations involved at this time were indeed diverse, with interests including;

- Combustion emission monitoring to improve efficiency and reduce pollution.
- Medical gas analysis for patient monitoring and improved early diagnostics.

- Monitoring of complex gas phase processes, for example in chemical plants and refineries.
- Safety monitoring in hazardous industries such as mining, oil and gas extraction and synthesized gas production.
- Environmental and transport pollution monitoring.

The importance of gas detection equipment was derived not only from the significant economic value generated by the relevant UK manufacturers, who were opening up new applications and markets, but also in the wider benefits accruing from the use of safety-oriented instruments. The provision of early detection and analysis for worker safety facilitated sustainable processes and the reduction of environmental pollution was also a critical area of attention for the industry at that time.

By September 1993, the UK Department of Trade and Industry (DTI) had assisted in the formation of a number of 'Sensor Interest Groups' under its Advanced Sensor Technology Transfer Programme (ASTTP). A meeting attended by Mark Churchyard and Jo Bazeley of the DTI, Peter McGeehin of the UKSG, Jonathan Gilby of City Technology and Russell Pride of British Gas led to the formation of a new group to focus on gas sensors, subsequently named the Gas Analysis and Sensing Group (GASG). It was eventually agreed that the DTI would support the GASG for 3 years via the ASTTP with annual funding tranches of approximately £7k, £5k and £4k, after which it became entirely self-supporting via annual membership fees, as it remains to this day.

The GASG convened its inaugural meeting in December 1993 at the DTI in London and elected the first committee, comprising Joe Watson (Univ. of Wales, Swansea) – Chair, Jo Bazeley (DTI/ASTTP), Paul Corcoran (Derby University), Jonathan Gilby (City Technology), Peter McGeehin (UKSG/Captur), Russ Pride (British Gas), Graham Thomas (Graham Thomas Consultants) and John Wykes (British Coal). In March 1994, Graham Thomas was elected as GASG's first Vice-Chair.

The Sensors for Water Interest Group (SWIG) was formed around the same time and, like the GASG, continues to flourish. These are the only two organisations arising from the original DTI initiative that are still operating. Others, such as the Optical Sensors Collaborative Association (OSCA) were also successful, but had much shorter existences.

Our current Chair, Jane Hodgkinson, remarked upon the longevity of the SWIG and GASG. "I have been active in all three areas – gas sensing, water sensing and optical sensing - so may be well placed to comment. I wonder whether meetings that concentrate on a family of measurands or around a particular sector attract more people from the industries they serve. In addition, the optical sensors community has been well served by academic conferences (which also attract technology-led companies in the field). Because this group clustered around a particular technology solution, the need for a new organisation serving optical sensors was perhaps less compelling."



3rd GASG Meeting, July 1994, Shell Research Centre, Thornton, Cheshire.

Members shown include Leigh Greenham (Crowcon), Peter Walsh (Health and Safety Executive), Rob van Ewyk (Zellweger), Joe Watson (Swansea University), John Wykes (British Coal) and Paul Corcoran (Derby University).

Aims & Operation

The original purpose of the GASG was to provide a forum for the discussion and dissemination of information on all aspects of sensing, analysis and monitoring of gases, volatiles (VOCs) and particulates in both gaseous and dissolved states including:

- New and interesting technologies for detection and measurement including sensor materials and design.
- Sampling, calibration and data analysis methods to improve the reliability, accuracy and specificity of detectors.
- Applications in the industrial and domestic sectors (including the energy industries and process control), defence, security and transport (land, sea & air). Uses in environmental monitoring, medical diagnostics, toxicology, forensics, agriculture and food.
- Human factors in measurement, both in the design of instruments and reporting of results.
- Standards development and metrology.
- The business of gas and particulate detection.

Although these aims have remained at the core of the GASG for 30 years, there has naturally been continuous evolution as the gas detection landscape is impacted by changes in technology, the environment, markets and society. The group has sought to anticipate and reflect this evolution by stimulating research and development and encouraging the adoption of appropriate gas detection methods for the benefit of all users.

For over 20 years following inauguration, the GASG was run by Joe Watson, with valuable administrative support provided by Swansea University Finance Department. When this arrangement ceased in 2015, the GASG was reconstituted in its present state, as an independent company limited by guarantee, but continuing to run as a non-profit making organisation funded by members' subscriptions and meeting fees.

As Jane Hodgkinson remembers "The change was by no means straightforward – in some ways a bit of a wild ride! Once the University told us of their intention to step back (which was not unreasonable as Joe Watson had retired) we looked to see whether we could join an existing scientific / engineering society as a special interest group. However, we faced several problems. We were (and remain) highly multidisciplinary – keeping the physicists and the chemists happy at the same time was always going to be a challenge! Furthermore, our business model was completely different, because our members are organisations, not individuals, and collecting personal subscriptions in the same way as the societies was not appropriate. Finally we looked at using the same administration team as CoGDEM and the STA. After much financial modelling and discussion, we took a deep breath and plunged in. There were tight deadlines and at several moments during the transition we didn't think we were going to make it with our reserves intact. But we held our nerve and eventually managed to open our own bank account – after much to-ing and fro-ing of signatures in the post. Finally we incorporated, the GASG funds were signed over, and we were on our own - and haven't looked back since!"

The management of the GASG is now carried out by the Board of Directors supported on a day-to-day basis by the secretariat at the Source Testing Association near Henlow, Bedfordshire. The Annual General Meeting takes place during the regular member's meeting in December, where financial results are reported and Directors and other committee members are elected for annual terms.

Joe Watson served as Chair for over 20 years before being appointed President and was succeeded in 2015 by the current Chair, Jane Hodgkinson of Cranfield University. Kim Chandler of Johnson Matthey served as Vice Chair for several years before Peter Walsh (Health and Safety Executive) took over in 2016.

Both Chairs have benefitted greatly from the work of those who have served on the GASG committee during the past 30 years. Participants have been drawn from the full spectrum of members and their voluntary efforts have been essential in allowing the group to fulfil its aims.



*GASG Committee Meeting at City Technology, Portsmouth, July 2002
(L to R) Russell Pride (British Gas), Rob Bogue (Robert Bogue Associates), Kevin Brown (E2V), Joe Watson (Swansea University), Peter Walsh (Health and Safety Executive), Malcolm Woodcock (City Technology), Kim Chandler (Johnson Matthey,) Martin Willett (City Technology).*

Membership

Throughout its history, the GASG membership has included representatives from many of the sensor and equipment manufacturers in the UK, along with university research groups, government and private laboratories focusing on gas/particulate sensing and monitoring. Many large-scale users of such technology have also been active in the group. Membership has always been available to all teams and individuals with interests in gas sensing and analysis, and organisations outside the UK are also welcomed. Great efforts have been made to maintain fees at moderate levels and from the outset the group has sought to be as inclusive as possible, by offering tiered memberships at Academic/Consultant, Industrial and Corporate levels.

Notable early supporters included Mike Byrne (EI Electronics, Ireland), Stuart Hopkins, (formerly of SIRA and then a consultant), Rob Newbury, (then of Pollution Monitoring Systems and now a consultant) and Mike Williams (Cranfield University). British Gas were the first Corporate members and indeed hosted the second meeting in 1994. Leading commercial organisations which have featured strongly in the group's history include City Technology, Crowcon Detection Instruments, E2V (later SGX), Kane International, EI Electronics and Edinburgh Instruments. In addition, the Health and Safety Executive has been a long-term supporter of the group, providing many speakers and hosting multiple meetings.

Although the Constitution of the GASG does not provide for, nor specifically aid, startup firms in the area of gas sensing and instrumentation, many such firms have been enthusiastic members

and have prospered alongside the group. Of particular note is Alphasense, which was formed in 1997 and has since become a major force in the global sensor market for electrochemical and other gas sensors.

Over the past 30 years, there have inevitably been changes in membership, as the activities of different organisations alter in response to evolutions in gas detection technology, applications and markets. However, overall numbers have been comparatively stable, and the GASG typically has over 50 members with a broad range of interests.

Activities

The GASG primarily serves members by arranging themed technical meetings which focus on the latest developments in gas sensing and analysis, addressed by leading UK and international experts. These bring together manufacturers, users, research organisations and academic departments who share interests in the field. A key feature of all GASG meetings is the provision of ample opportunity for members to discuss current issues with speakers and each other in an informal atmosphere during breaks in the presentation programme. This is recognised as a significant strength of the organisation.

Three technical meetings per annum have been organised throughout the past 30 years, and only extreme circumstances has the group failed to maintain this programme. Meetings are usually held in Spring, Summer and December (incorporating the AGM). A wide variety of venues and organisations have hosted GASG meetings, and wherever possible, tours of facilities are included in the programme since these are highly valued by members. Well over 50 different venues have hosted meetings, including leading sensor manufacturing sites, major technical research centres, university departments, a hospital, a naval dockyard and a brewery. The Institute of Electrical Technology in London has been the location for several successful December meetings.

The enduring popularity of the GASG meeting format over the decades can be gauged by comparing the 2nd meeting in March 1994 (hosted by British Gas at their research station in Loughborough) with the 85th (30th Anniversary) gathering in June 2023 at Crowcon Detection Instruments in Abingdon. Both events featured a full programme of technical presentations from leading experts, lively discussions, tours of facilities, and attracted 40-50 attendees.

The unprecedented Covid epidemic of 2020-21 demanded that face to face gatherings were temporarily curtailed and naturally resulted in the cancellation of some events. However, the new landscape also drove the development of online capabilities and, subsequently, hybrid meetings. Although most members still prefer the traditional face to face format, which was reinstated as quickly as possible, the ability to attend meetings remotely is now an attractive additional option. But reliance on such technology does have drawbacks, as Martin Willett remembers. "For one early hybrid event, we had visited the venue in advance and planned everything in detail. But on the day, there were new staff in place who didn't know what we needed, resulting in a mad

scramble for a laptop, camera and adequate Wi-Fi / phone signal to connect to the online attendees. Jane Hodgkinson ended up using her mobile as a microphone for the audience in the room and we certainly learned some hard lessons about hosting such events on that day. We have now bought our own equipment (shared with CoGDEM and STA) and Andy Curtis from STA does an excellent job in setting up the system at each new venue to ensure a good meeting experience for both the online and in-person audiences.” Increased online participation has also enabled a significant expansion in the range of speakers who are now able to address meetings from afar, and experts located in different locations and time zones have added greatly to the value of meetings.



*Original committee members celebrating the GASG 20th anniversary at the Institute of Materials, London, December 2013.
L to R: Jonathan Gilby, Joe Watson, Russell Pride and Peter McGeehin.*

GASG meetings continue to address a very wide range of topics dealing with technology and applications in environmental, industrial, medical and other fields where gas detection plays an important role. There have been over 500 presentations in total, dealing with subjects as diverse as the olfactory capabilities of dogs and bees, spectroscopic detection of gases in exoplanet atmospheres and the role of gas analysis in the early diagnosis and management of disease. From an early stage, members requested that the details of talks should be published and GASG now has a significant archive of presentation materials which our speakers have generously made available to the members. Latterly, these have been further supplemented by video recordings of meetings where possible.

On occasions, joint meetings have been held with other professional organisations having parallel interests, so enhancing further the benefits to attendees. These have included the Sensors for Water Interest Group (SWIG), the Optical Sensors Collaborative Association (OSCA), the Institute of Physics, the Royal Society of Chemistry and the National Physical Laboratory.

A regular and popular part of the programme in recent years has been the Early Career Researcher meetings. These allow the upcoming generation of developers and researchers in gas, volatiles and particulate detection to showcase an eclectic mix of short talks or posters with prizes awarded for the best presentations. The GASG also supports students engaged in gas detection research and development who wish to present their work at relevant international conferences by the provision of travel grants. In return, recipients give a synopsis of their work at a GASG meeting.



*Past and present committee members celebrating the GASG 30th anniversary at Crowcon, Abingdon, June 2023.
L to R: Jonathan Gilby, Martin Willett, Russ Pride, Joe Watson (President), Jane Hodgkinson (Chair), Peter Walsh (Vice Chair),
John Saffell, Claire Batty, Norman Ratcliffe.*

Newsletters have been regularly issued for all members since January 1994, primarily to distribute proceedings of the technical meetings, and the 77th edition marks the group's 30th anniversary.

The GASG has also funded 2 publications by Robert Bogue & Associates on "Gas Sensor Research in British Universities" with editions covering R&D in the periods 1994-1998 and 1999-2002 respectively³. In 2006, these were supplemented by "A Directory of Gas Sensor Research at Continental European Universities" by the same authors, complimenting the previous UK versions⁴. These were issued free to members to assist in locating sources of potentially

exploitable technology and partners for collaboration whilst also placing the domestic activity in a broader perspective.

The GASG has an ever-expanding online presence and has sought to embrace appropriate social media tools to improve engagement with existing affiliates and to attract new members. As the group enters its 4th decade, an improved website will be launched to simplify many of the member interactions and allow a streamlined access to the groups' archives.

Future

The UK gas detection community has a long and highly successful heritage. The technical and commercial successes of the industry are recognised at an international level, and it continues to be well served by trade groups such as the Council of Gas detection equipment manufacturers (CoGDEM), and non-commercial organisations such as the GASG.

The enduring strength of the GASG is a testament to the vision of the founders and the engagement of the members over the past 30 years. Looking ahead, the group will continue to offer a unique environment for discussion and for the dissemination of information covering all aspects of gas and particulate detection and measurement across the widest possible range of applications. Efforts to expand the membership will place particular emphasis on attracting individuals and organisations who have not previously been well-represented, and to the broader benefit of the increasingly diverse gas detection community.

References

- 1 "The GASG – Its History and Future", J. Watson, 2013.
- 2 "History of the Gas Analysis and Sensing Group (GASG)", J. Watson PhD, C.Eng, FIET, President, GASG, March 2020. GASG Website.
- 3 "A Directory of Gas Sensor Research at UK Universities". R.W. Bogue, 1999. Gas Analysis and Sensing Group (pub.), Swansea, UK. (Updated version published 2003)
- 4 "A Directory of Gas Sensor Research at Continental European Universities". R.W. Bogue, 2006. Gas Analysis and Sensing Group (pub.), Swansea, UK.