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THE Tech Magazine

THE MAGAZINE OF THE IST

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YEARS SUPPORTING THE TECHNICAL COMMUNITY

In The Digital, Engineering, Science and Creative Technologies

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THE Tech Magazine

The magazine for, and made by, the technical community.

THE Publications
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PUBLICATIONS: The Journal | The Tech Magazine

The IST **eNewsletter** has gone from strength to strength in design and content and has naturally changed from being a traditional newsletter into an established magazine over the last six years. We wanted to thank everyone for their positive and encouraging comments. The content has been popular in representing the technical workforce from different sectors. We wanted to take this one step further, hence the transition to **The Tech Magazine**, to give technicians a publication they could contribute to, as well as ensuring the technical community is well represented. We want to keep adapting all our publications to be useful for your work and career. Please let us know if you have any feedback or opinions.

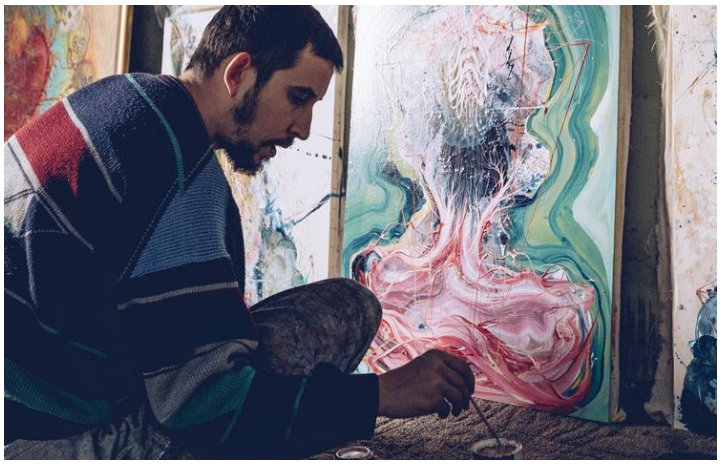
IST members can contribute with articles of interest / opinion pieces or research and information blogs. Members can advertise their projects, awards, or even advertise or offer an advert for their organisation.

MAGAZINE WALL OF CONTENTS

UPDATES & NEWS | INDUSTRY | BUSINESS
RESEARCH INSTITUTES | CONSULTANCY
COLLEGES | HIGHER EDUCATION | SCHOOLS
#TECHNICIANJOURNEY | AWARDS
E-ARTICLES | CREATIVE | ENGINEERING
SUSTAINABILITY | DIGITAL | SCIENCE
OUTREACH | ENGAGEMENT | DEI
TRAINING & RESOURCES | CPD CORNER
EVENTS | ARCHIVE | CROSSWORD

THE TECHNICAL COMMUNITY

Giving technicians the visibility & recognition they deserve



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WELCOME TO YOUR MEMBERSHIP MAGAZINE

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Volume 4 Number 1
July 2023

This magazine is made for, and made by, the technical community.

CALL TO MEMBERS:
If you want to publish an article or are interested in joining the team, contact us at the office, we would love to hear from you.

For details contact
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The Tech Magazine is produced on behalf of the Institute by AI Group.

Views expressed in this magazine are not necessarily those of the Editorial Board or the Institute.

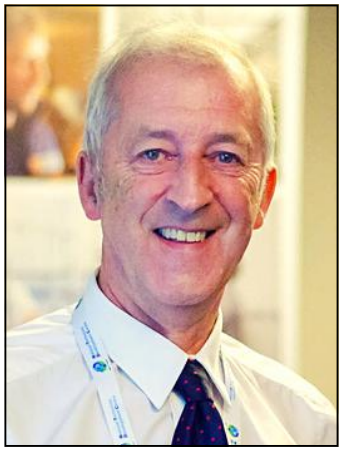
Cover image: '75 Years of the IST'.

Thank you for everyones contribution to this edition of the magazine.

We would love to hear your views on the Magazine and learn more about what you would like us to include in the future. Please feel free to send us your thoughts via office@istonline.org.uk.

Welcome

CHAIR'S MESSAGE



Terry Croft, MBE FIScT
IST Chair

"As our volunteers also experience the same issues in their daily roles, they are well equipped to provide such valuable support to our members and the technical community at large."

When I see the my local schools close for the annual summer break, it always reminds me that the first six months of the year have already passed in a blink of an eye. During that time, however, your IST volunteers have been working on your behalf delivering workshops, supporting and attending many of the key technical conferences and events and listening to our members and the technical community at large. This ensures that we are able to support our members and the community in many ways by keeping up to speed with issues and events that effect you, that impact on your work, career and future changes in job roles. Our teams have travelled the length and breadth of the the UK from Exeter to Glasgow and to many other towns and cities giving freely their time and expertise.

These brilliant volunteers are the backbone of the IST which is reflected in our motto "run by technicians for technicians". They are passionate about representing our community and ensuring your voice is heard both locally and nationally. This can be seen through their giving of their valuable time to the IST in the many roles and supporting activities that are available to members. A big thank you has to go to all our volunteers, past and present, as through their work we are able to celebrate the 75th Anniversary of the IST. You are able to see how the IST developed and has changed and adapted over several decades to meet the ever changing challenges and demands on the individual and the community at large and where the future may take us in my article "75th Anniversary of the IST – A look back over the years".

These changes can be through new legislation to how we work, to new technologies and procedures. The IST responds to these developments in a variety of ways, including webinars, workshops and the creation of specialist groups. Our "Women in Tech Group" and our " AI (Artificial Intelligence) Group" are just two highly successful examples of how the IST reacts to the ever changing world and the working environment and the impact on our members and the technical community.

This year we lost one of our key volunteers and friend to many, Val Gordon, who sadly died on the 7th May 2023. Val made an impact in so many ways and leaves an everlasting legacy in the work she had undertaken and through her last project, supporting Russell Wilson and his colleagues in the development of the (newly to be announced) IST Scottish Technicians Network Group. Her passion and drive that influenced everyone that met her, will give that extra impetus that ensures success. You can read more about her career and the major contribution Val made to the IST and other organisations in my tribute to Val "A celebration of the professional life and career of Val Gordon FIScT" in this edition of the TechMag.

You will be able to hear for yourselves about what are currently the key topics affecting you at this years IST Conference "75 Years and Beyond Delivering Excellence & Innovation in a Changing Technical Landscape" on Wednesday 13th September 2023 at the London South Bank University. The programme covers the Creative Arts and Media, Career Development, Digital and Artificial Intelligence, Environment and Sustainability and Health and Safety. So if you are a Technician, Practitioner, Specialist or Manager Manager in any industry and sector, then this is the conference for you and your colleagues. For more information and to register, go to www.istonline.org.uk/ist-conference-2023/

I look forward to seeing you all at this year's conference and please feel free to stop me or my colleagues for a chat or to highlight any concerns you may wish to raise.

Until then, have a great summer holiday and hopefully see you at the conference.

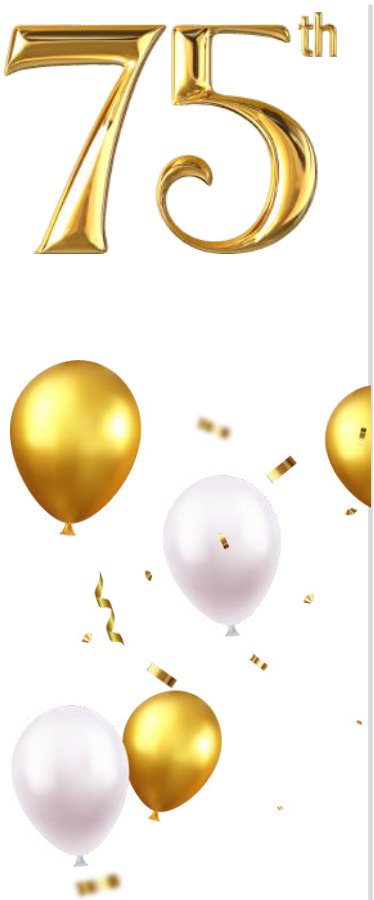
With best wishes,

Terry.

The IST is run by technicians for technicians so, join one of our teams and play your part. Contact the office: office@istonline.org.uk

75 YEARS AND COUNTING

75TH ANNIVERSARY OF THE IST – A LOOK BACK OVER THE YEARS



As we celebrate the **75 years** of the Institute of Science and Technology, my thoughts go back to how did our professional body come about. We are all aware of the great work undertaken by our volunteers over the many years supporting the technical community, managers and specialists across so many sectors and disciplines. But who first recognised the need for our professional body and what were those first steps to achieve the excellent organisation we have today.

Prior to World War 2, technicians were seen as the labourers, craftsmen and goffers and fetchers. Professional bodies existed mainly for university qualified staff, particularly in science and engineering, who had taken careers in industry, higher education and medicine and not highly experienced and in most cases less academically qualified, technicians. The war had changed the (old) world forever. Science, engineering, medicine and technology had moved on at pace. We had entered the nuclear age, countries had to start to rebuild their economies and infrastructure, there was a shortage of labour and peoples wanted to embrace the freedoms they gained at such a high human cost. The role of the technical community would play a major part in the breakthroughs and developments in future decades.

1948 unfortunately saw the start of the Arab-Israeli war, the assassination of Gandhi but also many positives, including the creation of the NHS, the invention of the transistor and some say the greatest invention of the century being the first computer program was written. This alone, would have an impact on all our lives over the coming years. Advances in laboratory and workshop technology and infrastructure meant the introduction of new ways of working and the need for upskilling and more focused training for the technical community.

The first page of a ledger containing 69 signatures of founder members

In the Derek Sayers, Simon Fairnie and Philippa Nobbs article, The Development of Science and Technology in the UK and abroad, it notes that in **1946** seven technicians independently formed themselves into the “Science Technologists Association” and campaigned to achieve a wider and national interest in their new creation which they saw as an opportunity of furthering the training and status of technicians especially those in the sciences.

Alan Gall, IST Archivist, in his article in the winter 2021 Journal, highlights that in 1948, 154 technicians expressed an interest joining the Association and on **10th July 1948** the “Science Technologists Association” formally came into being – and was the forerunner of the Institute of Science Technology, now known as the Institute of Science and Technology.

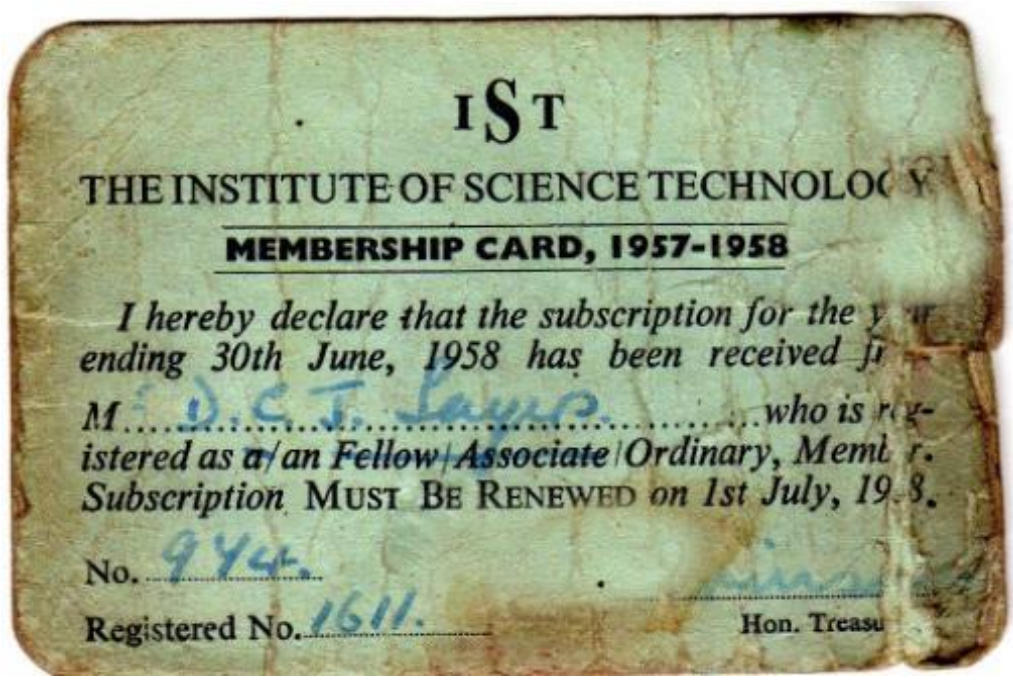
In the 50s and 60s, the pace of research, innovation and transition continued to increase with many new products becoming available to the general public including televisions, transistor radios and cordless tools to name a few. On the medical front, we saw the introduction of the polio vaccine and the birth control pill

as well as the heart pacemaker. We had the first jetliner and communications satellite. All these industries and research organisations needing more and more well trained and qualified technicians.

In 1954 the membership of the Science Technologists Association had significantly increased and it was agreed that there should be a Certificate of Incorporation and in the latter part of that year the Institute of Science Technology (IST) was formed. In the 1960 s, the IST continued to grow and by the end of the decade membership had reached over 4000 members. As Derek Sayers et al note in their article, London alone had 1,400 members and there were Branches in all the major university cities, as well as members from abroad, mainly from the British Commonwealth Nations. However, financial constraints in the 1960's particularly on universities and research organisations, meant cutbacks in their workforces. This mostly fell on technicians and subsequently this impacted on professional body membership in the UK.

The 1970 s saw further advances in science, medicine and technology. Major strides were made in computers and information technology (IT) services. In addition, we saw the introduction of the cell phone, laser printers and email. This had an impact on how we engaged with our members and how our publications and communications were delivered. This can be seen in the changing face of the IST publication, The Journal as well as the Bulletin and todays TechMag magazine. In 2023, the publications are delivered electronically as part of the IST's environmental impact strategy – Think Green.

Retro Mobile Brick Phone



IST

THE INSTITUTE OF SCIENCE TECHNOLOGY

MEMBERSHIP CARD, 1957-1958

I hereby declare that the subscription for the y
ending 30th June, 1958 has been received fr
M D. C. J. Sayers who is re-
istered as a/an Fellow/Associate/Ordinary, Memb r.
Subscription MUST BE RENEWED *on 1st July, 19 8.*

No. 944

Registered No. 1611.

Hon. Treasu

Derek Sayers's Membership card from 1957/58

75 YEARS AND COUNTING

75TH ANNIVERSARY OF THE IST – A LOOK BACK OVER THE YEARS

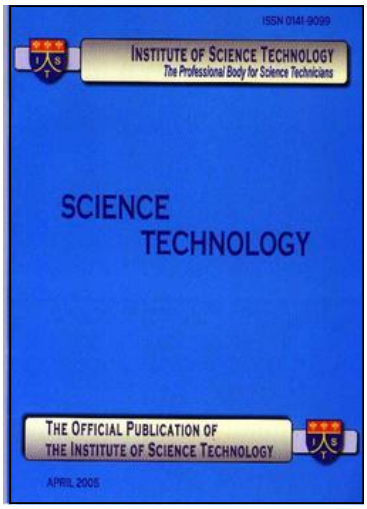
Bulletin 1976

Journal 1958

Journal 1968

Journal 1972

Journal 2001



Journal 2006

Journal 2008

Journal 2013

Journal 2022

TechMag 2023

75TH ANNIVERSARY OF THE IST – A LOOK BACK OVER THE YEARS

The **1980s** saw the introduction of the personal computer and MRI, development of statins and the vaccine for Hepatitis B as well as DNA fingerprinting. This just reinforced the need (and shortage) of highly skilled and qualified technicians.

Over the years, the IST saw the continual need to support the technical community and to provide advice and mentoring to help members achieve their career aspirations. As Derek et al noted in their article, the IST has always been involved in professional standards and qualifications in an effort to provide opportunities for members to demonstrate their capabilities. In addition to working with City and Guilds, it had representatives on the subject committees for TEC and BTEC. More recently, it was part of the groups that devised the National Occupational Standards that led to the NVQs for Laboratory Technicians in Education and in other areas. It was also part of the group that produced the Apprenticeship frameworks. In the 1980s, the IST introduced a Register of competent practitioners to which technicians could sign up if they met the standards that had been set, a professional register for technicians. In 1981, the IST published its manual for the training of science technicians in educational and research laboratories. This was updated and expanded in 1994 when the IST launched its Core Vocational Qualification (CVQ) and, later, the Preliminary Vocational Qualification (PVQ).

The **1990s** brought about the introduction of text messages, Adobe photoshop, DVDs, the human genome project and Hepatitis A vaccine. The World Wide Web had been invented in 1989 and was starting to have a major impact in the 90s to meet the demand for automated information sharing between scientists in universities and institutes around the world. Other communities and the general public were also starting to use this platform. With this and the improved mobile phones, the way we communicate and interact was going to change forever. The inventions to date, particularly the development of high-powered computers meant that the pace of change, innovation and scientific, medical, engineering and technological breakthroughs were increasing in shorter time frames. The need for technical staff to keep up to date with these changes and developments was essential. The IST continued to provide this support and encouraged Continuous Professional Development (CPD) through ongoing and planned learning-development processes.

The 90's was also a significant time for our President, Dr Helen Sharman CMG, OBE, who on the 18th May 1991, aged just 27, became the first British astronaut to travel into space. What an achievement and a demonstration of how far science and technology had advanced since 1948. With the experiments she undertook whilst in space, I think we can justifiably say she is our very special "space technician" and her work and support as our President is appreciated by all our members and teams.

Helen Sharman CMG OBE FIScT: The First British Astronaut

75 YEARS AND COUNTING

75TH ANNIVERSARY OF THE IST – A LOOK BACK OVER THE YEARS

The **2000s** brought more advances across all sectors from a better understanding of cancer to hormone therapy. Camera phones, flash drives and Bluetooth. Social media platforms were being introduced which again impacted on the way the IST communicated and engaged with the technical community and its members. This included LinkedIn which was launched in 2003. The IST knew it was essential to keep pace with the times, embracing the new technologies and ensuring we were fit for purpose and had the ability to quickly respond to change.

This IST also recognised the lack of opportunities and support for technical staff that was available at the time and the limited opportunity for CPD. To address the situation our Chair at the time, John Robinson, Bob Hardwick, Matt Levi and colleagues decided it was essential to have a formal training organisation. Following initial funding from the Leadership Foundation, they applied for further funding to the Higher Education Funding Council for England (HEFCE) to create HEaTED, Higher Education and Technician Educational Development. This successful training and development organisation is now a part of the National Technicians Development Centre (NTDC) providing key training and development course. The IST continues to work with the NTDC /HEaTED to develop new training programmes and courses to meet the needs of the 21st century technician, manager and specialist.

The 2000s, also brought about many policy and governance changes to the IST to ensure strategic aims supported all the key and necessary initiatives and legislation. From Equality and Diversity to Environmental Sustainability and Climate Change.

During this period the IST changed its name to the Institute of Science and Technology, to encompass the creative arts and media.

The IST has been a full supporter of many new initiatives and organisation. In 2013, the IST became a contributor to the £1.25M project, Technical Development and Modernisation Programme (TDM), specifically focusing on the technical community in the Higher Education sector. This successful project led to the (£1.15M) funding by HEFCE (now the Office for Students) of the first National Technicians Development Centre (NTDC) in 2016. With the lack of data and related reports on key factors relating to technical staff, the IST supported their key work through various collaborations and contributions, particularly the development of CPD software and the new NVQ level 3 technician apprenticeship which not only covered STEM areas but also covered the creative arts and media. With the introduction in 2017 by the Science Council of the Technician Commitment initiative, the IST confirmed its support and commitment and became an official supporter of the campaign. In August 2023, the new Institute for Technical Skills and Strategy (ITSS) and the IST has already formally made a commitment to fully support this new body bring 75 years of knowledge and expertise regarding the nations technical community to the table.

The IST continues to support its members in many ways and members (our brilliant volunteers) deliver these services and resources to our community and technicians at large. From volunteering to events, workshops, presentations and our national conference, to being part of the Executive, Senior team, Chairs of Specialist Groups and Committees to representing the IST across the globe.

A good example of how the support teams have, in recent years, addressed the additional demands experienced by members from the ever-changing work environment (e.g., from the introduction of new technologies, work practices and national directives and legislation), and to

ensure that the IST could continue to provide up to date support, guidance and advice to them, volunteer members suggested that one way to address these developments was by the formation of specific specialist groups.

Two of the highly active and successful groups supporting our community, are the AI Group and the Women in Tech Group, many of their activities can be seen on the IST website.

IST Member-Volunteers supporting the IST Community

Women in Tech Group

The Women in Tech Group aims to advance the knowledge and interests of Women in Tech, Support and Empower Females and help to overcoming barriers to, or within, scientific/technical careers.

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Be Inspired Posters

IST AI (Artificial Intelligence) Group

The AI Group aims to gain a real understanding of the rapidly developing and extremely broad subject that is referred to as Artificial Intelligence (AI). In addition, the group wishes to encourage interaction among a diverse group of people, interested in AI, who might not normally exchange views.

The AI Group is open to any IST member who has an interest in the development of artificial intelligence from a responsible, ethical, explainable, technical or other point of view.

YouTube Video recordings of the AI Group Seminar Series

75 YEARS AND COUNTING

75TH ANNIVERSARY OF THE IST – A LOOK BACK OVER THE YEARS

For 2023, a new specialist group, the IST Scottish Network group, will be launched shortly covering the needs and aspirations of our Scottish members as well as those of the Scottish technical community at large. Further details will be announced on our web site in the coming weeks.

New Professional Register for the Creative Industries

A further example of meeting the needs of our members, is the development of the new Creative Arts Professional Register, the Registered Creative Industries Professional, RCiP. Technicians, specialist and managers wanted a register that highlighted their specialist roles in the Creative Arts. This new register covers all the Creative Arts sectors from Higher Education to Theatre and Film industries and will provide the opportunity for specific creative arts activities within the IST community and the opportunity to network with like minded professionals from other sectors. Further information is available on the IST website.

Endorsed by Creative UK, the Creative Registration Framework (CRF) aims to provide parity of professional accreditation with existing schemes currently available to the science and engineering sector workforces.

The IST has made a significant contribution to its members and the technical community over the last 75 years. This couldn't have happened without the volunteers who have given their time and energy to being a part of the team. There are so many people to thank, it would be wrong of me to highlight specific members and colleagues but to say "Thank You" to you all. We have seen technicians develop their careers over the many years, going from strength to strength and becoming a senior member of their institution, company and organisation. At the same time taking more senior roles within the IST and being a part of our successes in supporting the technician at large. Our motto has always been "Run by Technicians for Technicians". As a "not for profit" professional body, it is essential as we move into the next 75-year journey of the IST, that new, younger members and established members continue to volunteer and play a part in their professional body. There will be challenges ahead for our community as well as the impact of new and emerging technologies and advances. Roles will continue to change, more automation will continue to replace certain roles and activities, new demands and requirements will be placed on the technical community. Therefore, it is essential that the IST also has the ability to change and adapt quickly to meet the demands of the 21st century in order to be able to continue to supply not only our services to our members and the technical community but provide the essential advice and support that will be needed.

If you feel you want to be a part of our journey over the next 75 years then please feel free to contact Joan Ward or myself at office@istonline.org.uk

We look forward to chatting to you on how you too can be a part of the history of the IST.

Written by:
Terry Croft MBE FIScT

Acknowledgements:
Many thanks to Joan Ward FIScT, for providing me with background and images.
To Derek Sayers FIScT, Simon Fairnie FIScT and Philippa Nobbs FIScT for extracts from their article "The Development of Science and Technology in the UK and abroad".

To Alan Gall for extracts from his article "Fred Consterdine and Ralph Gilson: A Chapter in the History of the IST".

75TH ANNIVERSARIES

75TH ANNIVERSARIES: CELEBRATIONS SHARED WITH THE IST

Given that the IST is celebrating it's 75th anniversary this year, we thought it would be interesting to see which other organisations and events share our anniversary.

UK/International Organisations/Companies

National Health Service (NHS): The NHS was established on July 5, 1948, as the primary healthcare provider in the United Kingdom. It offers medical services and healthcare to all residents, funded through general taxation.

Atomic Energy Authority: The AEA, now known as the United Kingdom Atomic Energy Authority (UKAEA), was established in 1948 to oversee and advance atomic energy research and development in the UK. It focuses on nuclear energy and related technologies.

World Health Organisation (WHO): Although officially established on April 7, 1948, the WHO has been instrumental in promoting global health and coordinating international efforts in disease prevention, health emergencies, and scientific research.

Raytheon: Initially focused on manufacturing radio tubes, Raytheon expanded into various electronics fields and became a prominent defence contractor, specialising in areas like radar systems and missile technology.

Hewlett-Packard (HP): Founded by Bill Hewlett and Dave Packard, HP started as a small electronics company in a garage in Palo Alto, California. It grew to become a major player in the computer and technology industry.

Motorola: Established as Galvin Manufacturing Corporation, Motorola became known for its advancements in electronic technologies, including the development of radios and later, mobile phones.

Porsche: While Porsche had been in existence since 1931, the first car bearing the Porsche name, the Porsche 356, was produced in 1948. This marked the beginning of Porsche as a standalone automobile manufacturer.

The International Union for Conservation of Nature: Founded in Oct 1948, the IUCN is a global organisation focused on conserving the environment, promoting sustainable use of natural resources. It plays a key role in biodiversity conservation and environmental policy.

Land Rover: Land Rover was founded in 1948 as a British automobile manufacturer specialising in four-wheel-drive vehicles. It is renowned for producing rugged and off-road capable vehicles.

Sony: Although officially founded until 1946, Sony began gaining traction and recognition in the technology industry from 1948 onwards. It became known for its innovative consumer electronics and entertainment products.

75TH ANNIVERSARIES

75TH ANNIVERSARIES: CELEBRATIONS SHARED WITH THE IST

These organisations, companies and advances are just a few that share our anniversary and we would like to mark the significant contributions that all the above have to our world in the last 75 years.

Advances in science and technology being made an/or announced:

Joan Ward, MBA FIScT
IST Deputy Chair

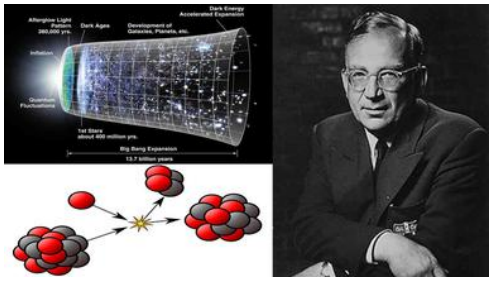
"Here's to the next 75 years – I wonder what they hold for the next generations!"

Transistor Invention: The invention of the transistor, a key breakthrough in electronics, was announced by John Bardeen, Walter Brattain, and William Shockley at Bell Labs. This laid the foundation for modern microelectronics.

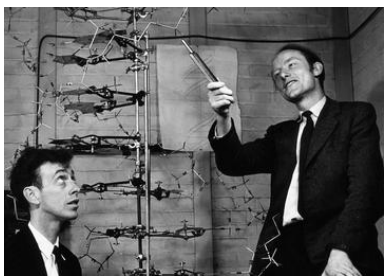
Polaroid Land Camera: Edwin Land introduced the first instant camera, the Polaroid Land Camera, which allowed users to obtain developed photographs in just 60 seconds.

Velcro: Swiss engineer George de Mestral patented Velcro, a hook-and-loop fastening system inspired by burrs sticking to his clothes during a walk. Velcro is widely used in various industries and everyday products.

Big Bang Theory: Astrophysicist George Gamow proposed the Big Bang Theory, suggesting that the universe originated from a highly condensed state and has been expanding ever since. This theory revolutionised our understanding of the cosmos.



DNA Structure: Biophysicists James Watson and Francis Crick were already working towards their groundbreaking paper on the structure of DNA, describing the double helix model. This discovery laid the foundation for modern genetics and molecular biology.



Watson and Crick
The DNA Structure

Decoding the Scented Secrets of Ancient Egypt:

Unveiling the Fascinating World of Perfume-making and its Cultural Significance

Amro Heikal

For centuries, perfumes have been used for their fragrant and therapeutic properties. Ancient Egyptians were particularly renowned for their skill in perfume-making, with perfumes playing a significant role in their culture and society. In recent years, scientists have made incredible strides in understanding the chemical composition and sensory experience of ancient perfumes, including those used in Ancient Egypt. Through a combination of archaeological and chemical analysis, researchers have been able to decode the complex scents of these ancient perfumes, shedding new light on the sensory world of the ancient Egyptians.

In addition to identifying the individual ingredients, scientists have also been able to determine the proportions in which they were mixed. This has allowed them to recreate the scents of ancient perfumes with remarkable accuracy, giving us a glimpse into the sensory world of the ancient Egyptians.

One of the most fascinating discoveries to come out of this research is the way in which the ancient Egyptians used scent in their daily lives. It is now believed that they used different perfumes for different purposes, such as religious ceremonies, medicinal purposes, and personal adornment. For example, some perfumes were used as offerings to the gods, while others were used to treat ailments such as headaches and respiratory problems.

The study, published in the journal Analytical Chemistry, utilized advanced analytical techniques to analyze residues from ancient perfume bottles. The researchers took their findings to two experts on Egyptian perfume, Dora Goldsmith and Sean Coughlin of the University of Strasbourg, analyzed four unopened perfume bottles from the tomb of Pharaoh Tutankhamun, dating back to around 1323 BCE.

The researchers used gas chromatography-mass spectrometry (GC-MS) to identify the individual chemical compounds present in the perfume residues. GC-MS is a powerful analytical technique that separates individual compounds from a complex mixture and identifies them based on their mass spectra. The researchers also used solid-phase microextraction (SPME) to capture the volatile compounds present in the perfume residues.

The results of the study revealed that the ancient Egyptian perfume contained a complex mixture of natural ingredients, including essential oils, resins, and waxes. The perfume contained a variety of botanical ingredients, including myrrh, frankincense, cinnamon, and cardamom. The researchers also identified a number of animal-based ingredients, including beeswax, musk, and civet.

One of the most interesting findings of the study was the presence of a previously unknown ingredient in the perfume.

The researchers identified a compound called 2-phenylethanol, which has a sweet, floral scent and is commonly used in modern perfumery. This discovery suggests that ancient Egyptians were using sophisticated perfume-making techniques, incorporating a wide range of natural ingredients to create complex fragrances.

The study also shed light on the ancient Egyptians' use of perfume in religious and ceremonial contexts. The perfume residues analyzed in the study were found in small, sealed flasks, which were likely used in funerary rituals to honor the dead. The use of perfume in funerary rituals was a common practice in ancient Egypt, and the study provides new insight into the materials and techniques used to create these fragrances.

In conclusion, the study of ancient Egyptian perfume has revealed fascinating insights into the history of perfumery and the ingredients used by ancient Egyptians. The use of advanced analytical techniques has enabled scientists to identify the individual chemical compounds present in the perfume residues, revealing a complex mixture of natural ingredients. The discovery of a previously unknown ingredient suggests that ancient Egyptians were using sophisticated perfume-making techniques, and the study sheds new light on the cultural and religious significance of perfume in ancient Egyptian society.

The study of odor molecules, old documents and other archaeological finds is helping scientists explore the spectrum of smells in ancient societies, and their possible cultural meanings. Despite all these challenges, a few new and powerful biomolecular approaches are helping scientists decode ancient scents.

Author: Amro Heikal MIScT

The Future of Science Technology?

Michael Quigley

It's amazing to think that items worthy of inclusion in a science fiction novel 40 years ago have become so mainstream that we don't give microprocessor enabled lab equipment and devices with liquid crystal displays a second thought. Still, consider that what were once state-of-the-art technologies, such as the humble strip chart recorder, and devices with Nixie tube display, have become archaic.

For those science technologists much younger than the author, Nixie tubes were display elements used in calculators and all manner of scientific equipment. More of a quaint novelty these days, you can still buy Nixie tube gadgets in the form of clocks and watches. Strip chart recorders were used as a graphical means of capturing data from instruments as diverse as spectrophotometers and chromatographs. If such fantastic advancements in lab technology have been made in the last few decades, what is to come next? My own thoughts are that miniaturization and consolidation of technologies will steadily improve. Many years ago, I was involved with the development of fibre-optic chemical sensors and this type of technology provided a first glimpse of this type of concept. There's something of a cautionary tale here though, taking into account the claims of some companies in pursuit of this Holy Grail of technologies. Still, I think we can anticipate that genuine improvements and advancements will inevitably take place. Along with an acknowledgement that AI will have an increasingly large part to play, these are just some of my thoughts. However, what do those better placed to predict what we can expect to see in the future have in mind?

To The Membership

You're invited to submit your own ideas for what you think may or perhaps what will happen in 10 years time or a timeframe of your choosing. I was fortunate to be in at the start of the laboratory robotics revolution in using US-based Zymark's first generation equipment. What next? Will robots truly take over? The most likely or perhaps most startling predictions will be incorporated into a future article.

Please submit your views to office@istonline.org.uk within the next 2 months and if there are sufficient responses we will collate and produce a report in our December Journal.

Michael Quigley, FIScT is xxx from the Createc Corporation, Ithaca, NY 14852, USA.

Figure. Nixie Numbers with decimals.

Laboratory error: Unpicking the reasons and analysing the causes

Tim Sandle

Introduction

This article looks at some of the reasons for, and patterns behind, laboratory errors. The article represents a brief look into the subject area, drawing on some of the issues that the author is aware of. Generally, laboratory errors should not be categorized as "human error" since these are not the problem but generally a symptom of a system or facility or operation. By delving deeper into the nature of the event (using techniques to get to the real cause of the problem) more meaningful corrective and preventative actions (CAPAs) can be developed, CAPAs with a stronger chance of remedying the problems first time. Hence an important focus is to seek a significant reduction of repeat observations. This should lead to improved laboratory efficiency supported by right first-time testing and control.

What are laboratory errors?

In terms of what is meant by laboratory error, the term is wide-ranging. These are errors occurring at any part of the laboratory system, from ordering tests to reporting results and appropriate interpretation and reaction to these errors. Hence, errors in the laboratory may occur as a result of the failure on the laboratory systems and processes (1). Examples of errors are (2, 3, 4, 5):

- Sample identification error.
- Lost samples.
- Samples delayed in transit.
- Samples stored at the wrong temperature.
- Sampling error, such as leading to microbial contamination, or a form of material termed composition heterogeneity leads to the sample being unrepresentative.
- Contaminated samples.
- Incorrect test performed. There will be specific aspects relating to specific tests that can lead to error. For example, with HPLC issues can arise as the result of incomplete dissolution, splattering during heating, and or with reading the meniscus improperly.
- Test performed inconsistent with the written procedures.
- Proficiency testing error.
- No action on out of range controls or responding to out-of-trend.
- False negative result.
- Late reports.
- Missing reports.
- Data errors, such as errors in calculation and rounding, recording errors, transposition of numbers, switched values, and with data entry.

The list is, of course, not exhaustive. Laboratory errors can often, but not always, be spotted through the use of controls. These are representative samples used to demonstrate that the analytical procedure was in control when samples are being analyzed. However, as McConnell and colleagues identify, analyst may spend more time getting controls right that the processing of the test sample is neglected (6).

Capturing the error

The method by which many laboratory errors are captured is via the Out-of-Specification (OOS) category or similar form of ‘laboratory deviation’, where an erroneous or ‘above specification’ or other atypical result is identified. This article uses ‘OOS’ terminology (which is common to healthcare and

pharmaceutical laboratories; irrespective of the initialism, the principles for assessing error are similar). Until the OOS report is concluded the reason for the OOS is unknown, other than the error concept representing some type of deviation from the specified test results. The OOS may occur due to: Laboratory error, non-process related error, process related error. Other errors may be captured by invalid assays, out-of-trends from control charts and deviations. The investigation of an OOS should be covered by a Standard Operation Procedure (SOP) and formally documented. The SOP should contain decision tress to ensure that, where possible, the conclusions reached are consistent. The first phase of the OOS is designed on determining the assignable cause, so that laboratory error is confirmed or ruled out. As part of this phase, the analyst should confirm the accuracy of test results, identify known errors, and carefully consider observations made during testing, to provide possible insight into the failures.

Why do laboratory errors occur?

As to why laboratory errors occur, some errors may occur because personnel are unclear about who is responsible for carrying out a particular task, so it may remain incomplete. Other errors occur when procedures are not written or followed, and staff are not adequately trained. Written procedures serve as a guide for all staff and help to assure that everyone knows what to do. Procedures can also be unclear or poorly written. It is essential to ensure that these written procedures are followed correctly. Personnel also need to be trained on how to conduct the procedures, and if this training is neglected errors can result.

Analysing errors

Error will often relate to the activity of a person, the operation of an item of equipment, or a problem with a procedure. With the former, a concern commonly raised by regulators is that too many firms note the root cause as “analyst error” without drilling down further to the actual root cause. This misses the opportunity to implement a more relevant preventative action and build a robust, quality laboratory system. This means a shift in thinking from human error as a cause of failure towards seeing human error as a symptom of failure (a symptom of trouble deeper inside the system) (7).

Where there is what is referred to as human error in common parlance, such as aberrant mental processes such as forgetfulness, inattention, poor motivation, carelessness, negligence, and recklessness, these are more often the result of poorly designed systems or procedures, or they are the result of too many distractions, or perhaps inadequate training.

In terms of a more in-depth assessment, laboratory errors for analytical tests can be divided onto three general groups (8):

- Random (or indeterminate) errors. These are caused by uncontrollable fluctuations in variables that affect experimental results. A sufficient number of measurements will result in evenly distributed data scattered around an average value or mean. This positive and negative scattering of data is characteristic of random errors. The estimated standard deviation (the error range for a data set) is often reported with measurements because random errors are difficult to eliminate. To overcome this type of error with an assay, a "best-fit line" can be drawn through graphed data in order to "smooth out" random error.

- Systematic (or determinate) errors. These are instrumental, methodological, or personal mistakes causing "lopsided" data, which is consistently deviated in one direction from the true value. Examples of systematic errors include an instrumental

error results when a spectrometer drifts away from calibrated settings; a methodological error is created by using the wrong indicator for an acid-base titration; and, a personal error occurs when an experimenter records only certain numbers from a test reading.

When numbers are misread the error can be compounded, such as by combining measurements with standard deviations in mathematical operations. Here, the answer's standard deviation is more prone to error since it is a combination of the standard deviations of the initial measurements. Hence, the error is "propagated".

Systematic errors can be identified after careful inspection of the experimental methods, cross-calibration of instruments, and examination of techniques.

- Gross errors are caused by experimenter carelessness or equipment failure.

Based on these categories and the inappropriateness of stating 'human error', the focus mist be on error prevention as part of the investigation. To establish an appropriate corrective or preventative action, the nature of the error must be understood. This may include changing a system or procedure, redesigning a test and so on. Or aspects that cause a person to make mistakes need addressing, such as minimizing distractions, avoiding tired employees, ensuring the work environment is comfortable. To address this requires a system approach to concentrate on the conditions under which individuals work and to build defenses to avert errors or mitigate their effects.

Preventing errors

Errors can be reduced by performing root cause analysis (for which the 5-Whys method is often invaluable) and setting appropriate corrective and preventative actions. In terms of general categories, errors can be reduced by focusing on human activities and automation.

In terms of personnel, the following advice can be considered:

1. Use a checklist. The use of checklists during laboratory activities can help to focus the mind and act as a reminder to perform a task or to carry out tasks in the correct order (9). Adopting checklists can help to reduce the attrition rate for experiments.
2. Checklists also help with error investigations, such as with the verification of the identity of samples, standards, reagents, and correct preparation of samples among other factors.
3. Ensure that protocols and procedures have been written by laboratory personnel, and that they contain clear instructions and diagrams.
4. Where a mistake has been made and an instruction in a protocol was unclear, it is good practice to update the protocol to avoid a recurrence of the error.
5. Performing tasks in chronological order (10).
6. Bookmarking progress when undertaking a large range of tests, to avoid a misstep caused by a loss of concentration.
7. Be systematic and avoid too much multitasking.
8. Prepare tests and experiments carefully in advance, ensuring the correct equipment and reagents are available.
9. Carry out the necessary preparatory work prior to starting the main test or experiment.
10. Avoid being excessively tired.

With automation, the automation of repetitive, error-prone and bio-hazardous pre-analytical processes will effectively decrease errors in

sample preparation and repetitive steps like centrifugation, aliquot preparation, pipetting and sorting (11, 12).

Errors can also be prevented through the implementation of appropriate CAPA. This can include capturing lessons learned, techniques, and statistical methods to safeguard against future similar activities from occurring by updating procedures. It is also good practice to apply the lessons learned to any other applicable procedures. Where changes are made it is important to validate changed analytical procedures as necessary.

Conclusion

Understanding the importance of laboratory errors is of great importance for addressing short-term and longer-term assay problems and for ensuing the batch under test is suitable in terms of efficacy and safety. As noted above, too many organizations note the root cause as “analyst error” without drilling down to the actual root cause. This misses the opportunity to implement a more relevant preventative action and build a robust, quality laboratory system. In particular, with setting good preventative actions. These should be aimed at reducing the frequency of errors in the long term.

A good understanding of the causes of error also assists with avoiding deficiencies of out-of-specification (OOS) investigations be cited by regulators. The laboratory investigation continues to be the major cause of warning letters in the pharmaceutical industry.

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Reducing Emissions in the Oil and Gas Industry

Amro Heikal

Exploring Innovative Technologies for a Sustainable Future

The oil and gas industry has long been associated with high greenhouse gas emissions and environmental degradation. With the increasing awareness of the negative impacts of these emissions on the environment and human health, the need for effective technologies to reduce emissions in oil and gas operations has become more urgent. In this article, we will explore some of the innovative technologies that are being developed and deployed to reduce emissions in the oil and gas industry.

Carbon capture, utilization, and storage (CCUS):
Carbon capture, utilization, and storage (CCUS) is one of the most promising technologies for reducing emissions in the oil and gas industry. CCUS involves capturing carbon dioxide (CO2) emissions from industrial processes, converting them into useful products, and storing them in underground geological formations or using them for enhanced oil recovery (EOR). This technology has the potential to reduce emissions by up to 90%.

One of the most significant CCUS projects in the oil and gas industry is the Quest project, which is located in Alberta, Canada. The Quest project captures CO2 emissions from a synthetic crude oil production facility and stores them underground. The project has been operating since 2015 and has successfully stored over 5 million tonnes of CO2.

Methane leak detection and repair:
Methane is a potent greenhouse gas that is emitted during oil and gas production.

Methane emissions are responsible for a significant portion of the oil and gas industry's overall greenhouse gas emissions. Methane leak detection and repair technologies have been developed to detect and repair leaks in oil and gas production equipment.

One such technology is the Optical Gas Imaging (OGI) system, which uses an infrared camera to detect and visualize methane emissions. The OGI system has been widely adopted in the oil and gas industry and has helped reduce methane emissions by up to 90%.

Energy efficiency and renewable energy:
Energy efficiency and renewable energy technologies can also significantly reduce emissions in the oil and gas industry. These technologies include energy-efficient equipment, renewable energy sources such as solar and wind power, and cogeneration systems that generate both heat and power.

One example of energy efficiency technology in the oil and gas industry is the use of variable frequency drives (VFDs) to control the speed of electric motors. VFDs can significantly reduce energy consumption and greenhouse gas emissions by optimizing the operation of pumps, compressors, and other equipment.

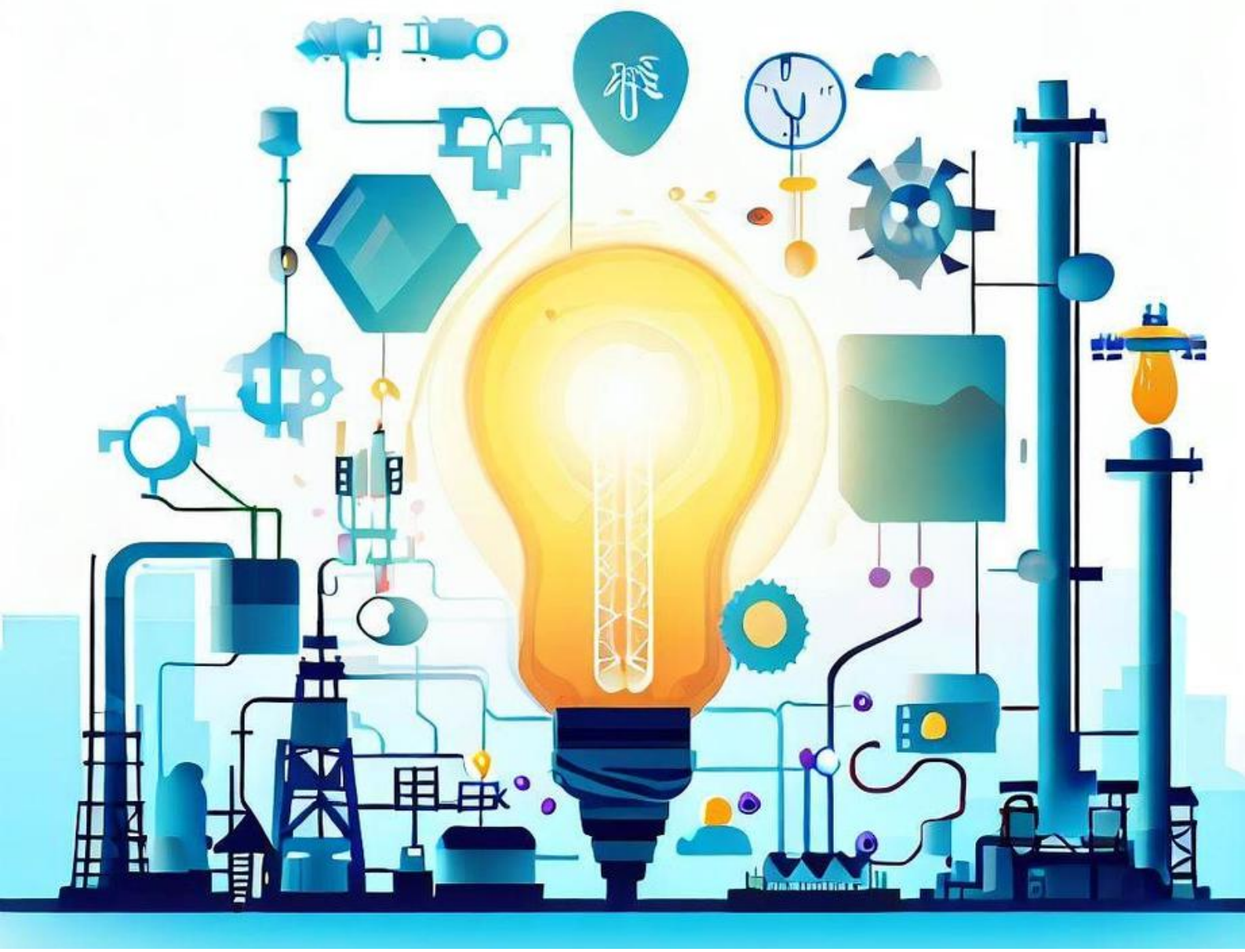
Renewable energy sources such as solar and wind power can also be used to power oil and gas operations. For example, Chevron has installed a 29 MW solar facility at its oil field in California, which provides up to 80% of the field's electricity needs.

Advanced combustion technologies:
Advanced combustion technologies can also reduce emissions in the oil and gas industry. These technologies include low-emission burners, oxy-fuel combustion, and gas turbine combined cycle (GTCC) systems.

Low-emission burners are designed to reduce emissions by improving the efficiency of combustion and reducing the formation of pollutants. Oxy-fuel combustion involves burning fuel in an oxygen-rich environment, which reduces the formation of nitrogen oxide (NOx) emissions. GTCC systems use gas turbines to generate electricity and capture waste heat for use in steam turbines, resulting in higher efficiency and lower emissions.

Conclusion:

The oil and gas industry has a significant impact on the environment, but innovative technologies are being developed and deployed to reduce emissions. Carbon capture, utilization, and storage (CCUS), methane leak detection and repair, energy efficiency and renewable energy, and advanced combustion technologies are all promising ways to reduce emissions in the oil and gas industry. With continued research and development, these technologies can help reduce the industry's impact on the environment and contribute to a more sustainable future.



'TECHNICIANS ARE THE UNSUNG HEROES'

Preparation of Standard Solutions

Michael Quigley

Standard solutions are important in many areas of chemical analysis. Although it is often easy to order stock standard solutions through a chemical supply company, knowledge of how to prepare one's own solutions is less expensive, and ultimately more satisfying. The following descriptions are especially relevant to those who use chemical solutions, but who do not necessarily have a chemical background.

BASIC TERMINOLOGY

The mole is the Système International (SI) term for the amount of a substance. It is usually used in association with a chemical formula, representing as it does, Avogadro's number (6.022 x 1023) of the chemical species under consideration. Under normal circumstances, a mole is used to refer to 6.022 x 1023 of any chemical species. Less typically, a mole could refer to the number of anything, be they grains of sand on a beach or stars in the universe. To indicate just how large of a number a mole really is, a search of the Web reveals that there is approximately 1/10 of a mole of stars in the observable universe.

Formula mass (FM or formula weight, FW) of a substance is the number of grams of it that contains Avogadro's number of formula units. Put another way, FM is the mass of one of these formula units.

Molecular mass (MM or molecular weight, MW) of a substance can be different to the formula mass if the substance (solute) exists in solution as an oligomer. For example, molecules can exist as dimers (2 x the formula mass), trimers (3 x the formula mass), and other variations. In such cases, the use of formula mass is preferred.

Molarity (M) is the number of moles of a solute in 1 litre of solvent, where regard is paid towards the speciation (type of species) of the solute in solution. Molarity is sometimes called **analytical molarity** to distinguish it from **equilibrium or species molarity**, which is the number of moles of a given species (e.g. CH3COO- and H+ ions) in 1 litre of solvent:

M = Moles of species/Volume of solvent in litres

Formality (F) is the number of moles of a solute in 1 litre of solvent. where no regard is paid towards the speciation of the solute in solution.

F = Moles of solute/Volume of solvent in litres

A solute is a substance that dissolves in a solvent to produce a solution. For example, NaCl is a solute that fully dissolves in water to produce a solution of Na+ and Cl- ions. Typically, the term molarity is used to describe such Na+Cl- solutions. However, because the salt is fully dissociated, strictly speaking there is no NaCl in solution. In this case, it would be better to refer to this as a
1 F NaCl solution, rather than a 1 M NaCl solution.

Other substances such as ethanoic (acetic) acid do not fully dissociate in water. Most of the species in solution are CH3COOH molecules with a smaller proportion of CH3COO- and H+ ions. In this particular case, the term molarity can be used in its strictest sense.

Molality (m) is the number of moles of a solute in 1 kilogram of solvent.

m = moles of solute/mass of solvent in1 kg of solvent

Normality (N) is the number of equivalents of a solute in 1 litre of solvent. An equivalent is defined according to the type of reaction: For acid-base reactions, an equivalent of an acid is the quantity that supplies 1 mole of H+ ions. An equivalent of a base is the quantity reacting with 1 mole of H+ ions. For redox reactions, an equivalent is the quantity of substance that gains or loses electrons.

N = Equivalents of solute/Volume of solvent in litres

PRIMARY AND SECONDARY STANDARDS

Primary standards are the preferred materials of choice in the preparation of standard solutions. A primary standard should satisfy the following criteria:

(a) Must be high purity.
(b) Must be stable in air (resistant to oxidation).
(c) Must be stable up to the drying temperature.
(d) Must be soluble in the chosen solvent.
(e) Must not possess waters of crystallization (e.g. CuSO4 preferred, rather than CuSO4.5H2O).
(f) Must not be deliquescent (absorb moisture from the air).
(g) Preferably be of high formula mass in order to reduce weighing errors.
(h) Preferably be inexpensive.
Examples of primary standards are pure metal powders (provided they are stored under nitrogen), and salts such as NaCl and CaCO3. When opened, primary standards are recommended to be stored in desiccators.

Secondary standards are any other materials that do not satisfy the above criteria, but that can still be used to produce standard solutions in less stringent circumstances.

VOLUMETRIC GLASSWARE FOR PREPARATION OF PPM AND PPB STOCK STANDARD AND WORKING STANDARD SOLUTIONS

Although a full article could address the selection and use of volumetric glassware, the briefest of descriptions will suffice here. In general, for the preparation of parts per million and parts per billion standard solutions, serialized glass volumetric flasks and 'To Deliver; TD' type volumetric pipettes are preferred. Despite the preference, plastic flasks and repetitive pipettors with disposable tips also have their appropriate applications.

PREPARATION OF PPM AND PPB STOCK STANDARD SOLUTIONS

For aqueous solutions with relative densities close to 1.000 g/mL, p.p.m. is also known in SI as mg/L (i.e. milligram per litre) or µg/mL (i.e. microgram per millilitre). Similarly, p.p.b. is also known in SI as µg/L or ng/mL (nanogram per millilitre).

Since 1 g = 1,000 mg, weighing out exactly 1 g of a pure metal powder such as iron, copper, zinc, etc., dissolving it in a suitable acid, and diluting to 1 L with deionized or distilled water, results in a 1,000 mg/L solution of the metal ion - a popular concentration for a stock standard solution.

To prepare a metal ion solution from a salt, the atomic mass of the metal ion of interest needs to be considered, along with the formula mass of the salt within which it is contained.

In general, if x grams of a given metal ion is contained in y grams of salt, then x/x grams of metal ion is contained in y/x grams of salt, i.e. 1 gram of metal ion is contained in y/x grams of salt. For example, in the case of silver nitrate, the atomic mass of Ag is 107.87, and the formula mass of AgNO3, is 169.87. Therefore, in a single formula unit of AgNO3of formula mass 169.87, exists an Ag+ ion of atomic mass l07.87. Put another way, 169.87 grams of AgNO3 contains 107.87 grams of Ag+. Since 107.87 grams of Ag+ is contained in 169.87

grams of AgNO3, then:

107.87 / I07.87 grams of Ag+ is contained in 169.87 / 107.87 grams of AgNO3,

i.e. 1 gram of Ag+ is contained in I.575 grams of AgNO3.

Therefore, dissolving 1.575 grams of AgNO3 in 1 litre of deionized water will produce a 1 gram (i.e. 1,000 mg) per litresolution of Ag+. Similar calculations can be performed in preparation of other standard solution salts, but care must be taken if two or more atoms or "entities" in general exist within a single formula unit or molecule respectively. For example, given that the atomic mass of molybdenum is 95.94, and that the formula mass of [(NH4)6Mo7O24.4H2O)] is 1235.86, the mass of molybdate required to prepare 1 litre of a stock standard solution of Mo6+ is 1.8402 grams. Also, given that the formula mass of quinine, C20H24N2O2 is 324.44 and that the formula mass of quinine sulphate, 2(C20H24N2O2).H2SO4.2H2O is 782.96, the mass of quinine sulphate required to prepare 1 litre of a stock standard solution of quinine is 1.2220 grams.

PREPARATION OF STANDARD SOLUTIONS FROM COMMERCIAL REAGENTS

For the most part, preparation of standard solutions from solid materials has been covered in the above description. Preparation of standard solutions from commercially available acids, bases and other reagents requires some special attention.

If the label on a bottle of acid is examined, two figures in particular should be noted: Relative density (older name, specific gravity), and the % assay (which in a very general sense, indicates the purity of the species of interest).

For example, a general formula to calculate the mL volume of commercial reagent to be diluted to 1 litre with deionizedwater to prepare a specified molarity solution can be used in most cases:

mL of commercial reagent diluted to 1 litre with deionized water = [(100 / % Assay) x Formula Mass x Molarity] / Relative Density

For example, given that the % assay of concentrated HCl from a commercial supplier is between 36.5 and 38 %. that the relative density is 1.19, that the formula mass of HCl is 36.46. and that 1 litre of a 0.1 M HCl solution is required, the volume of concentrated HCl to be dispensed into 1 litre of deionized water can be calculated:

mL of conc. HCl diluted to 1 litre with deionized water = [{100 / (36.5+38)/2} x 36.46 x 0.1] / 1.19

Specifically, 82.3 ml of concentrated HCl should be diluted to 1 litre with deionized water to give a 0.1 M HCl solution. In most cases, dispensing the acid into a volumetric flask using a graduated cylinder is all that is required.

SUMMARY

This description should enable you to not only prepare your own solutions, but to think critically about just what chemical species are in solution.

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A CELEBRATION OF THE PROFESSIONAL LIFE AND CAREER OF VAL GORDON FISCT

Val, Laura and Jane enjoying the winter scenery

It is with a heavy heart that I write this tribute to our friend and colleague Val Gordon.

Val was not only a loving wife and mother but also a highly respected professional technician. Although this is a sad time for her family, I'm sure they draw comfort from those many happy family memories.

It is also a time to celebrate Val's professional life and career and her contribution to both the local and national technical communities.

I first met Val more than fifteen years ago at one of the many conferences and events hosted by the Institute of Science and Technology (IST). It soon became apparent that she wanted to play her part in improving the preconceived image of technicians as just being "goffers and fetchers" and to help get the recognition for the impact they make in the world of teaching and research. To this end, Val became a member of the IST in 2011. With her honours degree in Zoology from the University of Edinburgh and a wide knowledge of laboratory operations and related experience in a variety of technical skills gained from many technical and research roles, (from work in endocrinology to diagnostic virology, research into HIV at Glasgow University and finally as a Technical Officer at the University of Edinburgh), she was ideally placed to have an immediate impact on the work of the IST which supported the technical community at large. She gained professional accreditation in 2013 with the award of RSci from the Science Council's Professional Registration Scheme, later becoming an assessor for the Science Council and the IST. More recently, she became a member of the Science Council's new routes to registration committee.

Joan Ward, (IST Deputy Chair) said,

"Val was a friend and inspirational colleague and made a major contribution to the IST's professional registration work, becoming a valued registration application assessor. Within her assessor role she was fair, supportive and committed to ensuring that registration standards were maintained, but she was always conscious that the application process could be a daunting task and was always positive and forward-looking in the feedback that she offered to applicants. She was keen to encourage staff within her University (and other surrounding HEI's) to develop their skills and did much to promote the notion of professionalisation amongst the technical staff in her locality. She was always open to new ideas and able to drive initiatives forward because of her committed, cheery and sensitive approach. She will be sorely missed".

Her passion and drive was also recognised by staff at HEaTED, (the Higher Education and Technician Educational Development, now a part of the National Technician Development Centre, NTDC), where she became their Scottish Network Coordinator. A post she held until 2019, when she then took up a new post of Technician Commitment Action Plan Coordinator on behalf of the University of Edinburgh. This was followed by further roles at the University, including membership of their strategic Technician Steering Committee.

The IST's Registrar recalls her time spent with Val at HEaTED events.

"Val was instrumental in setting up the Scottish Reginal Network for HEaTED. A strong proponent of the technical workforce. Val was at the heart of the many events we ran together. She will be sadly missed."

Sara Bacon, Centre Manager at the NTDC said

"We were very lucky to have the input from Val who was the Scottish HEaTED Coordinator. Val's contribution and collaboration with the other regional coordinators was a key offer that was much appreciated by the HEaTED community. I had the privilege of meeting Val at technician network events over the past 4 years and Val was always welcoming and generous in sharing her knowledge and experiences of the technician community. A sad loss to all that knew and worked with her."

Natalie Homer (University of Edinburgh) made the following comments in an email sent to all Edinburgh University staff. The following is an extract from that email.

"Although Val was based in the Moray House School of Education and Support, her role as Technical Officer meant that she worked closely with many people in our CMVM Community. Val's leadership and clear commitment to embedding the principles of the Technician Commitment across the University of Edinburgh led to the development of the University Technicians Commitment Action Plan. This brought people together and generated considerable momentum for change. We have a lot to thank Val for".

Demonstrating how Val was highly thought of and respected by her colleagues and friends and the impact she made at the University of Edinburgh.

Russell Wilson (Heriot Watt University/IST Scottish Network Co-ordinator) said,

"I first met Val at a HEaTED Scottish Regional Event in 2018, it was then I first learnt about the benefits of professional registration and expanding my technical network. Val was always there for me providing encouragement and support. Upon considering setting up the new IST Scottish Network I immediately turned

to Val as I knew she would be willing to play a pivotal role. This was indeed the case and Val was keen to head up and highlight current/ upcoming training and development opportunities for the technical community in Scotland. Tragically Val will not be able to see this through and I will miss not having her by my side, to learn from her experience, passion and drive which was always apparent whenever I was with her. I will miss of course miss her professionally, but it is my personal connection that I will miss the most. Val was an inspiration who supported me and many others across the UK, often knowing when to reach out with a supportive phone call or message. She was a helpful, approachable, and caring friend, it is this that I will miss the most. It feels fitting to finish with a message Val once sent to me, and I will try to follow this advice in the years to come."

"Nothing worthwhile ever came easy, but by challenging yourself you can help develop your confidence as well as your skillset".

Val leading the workshop at St Andrews - one of the many HEaTED Scottish Regional Events she delivered

This enthusiasm to demonstrate just how well trained and up to date technicians are and that this is something to be encouraged by employers as they also reap the benefits from a highly trained and accredited technical workforce. Val definitely led from the front. There are many training courses and events that she attended to give her the necessary knowledge and experience to make a difference in her day-to-day duties at the University of Edinburgh as well as her national roles. Reviewing the list of courses, you can immediately see that she, (quite rightly), felt the need to cover a wide range of subjects from EDI, project management for technical staff, Health and Safety, emergence from lockdown, laboratory sustainability, in addition to courses by the Science Council to promote CPD and Professional Registration.

As you can see, Val was a committed, dedicated, passionate champion for technicians, continually supporting many organisations and events in promoting the exceptional work undertaken by the technical community at large. I was therefore, in 2018, privileged and honoured to be able to award her, (on behalf of the IST Executive Board), the prestigious award of Fellow of the Institute of Science and Technology, FIScT, which she so richly deserved.

There is so much more that could be said in this tribute to the professional life of Val. There are so many stories and comments from friends, colleagues and IST members where Val had made such a positive impact on their working lives and status in their workplace and a proud moment and memory for Hamish, Laura and Jane. Therefore, apologies to those I haven't been able to mention by name in this tribute.

However, I am going to leave the last words to Gillian Riddell (Queens University, Belfast). Gillian was not only an IST/HEaTED colleague but a colleague who became a good friend whose thoughts, recollections and words speak for us all.

"I was privileged to first meet Val at a HEaTED course in York in January 2018. We immediately hit it off and began chatting about the plight of technicians and how the Technician Commitment was driving a change at our universities. At the end of the course, we promised to keep in touch. A few weeks later, Val kindly accepted my invitation to Belfast where she shared her experiences with our Technician Committee. I am honoured to say that this was the beginning of a wonderful friendship. Val invited Queen's University to join the Scotland Regional HEaTED network and I was excited to attend networking events across Scotland. With Val as facilitator, we even managed to host an event in Queen's, just before we locked down in 2020.

For the next three years we had many Teams calls discussing how we could improve and implement plans for technicians in Edinburgh and Belfast. Val was extremely supportive of me professionally, but also personally. She really helped me through a personal tragedy with frequent phone calls and messages with beautiful photos attached, to keep my spirits up. I was always delighted to attend any networking events knowing that my "wee pal" was going to be there.

Val's "Quiet Place" to enjoy her keen interest in wildlife and nature photography

Val's greatest love was her family and friends, but she was also dedicated to making a difference for her technical colleagues. Her smile, her wit and her friendship will be greatly missed by all who knew her".

Val was an inspiration to us all, a perfect example of the "Professional Technician", with an outstanding career, a colleague and a friend to many. So many happy memories that we will continue to remember and celebrate.

Written by:

Terry Croft MBE, FIScT
Chair, IST

Acknowledgements:

Many thanks to Joan Ward (IST) and Russell Wilson (IST/Heriot Watt University) for their support in writing this tribute. Also, to Michelle Jackson (IST/University of Manchester), Sara Bacon (NTDC/HEaTED), Natalie Homer (University of Edinburgh) and Gillian Riddell (Queens University, Belfast), for their contributions.

PROF. JOHN AMAECHI OBE, MISCT CSCI RECEIVES INTEGRITY & IMPACT AWARD 2023

Prof. John Amaechi, Activity Alliance Vice President, an IST Member and CSci has received the Integrity & Impact Award in association with InsightX at the FEVO Sport Industry Awards 2023.

The award recognises individuals who have made a significant impact on society while demonstrating a high level of integrity and ethical behaviour and the award highlights John's significant work in educating the sports industry about discrimination and encouraging athletes to use their voice for good.

John, a former NBA player, who played for the Cleveland Cavaliers, Orlando Magic, and Utah Jazz during his NBA career, has since focused on his work as a consultant and author. He has written several books, including "Man in the Middle," which discusses his experiences as a gay athlete and the challenges he faced during his career.

In addition to his current work in psychology, John is also known for his philanthropic efforts. He founded the Amaechi Performance Systems, which provides training and support for individuals and organisations looking to improve their performance. He has also been involved with several charitable organisations, including the Special Olympics and the Human Rights Campaign.

The Integrity & Impact Award is a fitting recognition for John's many accomplishments. His work as a consultant, author, and philanthropist has had a profound impact on many people's lives, and he has always demonstrated a commitment to ethical behaviour and integrity. His example serves as an inspiration to us all.

"I've presented this award previously and it never occurred to me that I'd be in contention to win it. I was an average NBA player, so I'm unlikely to pick up sporting awards that are related to actually being good at sport. So it's quite nice to pick up an award that sits in the sweet spot of my values, principles and ethics."

– John Amaechi

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HEA SENIOR FELLOWSHIP AWARD

Dr Marie Oldfield **PhD FIScT CSci CStat SFHEA**

We are delighted to report that Marie, who is one of our Executive Board, EDI Officer and Chair of our AI Special Interest Group and our Women in Tech Group has recently been awarded a Senior Fellow of the Higher Education Academy (SFHEA).

The Fellowship has been awarded based on the high standard of Marie's application. The review panel commented on the following:

- Her engagement with educational leadership and her significant contribution to high quality student learning.
- Her profound insights into effective approaches to teaching and learning support.
- Robust leadership of the development of a range of aspects of the pedagogy of her discipline, both within higher education and in professional settings, which has had a strong positive impact on practice.
- A meticulous approach to preparing the ground for innovation, exploring the views of students and staff.
- Attention to the vital issue of ethics in artificial intelligence and mathematical modelling is ground-breaking and has enabled students and practitioners to take account of ethics in their professional lives.
- Her curiosity, commitment and values with bring significant impacts that are evidenced in her application.

The IST Executive are proud that Marie's contribution in the areas detailed above has been recognised by this award, with examples of her commitment, insight and enthusiasm being seen on a regular basis with her work with the IST Executive Board.

Dr Marie Oldfield, CStat, CSci, FIScT, SFHEA is the CEO of Oldfield Consultancy and Senior Lecturer in Practice in the Dept mathematics at London School of Economics.

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IST ASSISTANT REGISTRAR CHANGES

We were sad to lose the services of Laurence Dawkins-Hall from the Assistant Registrar role recently and we would like the offer our sincere thanks to Laurence for his enthusiasm, commitment and much-valued input over the last couple of years.

We are delighted the announce that **Dr Kranthi Maniam** has agreed to take over the Assistant Registrar role and we look forward to working with him going forward, and we appreciate his volunteering for this role.

Dr. Kranthi Maniam is the Marie Curie Fellow at the Materials Innovation Centre- University of Leicester, UK and also works as a Senior Project Leader -Technology at TWI limited, UK. His primary research and engineering activities revolve around electrodeposition of metal and metal alloys, ionic liquids, coatings, corrosion, fuel cells and surface finishing. He is the recipient of Indian National Academy of Engineering (INAE) - Students Innovative Project Award at Doctoral Level and Gandhian Young Technological Innovation Award (2015). He has 3 Patent Grants and worked extensively in electrodeposition, ionic liquids, authored more than 15 papers covering different fields of interest.

I presented his work in various international conferences and is currently a member of Institute of Science and Technology (IST), Institution of Engineering and technology (IET) and the Institute of Materials Finishing (IMF). He is also active in the scientific community as peer reviewer and serving as an executive team member in IET-Tribology Network Community, Science Committee member in IMF, contributes to IST as common application process assessor, continuous professional development assessor, professional and personal development (PPD) audit reviewer. He is a Chartered Scientist and a Chartered Engineer in the UK.

AI in Brief: Anthropomorphism

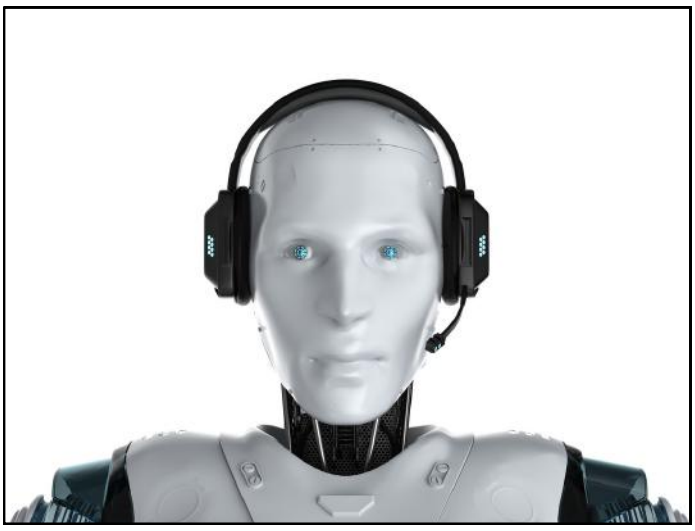
Marie Oldfield FIScT CSci

What is it and why does it matter?

When we design technology it is easy to forget that we bake in our own cultural backgrounds, our own interpretations of the world and our own emotional attachments to the algorithms we produce.

This is no better illustrated than in robot design where we have chosen humans as a blueprint. One of the reasons we do this is because humans find it difficult to understand complex concepts. We only have to look at history and fables to see the 'wise owl' and other creatures used to pass down knowledge. It makes sense, therefore, to use something we understand, such as a human to be the design for something as complex as AI. Our emotional response to this type of representation enables us to remember concepts better as we are able to use an 'anchor' that we know well, such as an Owl or a Human. When using the human blueprint for robots we can automatically ascribe humanity to the robot. We can very easily start to think it has a consciousness and goals for its future. Whilst this is clearly incorrect to the rational brain it is quite plausible to the emotional one. This is why this technique works well for sales. A basic human desire is to either be distinct or to be part of a group; I.e purchase something before everyone else or be in a select group with only those who have the item. Our desires are therefore exploited to encourage us to purchase items we may not want or need. Sales can increase by 7% due to this technique. Looking at adverts we can see the Meerkat or Tony the Tiger all speaking to us on a fundamental level. The product is represented as an animal, which we can both understand and ascribe qualities to. The problem with anthropomorphism comes when exploitation happens as a result of this.

Emotional attachments can lower our risk perception and make us more pliable to brands. We can even end up in groups on social media showing our loyalty to the brand by fighting with another, similar brand. This can lead to division and anger. This is called dehumanisation and it can lead to society being exploited due to the lack of risk perception. It is then increasingly easy for a person to be exploited by such things as chatbots, personal assistants (Alexa, Google, Siri) and social media platforms. So before you say to yourself 'oh that just applies to other people' take a look around your house at recent purchases, your interactions online and the privacy settings on your devices… are you really safe from exploitation?



AI in Brief: PR Challenges

Marie Oldfield FIScT CSci

Practitioners who develop AI are always at the mercy of regulation, legislation and technical guidelines. A recent study showed that practitioners are not only confused about what guidance to follow but that they are overwhelmed but the volume of it. So where do you start in developing your technology. The place many do not start is at the beginning. It is easy to rush to code but it is not easy to examine why the technology is being built, what the purpose is, who will use and whether it is fit for purpose. These are all human factors issues and are to do with a lack of communication, a lack of using the correct people and a simple rush to market that bypasses validation, verification and user testing. The recent ACM code of ethics went some way to establishing some level of ethics for the practitioner by listing methods and expectations of those developing technology. There are very simple ways to ensure your programming is robust and ethical.

The answers are quite simple and have been highlighted in multiple government enquiries into modelling.

1. Involve interdisciplinary experts. You can't build technology alone, you need a Statistician to help collect and design data, a Philosopher to discuss ethical implications., a Sociologist to understand society and how the technology will work once implemented. Another expert that is usually missed is the person being affected by the technology. Questions we might ask are: how will they use the technology, what is their background and does it work within the model or is it a special case we haven't captured, is the technology accessible.

2. Understand your data. There is no reverse engineering of data to make it look how you want it, neither is there a way to manipulate data to get the output you would like. Data represents society and society is messy. We have to understand the context behind the data and then work with the model to include everyone and their situations. Messing with data is highly unethical.

3. Test. Testing your model, verifying and validating it is critical. You need to know it works correctly and doesn't break when tested.

One of the largest problems companies face is the backlash when their implemented technology doesn't work as it should, thereby causing huge societal problems. To put this in perspective we saw suicides and death due to poorly implemented and inaccessible benefits technology as well as backlash to the Home Office Visa Algorithm. This not only causes a huge reputational hit reputation but a huge cost attached, many times to taxpayers money.

These three tips on their own go a long way to ensuring robust and ethical technology is developed, but they are currently the three most ignored.

AI in Brief: AI generated images, photography and visual documentary evidence as sources: Thoughts on Boris Eldagsen's image, well 'photograph'.

Alicia Colson PhD FGRS FI'10 FSA

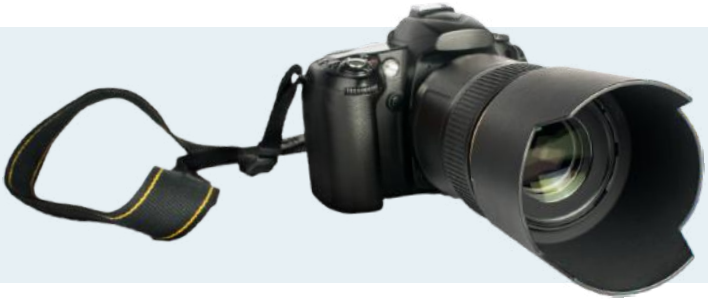
A brief glance of Boris Eldagsen's black and white photograph of two women from two generations should make you ask those 'w' questions used by those researchers who draw on photographic information as possible evidence, as sources of information for some proposition.

A quick glance at the photograph would cause them to ask: Who took it? Why was the photograph taken? When was it taken? What was photographed? Where was it taken? And 'How was it taken?'. That niggling 'back of the mind' feeling that something is slightly odd with this photograph is justified when you r ead that Eldagesen's photograph, entitled "Pseudomnesia: The Electrician", was in fact created (or rather) generated, using AI using DALL-E.

The Berlin based photographer admitted that he'd wanted to test the competition, after he'd been informed that he'd won the creative open category, of the Sony World Photography Award in April 2023.

The rationale behind his submission was that he wanted to create a discussion about the future of photography. He refused his prize, thanked the judges for selecting his photograph but asked them had they "known or suspected that it was AI generated". Eldagesen's point in submitting the photograph was that AI and photography shouldn't compete with each other in such a competition.

How is this done? Text prompts are used to produce images in AI art generators or AI image generators in seconds.



DALL-E and DALL-E 2, developed by OpenAI, are deep learning models that generate digital images from natural language descriptions. In September 2022, the company behind DALL-E and DALL-E2 stated that over 1.5M users were creating over 2M images a day.

This rapid growth in users is probably connected to their advanced capabilities and easy access. A range of AI art generators is readily available namely: Bing Image Creator, Dream by WOMBO, Midjourney; MyHeritage's AI Time Machine, and Craiyon, to name just a few. While these generate vast quantities of images, their existence needs to be highlighted in the documentation of provenience, otherwise those researchers who use visual images, i.e. photographs as evidence or sources of information will be operating on a false premise.

There is now greater potential for propaganda, hoaxes, and lies via this sort of visual media which will no doubt become more proliferate. Potentially the public, via their ignorance, are gullible. And they will be easily hoaxed and fooled. As most people believe that ‘what you see is what you get’; what they see is ‘true’. They are not used to the idea that photographs could be ‘telling them lies rather than truths.’

‘AI now has a life of its own’ ... Eldagsen’s The Electrician – initially a winner in the creative open category of the Sony world photography awards. Picture Credit from The Guardian.

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Central Scotland Technical Conference

6th June 2023

The IST was delighted to attend and support the recent excellent Central Scotland Technical Conference. which was held at the University of Glasgow on 6th June. It was great to see so many technical staff from several Scottish universities gathering for the event. The Keynotes and workshops offered a great range of topics for the delegates, with the Scottish Government's Minister for Higher and Further Education, Graeme Dey MSP addressing the group.

The conference was the first large-scale meeting for technicians from universities across the central Scottish area and was organised by the Universities of Glasgow and Edinburgh as part of their Technician Commitment action plan. The group plans to use the conference as the beginning of a journey towards creating a Scottish Technical Network which unites universities across central Scotland, and the IST are excited to be helping with the development of this network group, via our new IST Coordinator for Scotland, Russell Wilson.

If you are interested in joining the Scottish Network group please sign-up via https://t.co/7ugS6miQUQ and Russell will get back to you.

We are really looking forward to this exciting development for the Scottish universities, if you need any more information, please don't hesitate to contact us via office@istonline.org.uk.

Views and Shots from the Conference:

Russell Wilson "It was fantastic that the UoE & UoG decided to open this conference up to other institutions across central Scotland. Indeed there was such a desire for a Scotland Technical Conference that technicians from institutions right across the country managed to attend including those further afield such as UHI & Robert Gordon. It is an exciting time to be a technician and for those based in Scotland

I am delighted to announce that work is currently ongoing towards launching a new IST Scottish Technical network, to specifically support and address the challenges faced by technicians within the country. This conference will prove to be a crucial launch pad towards the future network that with the support of the IST will look to share best practice, bring forward future collaborative projects and increase opportunities for all Scottish based technicians."

Professor Frank Coton, Senior Vice Principal and Deputy Vice Chancellor (Academic), is chair of the University of Glasgow's Technician Commitment steering group:

"We're proud to be a signatory to the Technician Commitment, which recognises and supports the vital contributions of technical staff to universities across the UK. Here at Glasgow alone we have more than 1000 highly trained and qualified technicians on staff, without whom our world-leading research and teaching simply wouldn't be possible."

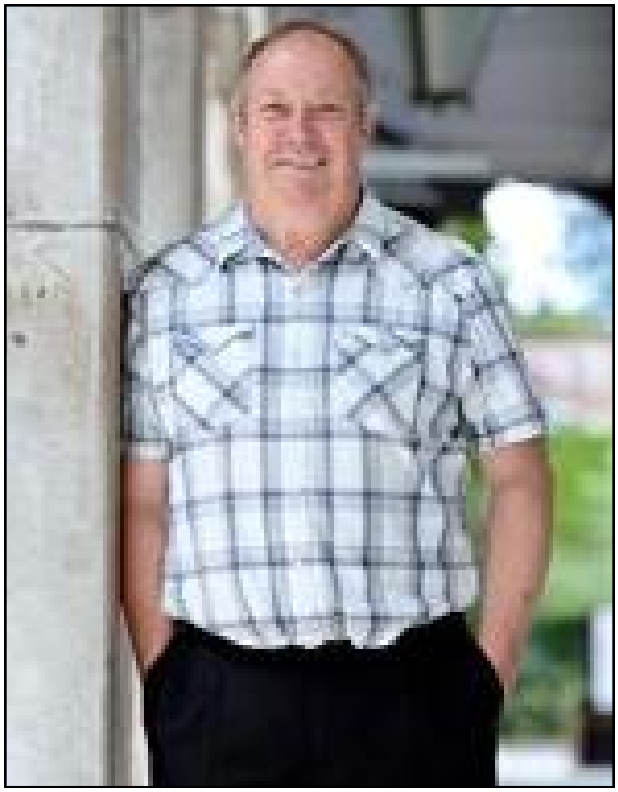
"The Technician Commitment helps us to ensure that our technical community is properly prepared to tackle the challenges of the future through investment, training and career development."

"The Central Scotland Technical Conference offered attendees an invaluable opportunity to meet to share stories of best practice, new ideas, and to plan for the future. I'm looking forward to helping our technicians build on the outcomes from the conference and work towards a Scottish Technical Network."

Dr Natalie Homer of the University of Edinburgh said:

"The University of Edinburgh are delighted to have worked together with the University of Glasgow to put on the first Central Scotland Technical Conference.

"With the recent 6th anniversary of the Technician Commitment it is timely and important that we bring technical colleagues together to celebrate and share our experiences. We hope it will be the start of fruitful collaborations and widening opportunities for technicians across Scotland."



Stephen Franey Awarded MBE

Congratulations to Stephen Franey CSci for being honored with the award of MBE in His Majesty the King's Birthday honors list.

The IST is delighted that Stephen has been recognised for his contribution to the growth in esteem and visibility of the science technician workforce in higher education and research.

Stephen spearheaded the London and Southeast Technical Managers Network across 20 different Universities providing a platform for collaborative growth across the HEI and Research Institute sector.

The team at the IST wish to congratulate him on his achievement and are delighted that his tireless dedication to supporting technical professionals in such practical ways has been recognised.

New Science Council CEO

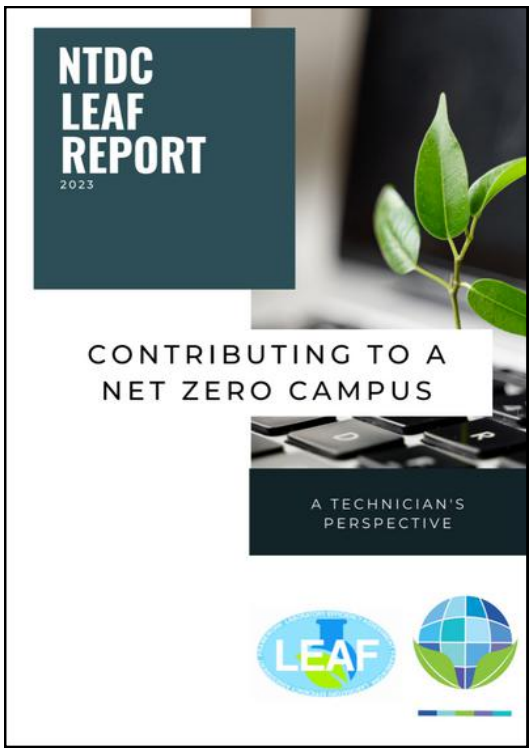
The Science Council has announced that Professor Della Freeth has been appointed Chief Executive, starting her term on 1st August 2023.

Della is currently Executive Director of Education at the Royal College of Physicians and has experience of working in a network of diverse professional membership organisations. She also has expertise from research and senior leadership roles in four contrasting universities.

The current Chief Executive, Helen Gordon, will be leaving the Science Council in late August to pursue a portfolio career in non-executive / trustee roles and leadership coaching.

The IST wish Helen all the very best in her future endeavours and looks forward to supporting and working with Della when she takes up her new role.

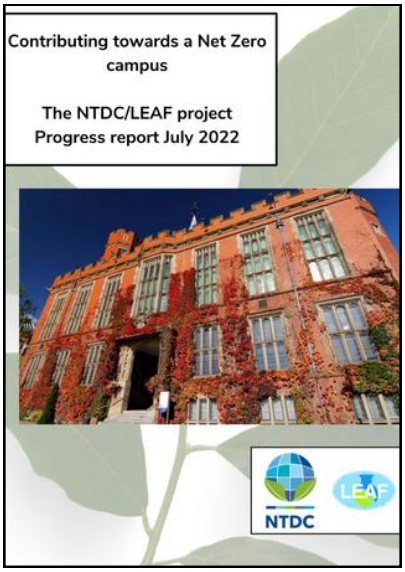
Contibuting to a Net Zero Campus



A 2nd report from the NTDC and LEAF in collaboration with many institutions across the UK was released recently from a technicians perspective.

LEAF, short for the Laboratory Efficiency Assessment Framework, is a certification in green and sustainable science operations. Developed by UCL, it has quickly grown since its launch to become the largest programme of its kind globally and is in use in **14 countries** and over **95 institutions**.

Five pilot universities worked with the NTDC and LEAF to provide case studies from the perspective of participating technical colleagues, contributing to this second LEAF report.



This report outlines the challenges and accomplishments that technical staff at the pilot sites have faced.

It also provides recommendations for further ways the UK could support development of sustainable science and technical communities.

Universities involved:
Newcastle University,
The Manchester Metropolitan University,
University of Liverpool,
University of Reading,
Edinburgh Napier University.

Click on the reports above to read

Technical colleagues across the five institutions have provided valuable insight into the impact and benefit that they have in the implementation of sustainability changes and implementing the LEAF framework in technical areas.

National Institute of Technical Skills and Strategy

A new £5.5 million national institute is to be launched to ensure that the UK has the technical capability and capacity across academia, research, education, and innovation to enable the UK to be a global superpower in science, engineering, and the creative industries.

The UK Institute of Technical Skills and Strategy (ITSS) is funded by Research England, which is part of UK Research and Innovation. It is being hosted by the University of Nottingham in partnership with a network of organisations and institutions across UK higher education and research.

UK First Research Technical Professional Career Pathway

The University of Liverpool is leading the way in introducing a comprehensive promotion pathway for specialist technical and research support staff.

The Research Technical Professional Career Pathway has been developed to meet three aims: recruitment, retention and recognition. It supports the Technician Commitment action plan for the University and some of the key recommendations from the UKRI / Research England TALENT Commission report.

Introducing TechxFest

Inspiring the next generation of technicians

TechxFest is a new careers event dedicated to inspiring the next generation of technicians.

From apprenticeships in arts, exciting opportunities in engineering and rewarding roles in research, technical careers are for everyone.

Technicians are the backbone of the UK workforce, yet many people don't know about the range of technical jobs which play an important role in our world.
Up to 2000 Year 9 and 10 children from the Midlands will explore what their future could look like as a technician.

100 UK-wide employers will showcase technical careers through innovative stands and demonstrations on 28th September 2023 at Derby Arena.

The IST will be attending this event and look forward to meeting the technicians of tomorrow.

We are still accepting expressions of interest to be part of the Editorial Board or to be involved with any of the other IST activities that take place over the year.

Thank You for your contributions

Alicia Colson
Amro Heikal
Marie Oldfield
Michael Quigley
Tim Sandle
Terry Croft
Natalie Homer
Gillian Riddell
Sara Bacon
Russell Wilson
Michelle Jackson
Kranthi Maniam
In memory of Val Gordon FIScT

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