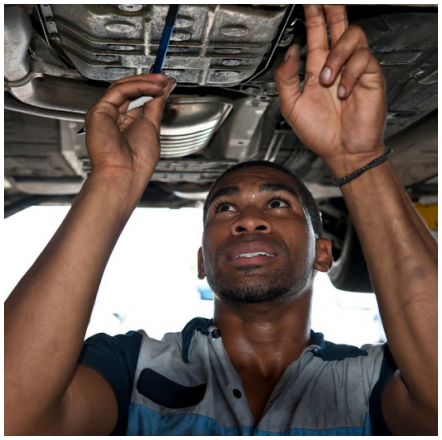
The Institute of Science & Technology

The Professional Body for Technical, Specialist, and Managerial Staff



The Journal

Winter 2022

Contents

The Journal

The Official Journal of
The Institute of Science & Technology

The Professional Body for Technical, Specialist, and Managerial Staff

December 2022

ISSN 2040-1868

Editor's welcome

Joan Ward, MBA, FIScT
IST Deputy Chair & Acting Editor

Welcome to the 2022 edition of IST 's Journal. The Journal is now published annually and is scheduled to coincide with the Christmas break. We are repeating our publication as an e-Journal and it is likely that this is the format that we will continue using in the future. The reasons for this decision are two-fold; firstly, we are mindful of the ecological consequences of generating and delivering hardcopy publications and secondly, costs have escalated significantly to the point where the hardcopy format is very difficult to support without a significant increase in membership fees. As you will be aware we work hard as an organisation to keep our costs as low as possible so as to minimise fees for members, and hardcopy publications are no longer sustainable within that context. I would also comment that membership preferences have also informed this decision to move to e-publishing.

In addition to our Journal, we will continue to publish articles and news in our online TechMag periodical and on our website. We also publish and circulate an e-bulletin on an ad-hoc basis, which comprises a series of short links to articles, events and news relevant to the technical community.

My thanks go to this edition's contributing authors for their excellent articles.

In this edition there is an interesting article about the UniGreenScheme which is a scheme via which laboratory equipment can be recycled. We were delighted that UniGreenScheme were one of the Key Sponsors at the IST Conference this year, and we hope to continue to work together in 2023. We also include an excellent article from Alicia Colson, a member of our AI Special Interest Group, about NFTs, AI, ethics, and indigenous peoples. Tim Sandle provides an article detailing the development of quaternary ammonium compounds for microbial contamination control, and Kevin Fletcher writes about andragogy in science and technology.

Michelle Jackson (IST's Registrar) and Lucy Hudson from University of York provide an item about the exciting Herschel Programme for Women in Technical Leadership. We also have an update on developments in T-Levels from Jan Brett, who writes about local collaborations between FE/HE. George Gibson and Lisa Lorenz report on how technicians at Manchester School of Art promote extracurricular learning through zines using social media platforms and John-Paul Ashton-Kinlin relates the parable of the technician, the manager and the visionary. The IST team also provide a review of our Annual Technical Conference, held in September, which we felt was a great success.

In our Members News we are delighted to report on the new Fellowships that have been awarded this year; all excellent electees who contribute much to the IST and the technical community, and we look forward to working closely with them in the future. We are also proud to announce some awards made to our members; Rae Freestone being the winner of the Science Council's CPD Award 2022 in the RSci category, Laurence Dawkins-Hall winning the Technician category in the University of Leicester's Citizen Awards 2022 and Tracey Davey having secured a GOLD LEAF (Lab Efficiency Assessment Framework) award for the Electron Microscopy Research Services core facility at Newcastle University. We hear from the National Technician Development Centre (NTDC) about funding initiatives and their Apprenticeship Week in February 2023. Tim Sandle also comments on improving training consistency with Training Master Kits.

I wish to thank our Editorial Team for continuing to provide support in reviewing our articles. In addition, I would like to thank John-Paul Ashton-Kinlin for his hard work and expertise in designing and compiling this edition of the Journal. The IST's Executive is actively seeking a replacement Editor(s) and will very much welcome enquiries from any member who may be interested in the role.

We like to think our publications have evolved into what are now quality publications, with a style and content that reflects our unique standing as a professional body with an extremely diverse and vibrant technical community membership. Our publications provide us with opportunities to invite our members and guests to present and publish articles, papers, and news items that will be of interest/relevance to our broad ranging membership.

istonline.org.uk/the-tech-magazine

We welcome article submissions from all and any areas of technical interest, eg. creative industries, digital, engineering and science technologies. We like to cover existing, historical, and new technological advances and unusual aspects of science, technology and the arts. And we particularly want to encourage technical people to publish for the first time, as part of their career development.

If you are interested in learning more about the editorship role then please do get in touch.

Email us at office@istonline.org.uk in the first instance.

Why not take a minute to check out the IST's shorter, periodic TechMag magazine, and get up to date news of what is happening in the technician community. Subscribe free and follow the links to our series of periodicals and have a look at what we have been doing and the things we have planned for the near future.

We are always happy to include short articles and news items in the IST's TechMag that you feel would be of interest to the technical community, or if you would like to promote a technician event or advertise a job vacancy. Please do get in touch our IST Office at office@istonline.org.uk.

I hope you enjoy this edition.

Joan

Chairman's view

Terry Croft, MBE, FIScT, CSci,
IST Chairman

A Christmas Message from the Chair

As we approach Christmas, we are still feeling the impacts of the pandemic and now we have the added issues caused by the war in Ukraine, the energy crisis and the country falling into recession. The good news is that jobs and vacancies are buoyant and a number of government schemes are in place to help buffer the financial impact on households and individuals. The IST Executive have agreed to continue to hold membership fees at current levels for 2023 and are also looking at how we can bring in split payments through direct debit schemes for those individuals who wish to budget in this way. If you have any concerns reading your membership and renewal, please contact the office for further help and advice.

Away from what seems are daily national and world challenges, 2022 has been an excellent year for the IST and the programmes and events that our dedicated team of volunteers have delivered. The **Women in Tech Group** has gone from strength to strength with an exciting seminar series across the year. *For more information about the group click here*.

Similarly, the IST's **AI Group** has been extremely active across the year and continue to organise a great series of exciting seminars and events. *Further information is now available on our website.*

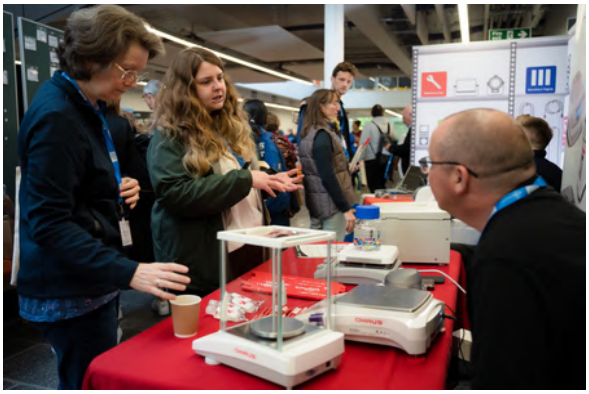
Questions from delegates at the IST Conference in York.

Delegates at this year's IST Conference at York University had the opportunity to hear from these specialists groups first hand in a number of the days workshops, receiving excellent reviews. A must in your diaries for the 2023 Conference.

Our first face to face conference for two years was a resounding success. With over 350 delegates, the day was packed with workshops and events that served the broad interests of the technical staff, managers and specialists that attended the day.

Thought evoking keynote given at IST Conference 2022.

With our key sponsors and exhibitors providing the opportunity to view the latest equipment and services available to our community, the company representatives were kept busy all day.



Conference delegates speaking with our sponsors.

The opportunity wasn't missed by delegates to catch up with friends, colleagues and first-time attendees and to have that opportunity to network and share good practice and discuss the issues faced by technical staff from many different sectors. Many thanks go to Simon, Lucy, York University and the IST's conference team and volunteers for their significant contribution in ensuring the conference was such a resounding success.

2023 will see the **75th Anniversary** of the foundation of the IST and work has now started on the 2023 Annual Conference which will encompass anniversary celebrations and will highlight the changing roles of technicians over the last 75 years. Discussions regarding venues are well underway with the Conference being held on **Wednesday 13th September 2023.** I look forward to catching up with you all, our members and the technical community at what will be a day of celebrations, high quality workshops, presentations and events. Once again delegates will have the opportunity to network with colleagues, sponsors and exhibitors. So please add that date to your calendar now.

Once again, we are proud to celebrate our Science Council CPD winners and those that were highly recommended. Well done also to the technicians who were awarded with memberships at other institutions

We are proud to share that one of our members, Rae Freestone, has been recognised in the Science Council's CPD Awards, they won the the award in the RSci category. Many congratulations Rae, and really well done.

Science Council CPD RSci Winner, Rae Freestone.

A warm welcome to Marie Oldfield who is taking over the role of Diversity and Equality Officer and Russell Wilson who has been co-opted onto the Executive taking on a role in Outreach.

We are always interested in hearing from members who would like to become more involved with the IST and we welcome any such offers of support. The IST is a not-for-profit organisation, and we rely heavily on the support from our many volunteers, from our Executive Board (all members of the Board occupying voluntary, elected roles), committee members and project teams, through to contributors to our Journal, TechMag and website. If you would like to play a part in **YOUR** professional body, then please contact us via office@istonline.org.uk.

I am looking forward to 2023 and an exciting anniversary year for the IST and its members. I am hopeful that 2023 will be a good time to be a technician, specialist and technical manager. The IST is here to support you on your career pathway and support you in any way we can in these difficult and challenging times but still filled with opportunities and new horizons. So please remember to visit the IST website to keep up to date with news and events specifically for you and the technical community.

Wishing you all a Very Happy Christmas and a Peaceful and Rewarding New Year.

With best wishes,

Terry

President's view

Helen Sharman, CMG, OBE, FRSC, FIScT
IST President

It's the end of another brilliant year for technicians, and there is nothing quite like a dedicated gallery in a national museum to demonstrate technicians' value. The Science Museum in London advertises its new gallery 'Technicians' as, "Try hands on exhibits that bring to life a wide variety of workplaces, from a blockbuster film set to a pharmaceutical lab, allowing you to experience the hidden yet vital careers of technicians." IST members have participated in gallery advisory boards and steering panels and some have even been filmed so that visitors can watch them talk about their roles in different parts of the gallery.

Showcasing Technicians applying their diverse skills in every sector of the UK economy.

I was delighted to see that the importance of technicians is acknowledged at the highest level in the UK when 'Technicians' launched with a bang at the beginning of November. Hundreds of people, including a strong IST presence, gathered to celebrate this newest gallery being open to the public. There were speeches by two Secretaries of State (Michelle Donelan for Digital, Culture, Media and Sport and Gillian Keegan for Education), Lord Sainsbury and Sir Ian Blatchford, Director and Chief Executive of the Science Museum, who is on record as saying, "Technicians are long overdue their time in the spotlight, as one of the country's most vital teams, driving economic growth in an amazing range of sectors."

Lord Sainsbury highlighting the importance of Technicians to the UK economy.

We might not all want to be in the spotlight ourselves, and there remains plenty of opportunities for technicians with a diverse range of personalities. But to have the technical profession signalled so publicly can only be positive. The IST has always been proud of technical contributions to the world, and now the UK is shouting its regard loud and clear. Hurrah for that!

The cost of living is impacting us all in various ways and to varying extents and it is a source of worry for many. This will only be heightened as we move into the Christmas period, with the usual advertising to entice us to buy gifts and the expectations of increased socialising.

Fortunate employees at some institutions will be able to access targeted financial support, which will come as a welcome addition to any pay increases that have, for the most part, been under inflation. It is also worth looking out for offers from your employer and elsewhere for discounts on prices of a range of items and services like opticians, cycle hire schemes, phone plans, and so on, which you might have previously overlooked. Financial concerns can also be challenging for our mental health, and you may be able to find support though your employer's counselling service or your GP.

The months ahead will be challenging for many in the technical community but remember that it is a sign of strength to seek help. Do talk to your team leader, who may not be aware of everyone's circumstances. And if you are a team leader, be considerate that not everyone is able to join events with associated costs, like travel or buying food and drink.

Some people may even be working an additional part time job and no longer have the time for socialising.

It may be little consolation for those facing hardship but if there was ever a time to remember what the true spirit of Christmas is, it's now. Let's all focus less on what we can buy and more on the people around us. A piece of kindness goes a long way and can last a lifetime.

Next year we celebrate the 75th Anniversary of our professional body and the focus will be on how technicians have adapted and responded to the needs of their employers over this period of time.

How they have kept their skill sets relevant and have embraced the changing face of technology becoming highly skilled specialists in many sectors of the economy. I look forward to seeing you all at next year's extra special IST annual conference. Watch our website for further details www.istonline.org.uk.

Best wishes to you all for a **Happy Christmas**,

Helen

New members and registrations

New members December 2021-December 2022

No.	Name	Grade
T16614	Ms F Booth	MIScT
T16615	Ms E L Bourne	MIScT
T16616	Ms A.Perz	MIScT
T16617	Miss S L Kelly	MIScT
T16618	Mrs A Robertson	MIScT
T16619	Mrs E Clowes	MIScT
T16620	Mr L Brincat	MIScT
T16621	Mr R I Hussain	MIScT
T16622	Mr J Jeyaneethi	MIScT
T16623	Mr B Sani Tela	MIScT
T16624	Mr B I Maikatsina	MIScT
T16625	Mr C Wright	FIScT
T16626	Mr T G Davies	MIScT
T16627	Mr O A Adejo	MIScT
T16628	Mr D Barry	MIScT
T16629	Mrs S J Smith	MIScT
T1663	MR G W Swayne	MIScT
T16630	Miss A Reichardt	MIScT
T16631	Miss J Robertson	MIScT
T16632	Mrs S M Johnston	MIScT
T16633	Miss S Galloway	MIScT
T16634	Mr G E Obem	MIScT
T16635	Mr I Salisu	MIScT
T16636	Mrs K Spiers-Fitzgerald	MIScT
T16637	Dr N Ludgate	MIScT
T16638	Dr K Dexter	MIScT
T16639	Mr J Thompson	MIScT
T16640	Mrs I C Goncalves Cattuzzo	MIScT
T16641	Mr H Morris	MIScT
T16642	Dr E Moyce	MIScT
T16643	Mr M J Healey	MIScT
T16645	Mr P S Boakes	MIScT
T16646	Mrs K Keen	MIScT
T16647	Dr J Orton	MIScT
T16648	Mr R J Manford	MIScT
T16649	Mr K B Wagner	MIScT
T16650	Mr C Jones	MIScT
T16651	Mrs L Donnelly	MIScT
T16652	Mrs Chatfield	MIScT
T16653	Mrs L Hicks	MIScT
T16654	Mr J R Winch	MIScT
T16655	Miss W Housam	MIScT
T16656	Miss E M Colquhoun	MIScT
T16657	Dr J Uguna	MIScT
T16658	Mr S J Carey	MIScT
T16659	Mr S N Yohannan	MIScT
T16660	Mr S Snowden	MIScT
T16661	Mrs J Smith	MIScT
T16662	Mr M Webster	MIScT
T16663	Mr D Bower	MIScT
T16664	Dr K J E Chua	MIScT
T16665	Miss T Harvey-Cowlishaw	MIScT
T16666	Dr M A B Jalil	MIScT
T16667	Dr S W Breeden	FIScT
T16668	Dr B Shen	MIScT
T16669	Mr I Jabbar	MIScT
T16670	Dr A Schuler Scott	MIScT
T16671	Mr I Brown	MIScT
T16672	Dr S Bose	MIScT
T16673	Mr M Dabee Saltmarsh	MIScT
T16674	Mr R Marvi Esfahani	MIScT
T16675	Mr P J Strike	AssocIScT
T16676	Mr J P Elkin	AssocIScT
T16677	Mr M Myszczynski	AssocIScT
T16678	Mr A Hayes	AssocIScT
T16679	Mr D Fella-Glanville	AssocIScT
T16680	Mrs S J Christie	MIScT
T16681	Mr R A Stroulger	MIScT
T16683	Mr W Wilson	AssocIScT
T16684	Mr J Melling	MIScT
T16685	Mr S I Onuorah	MIScT
T16686	Mrs J O Ndika	MIScT
T16687	Dr I D Kenny	MIScT
T16688	Mr J Dunning	AssocIScT
T16689	Miss R Mock	MIScT
T16690	Miss V Davison	MIScT

Total 77

Fellowship Upgrades

No.	Name	Grade
T14884	Dr K Henderson	FIScT
T15291	Ms J R Barkans	FIScT
T15551	Mr R W Carter	FIScT
T15734	Mrs J C Brett	FIScT
T15972	Mrs G E Riddell	FIScT
T16075	Mrs L C Hudson	FIScT

No.	Name	Grade
T16114	Mr P R Ashford	FIScT
T16458	Dr M L Sterry	FIScT
T16543	Dr R A Saldanha	FIScT
T16625	Mr C Wright	FIScT
T16667	Dr S W Breeden	FIScT
Total 11		

Science Council New Registrations

Membership No.	Name	Grade
T15667	Mr B J Martin	CSci
T16111	Mrs C Whalley	CSci
T16125	Mrs J Hibbard	CSci
T16581	Miss G E Davies	CSci
T16595	Dr C F Taylor	CSci
T16609	Dr V Rajasekaran	CSci
T16618	Mrs A Robertson	CSci
T16626	Mr T G Davies	CSci
T16632	Mrs S M Johnston	CSci
T16637	Dr N Ludgate	CSci
T16638	Dr K Dexter	CSci
T16639	Mr J Thompson	CSci
T16640	Mrs I C Goncalves Cattuzzo	CSci
T16652	Mrs Chatfield	CSci
T16659	Mr S N Yohannan	CSci
T16668	Dr B Shen	CSci
T16681	Mr R A Stroulger	CSci
T15949	Miss S J Viney	RSci
T16023	Ms A Dolling	RSci

Membership No.	Name	Grade
T16561	Dr H J Goring-Harford	RSci
T16614	Ms F Booth	RSci
T16615	Ms E L Bourne	RSci
T16616	Ms A.Perz	RSci
T16617	Miss S L Kelly	RSci
T16619	Mrs E Clowes	RSci
T16621	Mr R I Hussain	RSci
T16630	Miss A Reichardt	RSci
T16633	Miss S Galloway	RSci
T16636	Mrs K Spiers-Fitzgerald	RSci
T16641	Mr H Morris	RSci
T16646	Mrs K Keen	RSci
T16647	Dr J Orton	RSci
T16651	Mrs L Donnelly	RSci
T16665	Miss T Harvey-Cowlishaw	RSci
T16564	Ms T Clayton	RSciTech
T16575	Miss A E Ward	RSciTech
T16653	Mrs L Hicks	RSciTech
Total 37		

Not working in science or science technology?

IST Registered Practitioners

FIScT(Reg) Registered Practitioner

MIScT(Reg) Registered Practitioner

The Institute of Science and Technology is uniquely an organisation run by technical people for technical people. We support these incredibly important staff in all areas, not just science but technologists in all fields.

As the professional body for specialist, technical, and managerial staff, we are actively involved in the professional recognition of technical staff in education, research, government, and industry. It is our view that our Registration Schemes are essential to establish your professional standing, acknowledge your expertise, and to enhance your career prospects.

People who work in technical roles in non-science fields, such as arts and media, may not be eligible to join the Science Council's Registers, but the IST recognises the exceptional work that these technical people do. We are committed to providing all our members with a means to endorse their status and to enable them to demonstrate transferable skills. up-to-transferable skills, up-to-date professional competence and continuing professional development. We do this through our Registered Practitioner Scheme, and by the designation of MIScT(Reg) or FIScT(Reg) status to members who meet the criteria.

Want to find out more?
Visit: istonline.org.uk
Follow us on Twitter @istonline

IST The Institute of Science & Technology

Chartered Scientist
Registered Scientist
Registered Science Technician
Registered Practitioner

Since 1987, the IST has operated a register of competent and qualified technical practitioners

Registered Practitioners must have attained a high level of technical proficiency supported by sufficient knowledge of modern technology to enable them to relate to operating practises in their chosen field.

Criteria for Registration include:

- Corporate Membership of the Institute of Science & Technology
- Qualifications judged to be of an acceptable standard
- Appropriate experience (in terms of breadth, depth, and length)

Importantly, there is also a route for mature applicants who have achieved a high standard of professional competence but who may not have the formal academic qualifications.

Registration is renewed each year with evidence of Professional and Personal Development. There is a small fee for admission to the Register and a nominal annual renewal fee.

IST Journal Publication

Back copies of our journal publication are viewable online:

istonline.org.uk/ist-journal-publication

Article submissions for the IST Journal & the TechMagazine

The IST Journal is a quality annual publication. Its style and content strongly reflect the IST's unique standing as a professional body that has an extremely diverse and vibrant technical membership.

The Journal's informal style offers an opportunity for our members and guests to freely present and publish articles, papers, and news items that would be of interest to our readership's varying expertise and extremely broad subject range. We do try to encourage articles to be written with our diverse technical membership in mind.

We positively welcome article submissions from all and any areas of technical interest, including areas such as IT, media, medicine, and the arts. We like to cover existing, historical, and new technological advances, and also unusual aspects of science or technology.

We particularly want to encourage technical people to publish for the first time, as part of their career development, and we can offer help and assistance in putting a first article together.

Contact: office@istonline.org.uk

The guidelines for article submissions for the IST Journal and TechMag are:

1. Article submission deadline for our annual Journal edition is 31st March. Deadlines for the TechMag articles are:

2. Your article should be submitted electronically in Microsoft Word format; with its images supplied separately as JPEG files (it is important that all your article images have a minimum resolution of 300dpi. Images embedded in a Microsoft Word document are not usually reproducible to the necessary print resolution).

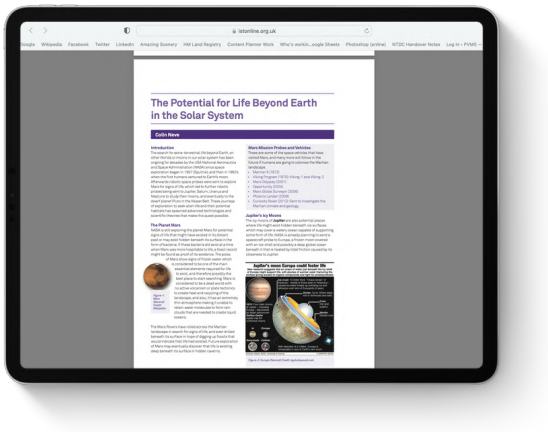
3. Short articles: these can be any length up to roughly 2,000 words.

4. Major articles: these are normally no longer than roughly 6,000 words. We can only publish one or two major articles per edition. Larger articles may need to be accommodated across two or more editions.

5. All articles should be written in UK English. This is important as, depending on the content size and quality of English, they can take up a lot of editing time. Some can require extensive re-writing. We may have to decline very poorly translated articles.

6. Editing – we will edit all articles into the IST Journal's house-style, and may have to correct for spelling and grammar. Text layout and images may need to be changed, altered, or omitted. Pease see "IST Journal house-style" description on our web site. It will help enormously if your article follows this style as much as possible.

7. Article submissions should be submitted via email to office@istonline.org.uk. Your email should clearly state "Journal (or TechMag) Article Submission" and the article and separate images sent with it as email file attachments.



IST Organisation

Executive Board (December 2022)

President: Helen Sharman CMG OBE FRSC FIScT

The main role of the President is to lead and guide the Institute in its strategic and operational development. Helen is ideally suited to this role having become the first British astronaut when she launched into space on board a Soyuz space craft on 18 May 1991. Helen graduated with a degree in chemistry from the University of Sheffield before working in industry. Following which she trained at the Yuri Gagarin Cosmonaut Training Centre in Star City near Moscow. Helen became a science communicator after her space flight, and more recently she has started a new career in management, working at the National Physical Laboratory and at Kingston University London, before moving to Imperial College in the summer of 2015.

E: office@istonline.org.uk

Chairman: Terry Croft MBE FIScT CSci

Terry is the Chairman of the IST. He is passionate about, and is committed to, the technical community. His work involves promoting the professionalisation of the technical workforce. He brings a wealth of experience to the board through his involvement with the wider sector and as the Founding Director of the National Technician Development Centre for Higher Education.

E: t.croft@istonline.org.uk

Secretary: Sandra Tayor MIScT RSci

Sandra is the IST Secretary, and has responsibility for ensuring that we comply with legislative requirements and that we maintain suitable official records, and also for the corrdination of our Executive meetings and documentation. She is Senior Research Technician on Synthetic Biology, at the University of Manchester and is Secretary for the UoM Manchester Technical Excellence network TE@M.

E: sandrataylor@istonline.org.uk

Deputy Chair & Finance Officer: Joan Ward FIScT

Joan is Deputy Chair of the IST. As Finance Officer, Joan's primarily role is to control expenditure on behalf of the Executive and be responsible for ensuring that satisfactory accounts of all monies received and expended are maintained.Further to this, Joan provides advice as to how annual financial performance might be improved, within the context of the IST being a not-for-profit organisation. She carries out tasks agreed by the Executive to maximise overall financial wellbeing.

E: joanward@istonline.org.uk

Education Officer: Arthur Nicholas FIScT

As Education Officer, Arthur maintains knowledge of vocational training and qualifications for technical practitioners. He also participates in regional and national development programmes. Arthur is involved in the development and delivery of technician training and manages the IST's service to employers to validate their in-house training schemes. Arthur is a Trustee of the Science Council and a Specialist Advisor to the National Technician Development Centre (NTDC).

E: arthurnicholas@istonline.org.uk

Diversity & Equality Officer: Marie Oldfield FIScT CSci

Marie is the Institute's Diversity & Equality Officer and works to ensure that the IST operates in line with the principles of diversity, equality, and inclusion, and to measure progress in that regard.

E: marieoldfield@istonline.org.uk

Registrar & Marketing Officer: Michelle Jackson FIScT CSci

As Registrar, Michelle oversees the registration schemes run through the IST and contributes to the development of associated strategic and operational procedures. She liaises with the Science Council with respect to continuing development of the registration process and monitors all aspects of the IST registration and assessment processes. As Marketing Officer, Michelle looks at new and existing ways in which the IST markets itself to its members, prospective members, and the science and technology community.
E: michellejackson@istonline.org.uk

IST Advisors

Executive Advisor: Lee Shunburne FIScT CSci

Lee is Department Manager at the University of Sheffield, an IST Fellow and is an assessor for professional registration at CSci level and sits on the Science Council's Registration Assessment Committee.

Assistant Registrar: Laurence Dawkins-Hall FIScT CSci CBiol FRSB

Laurence is currently our Assistant Registrar and has responsibility for providing assistance in a variety of way to our registration activities. He offers mentoring support for potential new registrants and those looking to upgrade. In addition delivers presentations and training sessions on behalf of the IST and helps us to promote professional registration through outreach work. He also undertakes professional registration support work on behalf of the Science Council.

Executive Advisor: Lucy Hudson FIScT CSci

Lucy is the Operations Manager in the Dept. of Biology at University of York. She is a Trustee at The Royal Society of Biology, Fellow of the IST, & external advisor for the National Technician Development Centre.

Executive Advisor: Russell Wilson MIScT RSci

Russell is a Senior Laboratory Technician in Sport and Exercise Science at Heriot-Watt University and provides outreach support for the IST.

Fellowship & Overseas Advisor: Derek Sayers FIScT FInstLM FRMS

As Fellowship & Overseas Advisor, Derek coordinates the review of Fellowship applications, setting in place panels of other Fellows for peer review, and advises the Executive on the outcome of the reviews. He also maintains the documentation of those applications. Derek is our point of contact for overseas inquiries from members and for organisations wishing to work with the IST; he liaises with such organisations and reports back to the Executive. Derek is a Vice President of the IST.

Executive Advisor: John Dwyer FIScT

John is co-ordinator for Partnerships/Champions. His role involves actively promoting professional registration for the IST throughout the UK: attending meetings, workshops, and conferences, and seeking champions for this cause at institutions nationally.

Executive Advisor: James Trout FIScT CMgr RSci

James is the Laboratory Manager for the National Laboratory Site at Starcross in Devon. The NLS is a national service of the Environment Agency and provides analytical data for a range of sample types. James is a Chartered Manager and a Governor of Newton Abbot University Technical College. He will be helping the IST develop industrial links and promoting frameworks for professionalising science/technical staff working in that sector.

IST Archivist: Alan Gall BSc MSc MMath MInstP MRSC FIET FIScT CSci
Alan has been IST Archivist since 2004. Originally a laboratory assistant, he has worked in industries concerned with edible oils, food additives, polymer stabilisers, electroplating and explosives. He is currently a company director involved with magnetic materials, electrical engineering and general mechanical engineering. Contributions to the Journal began in 2003 with an article on the Manchester University technician William Alexander Kay. He has provided regular articles since then.

Advisory Boards

The Education Board – Chaired by Arthur Nicholas

Ian Gray MIScT

Melanie Hannah MIScT, RSci

Joan Ward FIScT

Michelle Jackson FIScT CSci

Chris Pambou MIScT RSci

The Marketing Board – Chaired by Michelle Jackson

Joan Ward FIScT

TBA

The Editorial Board – Chaired by Joan Ward

Alan Gall FIScT, CSci (IST Archivist)

Michelle Jackson FIScT, CSci

James Fox MIScT

Nigel Cook MIScT

Stephen Gamble MIScT

IST Vice Presidents

Maida Davidson FIScT

Terry Evans MIScT

Simon Fairnie FIScT

Ian Gray MIScT

Robert Hardwick FIScT

Ian Moulson FIScT

Derek Sayers FIScT

What does your lab do with unwanted equipment?

Michael McLeod

Introduction

This was a question I found myself asking constantly back in 2014. I was working as a postgraduate student when one day between powdering samples and running gels I was asked to help with a lab clearout. This meant putting unwanted lab equipment on a trolley, wheeling it down a corridor and throwing it into an electrical skip. It felt awful, and I couldn't understand why it was happening.

I learned the staff in my department had already exhausted all other options. The store rooms were already packed to the roof and every little space in the building had been filled. The bottom of the stairwells had practically become their own laboratories – much to the dismay of the health and safety officer. But with two departments merging, they needed to make space. They had to get rid of some equipment.

I couldn't believe this was how things were done – and every single lab I went to it was the same. There was **no solution** for unwanted equipment – it was either storage, or disposal.

Figure-1: Storage cupboards in universities are often full of redundant equipment.

I had a simple idea – what if we could sell unwanted equipment rather than letting it just gather dust or go to waste? So I came up with UniGreenScheme – a service to collect, store and sell surplus equipment for universities. But I had no resources, no experience, and a one-page business plan.

What I did have, was the immense support of the technical community to help make the idea into reality.

Looking back I am incredibly proud to say that UniGreenScheme has now rehomed over 20,000 pieces of unwanted equipment saving the research and education sector over £3m versus recycling - including over £400,000 in direct rebates paid to universities for sold equipment.

UniGreenScheme started as a student start-up but we now employ over 20 staff across our two sites and our hard-working team process on average a full lorry of unwanted lab equipment every single day.

One of the early adopters of UniGreenScheme was the department of Biomedical Sciences at the University of Bristol. Steve Gaze and his team there were already proactive – they had established a number of internal re-use processes but always had some equipment left unclaimed.

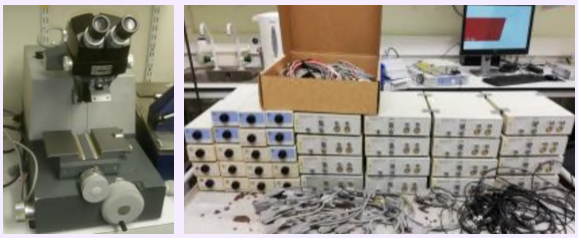


Figure-2: Unwanted equipment that UniGreenScheme collected.

In just the first summer clearout we collected nearly 2,000kg of unwanted equipment they had been unable to get re-used elsewhere. Over the following years we have made numerous additional collections and have re-sold over 9,000kg of equipment from the department.

Figure-3: Impact of UniGreenScheme so far.

The equipment included unwanted microscopes, 14 outdated teaching spectrophotometers, 70 electrophysiology instruments and many other items.

The department has now received over £15.5k in rebates for equipment sales and over 25,000kg of CO2e has been avoided through re-use.

"The UniGreenScheme team are always happy to visit site and give us advice as to what equipment will sell and give us an estimate of what might be achieved. On each visit to date the team continue to surprise us with the wide plethora of items that they will take for resale which has the extra benefit of creating space here in the Faculty."

- Steve Gaze, Faculty Technical Manager

As our team has grown so has our capabilities and we now deal with more and more complex projects.

For example, for one university chemistry department we recently sold a Molecular Beam Epitaxy system (MBE). This was contaminated internally with 8 different contaminants including arsenic.

Figure-4: Projects completed by the UniGreenScheme team.

We were able to project manage the entire job. We completed all detailed risk assessments, we brought in a specialist to carry out a two week scrub of all hazardous material under clean-room conditions, then we brought the machinery out through a side wall by forklift. This job would have cost at least £30,000 if paid for by the institution but we were able to do it at no cost by using the resale value of the system to fund the works.

When I first stumbled upon this problem, I really didn't understand the scale, or how big the impact really is.

Lab space is expensive to run, and equipment is expensive to buy. Facilities can't afford to have space taken up with equipment not in use, nor can they afford to allow valuable equipment to depreciate unused. But, with no other option of storage or disposal, equipment seems too good to throw away so it just clutters up facilities.

Figure-5: This ultracentrifuge had sat in a lab unused for two years before it came to UniGreenScheme. It had been serviced annually during the time.

Unfortunately we often see equipment being left in corridors or on lab benches unused for years, in some cases even being PAT tested and serviced annually. In the worst possible case I saw a class 2 safety cabinet in a clean-room that had received bi-annual servicing for eight years without being used once over the duration.

With this in mind, what is the financial cost, and carbon footprint of redundant equipment? Its certainly more than just the embodied cost.

A survey from Zero Waste Scotland found that over **half of lab managers reported they had redundant equipment in their lab at the time of the survey.**

That statistic alone is phenomenal. We can't be sure how much of the equipment could be suitable for re-sale, but what we do know is that based on just our data so far we can estimate there are over 15,000 pieces of unwanted and saleable lab equipment being generated by just the 24 Russell Group universities every single year.

As universities desperately grapple to reduce their scope 3 carbon emissions (purchased products and services) there is an opportunity to make real changes in the way research equipment is consumed – with equipment resale being a significant part of the solution.

But for me what is most exciting is knowing where all that redundant equipment can end up and the knock-on impact it has.

Our buyers mainly consist of start-up or early-stage research companies trying to put together labs on a shoe-string budget.

Without used equipment what happens to this valuable grass-roots research? How many big discoveries start with a few pieces of second-hand equipment and a great idea?

"As a start-up, keeping costs down is essential to avoid excessive borrowing. We have found that purchasing used equipment is the best way to save on large capital purchases with equipment being available at a fraction of the value of buying new."

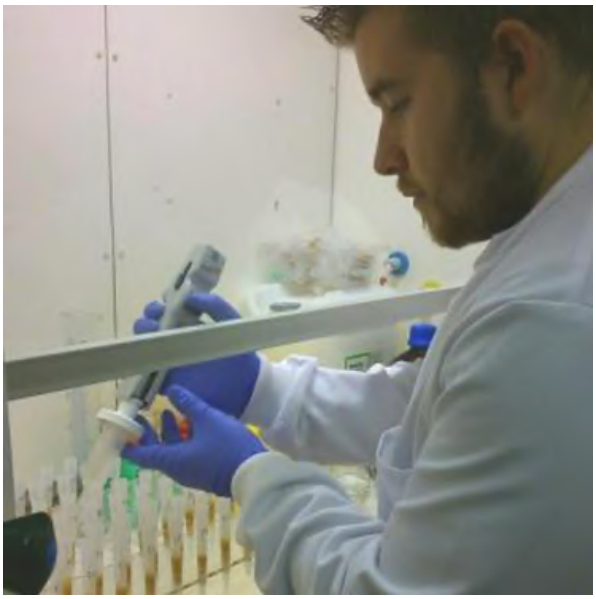
- Andrew Barnes, Managing Director
Geochemic Ltd

UniGreenScheme has taken me on a phenomenal personal journey and I am very proud of what we have achieved – but I am all too aware that we have only just started tackling the problem.

Facilities have a wonderful way to save money and be more sustainable if they can look at their redundant equipment as an opportunity not a disposal problem. If you would like help doing this – please contact us.

So if you find yourself being asked 'What does your lab do with unwanted equipment?' – I hope your answer will be, we sell it, with UniGreenScheme.

Author:
Michael McLeod, BSc(Hons) Managing Director of UniGreenScheme.



UniGreenScheme
The Asset Resale Service For Universities

NFTs, AI, Ethics, and Indigenous Peoples.

Alicia Colson

How are these connected? A Non-Fungible Token or NFT is a digital asset stored in a blockchain which is a decentralized ledger of transactions. The word 'blockchain' stands for the same process used by those buying and selling cryptocurrencies such as bitcoin. AI (Artificial Intelligence) can generate NFTs and be integrated within NFTs. NFTs is the phrase used to record anything digital be it digital games, art, music, films and so on. NFTs are uploaded and verified by a third party, consequently attaining an exclusive status. Their ownership is unchallengeable.

Prior to the downturn in cryptocurrency, NFTs of what are called 'art' and 'artwork' were marketed, gaining value in financial terms. The words 'art' and 'artwork' are used because different cultural groups engage in trading activities have different notions of what is 'art'. What is 'art' depends on one's world view, where we enter the realms of **Emic and Etic**[1] and encounter the discipline of anthropology. To return to our story, the collapse in cryptocurrency meant that companies managing NFT platforms shifted their financial model, so NFTs and the meta communities are visible via 'brick – and mortar shops' gaining wider audiences.

NFTs enable Indigenous artists and communities to create new spaces for storytelling, sharing their stories, preservation of their language, to create art and take ownership of that work and forgo intermediaries. Non-Indigenous people, for years, acquired art objects made by Indigenous peoples who owned them, added a large mark-up, and resold them while keeping the difference in the price for themselves. NFTs enable Indigenous peoples, as defined by the UN Declaration on the Rights of Indigenous Peoples, to challenge existing barriers to the global marketplace and demand fair compensation for their work. The technical aspect of NFTs provides opportunities for the preservation of images, stories, and photographs to live indefinitely, or at least until the server which houses them ceases to function.

An article entitled "NFTs and Me: Meet the People Trying to Sell Their Memes for Millions" dated June 23, 2021, in The Guardian, described NFTS "in the minds of collectors as "akin to cave art, painted across the walls of the web by the flickering firelight of a dial-up modem". Catchy analogy but highly problematical and unethical given the NFT which the collectors want to "own", i.e. the original digital file, were created by someone with a contrasting cultural worldview.

It's said 'a picture is worth a thousand words' – images are effective. Unpacking an image's meaning is tough since more far more information is encoded than a piece of text – we're not talking about code here.

Indigenous community members know that their work is used for commercial purposes, but they often have not benefited from their use or been protected by copyright and the invocation of IPR. If a meme is made for an NFT which uses and reuses the IP (intellectual property) the IP could be communally or individually owned. It's possible an image is the expression of an idea which cannot be used or reused in a range of environments or for a range of purposes. It's possible that an image, an object, a design is a symbolic representation of a cultural practice or ceremonial protocols.

NFTs require legal and technical literary expertise which artists, collectors, and buyers of images frequently lack. NFTs, once sold, require contracts which do more than record trust between the creator of the NFT but include user(s) and potential buyer(s). Several layers of IP could exist. Such contracts, in the realm of cryptocurrency, increase trust but they are expensive to break. Ethical quandaries abound.

Author:

Alicia Colson PhD FRGS MIScT (ExplorersClub50)

Freelance archaeologist and ethnohistorian interested in the interplay between digital humanities, pattern matching and machine learning (AI) particularly using images, often created by indigenous peoples, and texts. Alicia holds a PhD in Archaeology from McGill University, Canada.

Footnote 1

The emic approach to studying human culture is one in which the members of the culture being studied are the main source of information used to understand the culture. The etic approach to studying human culture employs existing theories and perspectives that originated from outside the culture being studied.

How technicians at Manchester School of Art promote learning

George Gibson & Lisa Lorenz

Collaboration Print: How technicians at Manchester School of Art promote learning through zines[1] using social media platforms.

This article spotlights projects and initiatives born from the corona virus pandemic led by Manchester School of Art technicians George Gibson and Lisa Lorenz. They work part-time as Assistant Technical Officers as part of MMU's Makers Team.

Born from a Pandemic

From early on in 2020, it has become clear how vital social media platforms are to help students in their learning from home. The bookbinding workshop – as the reader may imagine – is, like many other technical spaces, focused on honing practical skills, material knowledge, and learning by doing. However, by embracing existing online tools students are familiar with - such as Instagram and Moodle - the bindery team has managed to create an exciting, responsive, and engaging platform to share learning resources.

Building a Presence

Thanks to Gibson's expertise in comms and online marketing gained from their own professional practice as an artist, the entire Makers team could learn and benefit from their experience. At the time of writing this article, the team's Instagram account **@msoa_teamprint** counts 1,527 followers and has published 273 posts highlighting students' achievements, home tutorials for printmaking and bookbinding processes, project and job opportunities. Whilst the @msoa_teamtprint account has been vital to stay in touch with students during the pandemic, it is still just as important to keep alumni, current students and external audiences engaged: nurturing collaboration, and working as a platform to highlight the outstanding work students create aided by technicians.

Zines for Futures

While digital communication has been paramount to surviving during the pandemic, both Gibson and Lorenz are physical makers at heart, partial to traditional craft and keen to secure the tactile nature of the bindery within an increasingly virtual world.

Figure-1: Art Collaboration Image.

A central part of the bookbinding workshop at Manchester School of Art is a specialist print process called risography. Risography, or short RISO, is a visually stunning and eco-friendly print process, marrying traditional screen and stencil printing with the velocity of a photocopier. RISO is exceedingly popular with students in the visual arts – it is also a skill that increases employability and empowers students in their small business endeavors. Both Gibson and Lorenz are RISO practitioners and avid printers, offering a rich resource of knowledge of opportunities for collaboration to their students. It is often used to produce zines due to its visual and tactile qualities.

Over the years technicians have collected RISO printed zines and prints in archival folders for posterity. Gibson saw the potential in a more public way of displaying this rich resource and, since 2021 has begun to sort through publications scattered in plan chest drawers and hidden between shelves

were published by Manchester School of Art staff and alumni. They needed to be seen and expanded – the idea of MSoA Team Print Zine Library was born. A call out was posted around the university: WE NEED UR ZINES: Donate your zines to the archive to inspire our future bookbinding students. The only prerequisite is that donations stick to the one thread binding all the publications together: Manchester Met made.

Utilizing MMU's own wood workshop, shelves were commissioned to display the collection in a form that also acts like an exhibition – presenting the editions, cover forward, to anyone accessing the room. Removing the collection from its forgotten folders not only gave easier access for references and learning, but a platform for Manchester-based zine makers to read each other's work. New publications hot off any press within the university have an official stockist and keen readership. The workshop zine library currently houses over 100 editions. Gibson has since begun cataloging the editions, to merge the physical and digital via an online Moodle archive.

International Networks

When a call for an international zine collaboration – BUG magazine - from ABK (Academy of the Visual Arts) Stuttgart, Germany was advertised in early spring 2021 Lorenz decided to take the lead in forming a student working group that would represent Manchester School of Art. The idea was simple: students at ABK Stuttgart would receive an edition of prints from each collaborating group and bind it into a compendium. Every participating group would in return receive one copy of the compendium.

Interest in the project was huge: print collectives from all five continents took part in the project, which offered a great chance for exposure to participating students. Taking part in BUG mag gave them a chance to work on a real-life project - whilst the pandemic still put in-person exhibitions and travel to a halt. The project helped students in learning or honing their risography, teamwork, and project management skills. Working on a project that promotes digital sharing and networking, as well as a physical outcome, was a rewarding and exciting experience for the students involved. An outstanding example of the value of physical publications, the importance of workshops at universities, and the creative practice of technical staff – print is not dead!

A Hybrid Future

Traditional craft, such as bookbinding and print, in combination with the possibility of digital advances such as augmented reality, embedded QR codes and international collaboration via Zoom, Instagram and TikTok – offer a wide range of learning and professional growth.

Making traditional craft future-proof almost comes naturally when keeping a curious mind and conversations with students in a healthy flow. It is an exciting opportunity for technical staff to expand their knowledge in digital media and arts whilst conserving specialist skills and passing them on to a new generation of creative practitioners.

Authors:

George Gibson is a freelance artist and bookmaker, working within galleries, communities and DIY projects. In 2016 they co-founded Shy Bairns (*www.shybairns.co.uk*), a collective of artists, designers and curators interested in print. SB produce collaborative publishing projects, most recently exhibiting at The Grundy, Blackpool.

Lisa Lorenz is a freelance graphic designer, publisher and workshop facilitator for community groups, galleries, and museums. She is founder and director of Team Trident Press specializing in risograph-printed, hand-made books and zines and has exhibited most recently with Tokyo, Dublin, and Bergen Art Book Fair. *www.teamtridentpress.com*

[1] */zi:n/ A zine is a small-circulation self-published work of original or appropriated texts and images, usually reproduced via a copy machine. Zines are the product of either a single person or of a very small group, and are popularly photocopied into physical prints for circulation. (Wikipedia, http://en.wikipedia.org/wiki/Zine [7th February 2022])*

The development of quaternary ammonium compounds for microbial contamination control

Dr. Tim Sandle, PhD FIScT CBiol

Introduction

Cleaning and disinfection are activities of great importance for controlling microbial contamination (1). Outside of the home, disinfection is undertaken regularly to make food handling areas, hospitals, pharmaceutical facilities, among other areas, safer by reducing a given microbial population residing on an inanimate surface (2).

One of the most commonly used agents for disinfection are quaternary ammonium compounds. Discovered to be antimicrobial agents over one hundred years ago, products made from the compounds entered into widespread use after World War II (3). As well as being the active ingredient of a vast array of disinfectants, the compounds are used in fabric softeners, personal hygiene and cosmetic products, such as shampoos, conditioners, and body lotions (4); as well as in some ophthalmic solutions and medications that use the nasal route of delivery (5). To demonstrate the ubiquity of QACs, as survey on approximately 500 US EPA (Environmental Protection Agency) registered disinfectant products for households showed quaternary ammonium compounds are the most widely used, being applied in 58% of the formulations (6). The annual worldwide consumption of quaternary ammonium compounds is assessed as being over one million tonnes.

There are concerns about the use of quaternary ammonium compounds in consumer products given the association with decreased susceptibility to several clinically relevant antibiotics in some species (7); in addition, there are concerns about the environmental impact of these chemicals (8). While this is a topic of societal concern (and discussed briefly), the focus of this article is with the chemical disinfection of inanimate objects in healthcare and pharmaceutical facilities. Here quaternary ammonium compounds are commonplace, where they function as membrane-active agents interacting with the cytoplasmic membrane of bacteria and the plasma membrane of yeast.

In looking at the role of quaternary ammonium compounds as disinfectants, this diverse complex of chemicals has gone through several iterations (or ‘generations’) across a period spanning over one hundred years. This article looks at the generation development of these ubiquitous chemicals.

Quaternary Ammonium Compounds (QACs)

Quaternary ammonium compounds are salts of quaternary ammonium cations, prepared by the alkylation of tertiary amines with a halocarbon (alkylation is the transfer of an alkyl group from one molecule to another). This is known as the Menshutkin reaction (9). QACs with 12–18 carbon atoms in the chain are the most suitable for use as disinfectants (compounds with N chain lengths less than 4 or greater than 18 are practically inactive in terms of antimicrobial action) (10).

Disinfection is not ‘sterilisation’, and it is a term typically applied to the inactivation or killing of a given microbial population on an inanimate surface. The effectiveness is dependent upon microbial numbers, species and the presence of any soiling (which can interfere with the disinfectant activity). Due to these variables, disinfection is less exact than sterilisation. Nonetheless, disinfection is an essential activity for maintaining hygiene as part of contamination control activities.

As disinfectants, quaternary ammonium compounds (QACs or sometimes ‘quats’) are cationic (positively charged) surface-active agents (both characteristics of which contribute to their bactericidal activity), which possess bactericidal activity and weak surfactant properties They are primarily active against vegetative Gram-positive bacteria at lower concentrations (including Mycobacteria) (11). QACs can be lethal to Gram-negative bacteria at higher concentrations, although *Pseudomonas aeruginosa* is often insusceptible (12). QACs have also been shown to be potent biofilm eradicators (13). The compounds possess antifungal properties, although they are

typically fungistatic rather than fungicidal (14). With bacterial and fungal activity, the optimal activity against Gram-positive bacteria and yeasts is achieved with chain lengths of 12 to 14 alkyls, while optimal activity against Gram-negative bacteria is achieved with chain lengths of 14 to 16 alkyls. The ability to achieve this wider spectrum of kill was advanced with the fourth generation of QACs (as discussed below). QACs are not effective against bacterial spores (although they are effective against the vegetative cells of *Bacillus* and *Clostridium* species, but not when these bacteria form endospores).

QACs are also able to inactivate enveloped viruses (such as SARS-CoV-2, responsible for the 2020 global coronavirus pandemic) (15). However, QACs are not effective against difficult-to-kill nonenveloped viruses such as norovirus, rotavirus, or poliovirus.

QACs remain active over a broad temperature range (with increased efficacy notable with an increase in temperature), and they are not affected by the pH ranges typical to most food or industrial facilities. QACs possess some limited cleaning ability, although, as with most disinfectants, efficacy is greatest when surfaces are clean and QACs are inactivated by organic soil, which means that the presence of protein based surface residues prevents the QAC from interacting with the target microorganisms. Due to the necessity to preserve the ionic nature of QACs, they should never be diluted with hard water (so tap water must be avoided) and instead deionised water should be used. Most QACs are also of low volatility, low odour, and they have a relatively long shelf life (16).

In terms of microcidal kill, QACs attack cell walls or membranes forming a surfactant-microbe complex. This causes the disruption of phospholipids in cell membranes, which leads to leakage of cellular constituents and cell lysis (17). This occurs after a relatively long contact time (which is organism dependent) and this is where the positively charged nature of the chemical comes in, given that microbial cell walls are typically negatively charged (in other words, the QAC is drawn towards the microbial cell). There is a secondary kill step through protein denaturation. QACs also affect bacterial DNA, causing a loss of multiplication ability. Examples of antimicrobial QACs include: **benzalkonium chloride (or alkyldimethylbenzylammonium chloride), benzethonium chloride, methylbenzethonium chloride, cetalkonium chloride, cetylpyridinium chloride, cetrimonium, cetrimide, dofanium chloride, tetraethylammonium bromide, didecyldimethylammonium chloride and domiphen bromide**. A further factor with microbial kill is the concentration of the QAC; lower concentrations exert a static effect on growth, while higher concentrations are microbicidal.

QACs are incompatible with a wide range of chemical agents, including anionic and non-ionic surfactants, although potentiation of the antibacterial activity by low concentrations of non-ionic agents has been reported. As they have detergent properties, they are less affected by soil compared to other disinfectants. They tend to be free from odour and colour, are stable, show low toxicity and are noncorrosive in dilute form. Other characteristic of QACs are displayed in Table 1.

Table 1: Basic characteristics of QACs

Advantages	Disadvantages
Broad spectrum of activity	Non-sporicidal
Good stability	Leave surface residues
Non-corrosive	Typical fungistatic, rather than fungicidal
Nontoxic at low concentrations Suitable for large surface disinfection	Some less active against Gram-negative bacteria

In terms of health and safety, QACs cause mild skin and respiratory irritation (18).

Origins

The origins of quaternary ammonium compounds as an agent for microcidal kill dates back to 1916, where the bactericidal effects of hexamethylene tetramine groups were investigated in the laboratory setting (19). Additional work was undertaken over the next twenty years looking at other quaternaries.

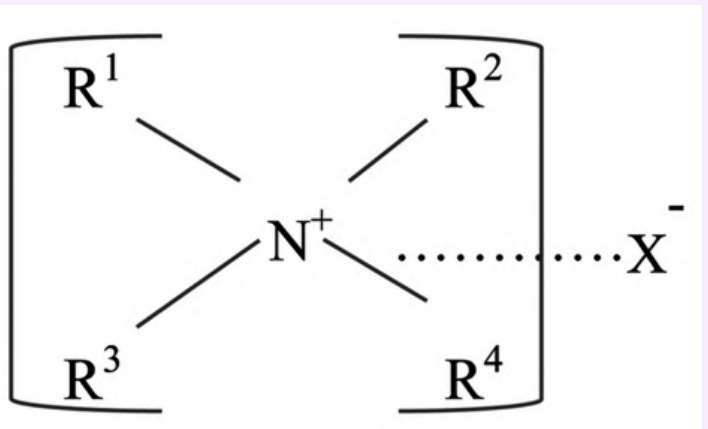


Figure-1: QAC structure (adapted from McDonnell, 2007) (20).

With the figure 1:

a) Within the square is the cation portion.
    a. This consists of the central nitrogen (N) with four attached groups (represented by 'R'). The R groups occur in a variety of structures.
b) Outside of the square is an X. This is negatively charged anion portion. This is usually chlorine or bromine.
    a. The X- is linked to the nitrogen to form the QAC salt, which is soluble in water.

The classification of QACs is based on the nature of the R groups. These groups include the number of nitrogen atoms, branching of the carbon chain, and the presence of aromatic groups. QACs are differentiated into three main groups: (a) linear alkylammonium, (b) imidazole, and (c) pyridinium compounds, each of which consists of numerous compounds and subgroups. These variations affect the antimicrobial activity of the QAC in terms of dose and action against different groups of microorganisms. The length of the R groups can also greatly affect their antimicrobial activity. As discussed above, methyl group lengths of C12 to C16 usually show the greatest antimicrobial activity.

It was not until 1935 that the potential of using quaternary ammonium salts as an active disinfectant was concluded in a research paper by Domagk (21). The conclusion was that bactericidal properties were possessed by any quaternary ammonium salt that possessed at least one radical that was composed of a long-chain aliphatic group. This led to the development of dimethyl benzyl ammonium chloride (benzalkonium chloride) in 1935, sold as a skin disinfectant (22). This was which was probably the first commercialised quaternary ammonium compound disinfectant (sold under the brand names Zephiran (refer to figure 2) and Roccal in the USA) (23). In 1947 the first benzalkonium chloride was registered with the U.S. Environmental Protection Agency (24), allowing its use for the decontamination of fruit for general consumption.

Figure-2: Zephiran bottle, circa 1940 (source: Image taken from a bottle on sale on eBay).

Today, benzalkonium chloride remains in use (the chemical formula is represented in figure 3). It has been used in eye drops as a preservative since the 1950's and it is still the most common preservative used in ophthalmic solutions at a concentration of 0.01–0.02%.

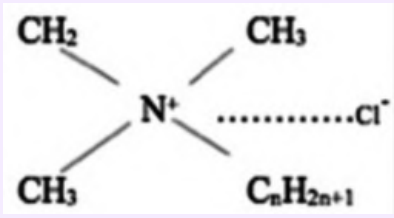


Figure-3: Chemical formula of benzalkonium chloride. The figure can be compared with the general representation of QACs in figure 1.

Subsequent improvements to QACs followed as knowledge about the chemical properties progressed. For example, the antimicrobial activity of QACs was found to be dependent upon the length of the alkyl chain, the presence of perfluorinated groups and the number of cationic ammonium groups in the molecule (25). The improvements are described within 'generations' and, where the chemistry takes a new direction, as a new 'generation'. The generation development is discussed below.

Registration

There is a vast range of QACs on the market, although not all of these meet acceptable standards for safety or for microcidal activity. Those that meet both requirements are the compounds registered with the U.S. Environmental Protection Agency (EPA) and the European Biocidal Products Regulation (BPR), or with other recognised regulatory bodies. For registration purposes, testing must be provided to the regulator to show microbiological performance against bacteria, including Gram-negative and a Gram-positive organisms. For claims against a specific virus, tests must be conducted with the specific organism to demonstrate the product's efficacy.

Generational development

QACs are probably the class of disinfectants that have gone through the most evolved and convoluted chemical development curve. Successive developments with QACs are ascribed the term 'generation'. Progressing with QAC development has been driven by the objective of improving microbial kill, of achieving faster contact times, to improve operator safety and to minimise environmental impact.

These generations can be summarised as:

First generation QACs

As indicated above, benzalkonium chloride (nalquil dimethyl benzyl) was commercialised in the 1930s and this is generally regarded as the main representative of the first generation of QACs. This first generation has a relatively low biocidal activity. Despite there being some concerns regarding bacterial resistance to benzalkonium chloride (26), the molecule is still widely used in hospital and veterinary disinfection, as well as in household products (as illustrated in figure 4). This is as both a hard surface disinfectant and as skin antiseptic (albeit less often than a 60-70% alcohol or chlorhexidine).

Figure-4: Disinfectant wipe containing benzalkonium chloride, in use in 2022 (Image: Creative Commons Library).

Furthermore, for most multidose aqueous nasal, ophthalmic and otic products, benzalkonium chloride remains the preservative of choice. There are safety concerns, and regulators like the European Medicines Agency have issued safety notices in relation to contact lenses, especially if you have dry eyes or disorders of the cornea; repeated nasal application (oedema of the nasal mucosa); risks from inhalation products for those who have asthma (wheezing and breathing difficulties (bronchospasm); and with skin irritation (27).

Second generation QACs

Second generation QACs were more complex molecules. An example of a second generation QAC is nalquil ethyl benzyl dimethyl ammonium chloride. This has ethyl radical in the aromatic ring. Second generation QACs are no longer manufactured commercially, due to advances made with third generation products.

Third generation QACs

The third generation QACs were formulated as a mixture of the first two generations, being first proposed in 1955. Here, benzalkonium chloride (first generation) chloride and alkyl dimethyl benzyl ammonium chloride (second generation generation) were chemically combined. The mixture of these two molecules led to the resultant chemical exhibiting increased biocidal activity, increased detergency and increased user safety by virtue of lower toxicity.

Fourth generation QACs

Fourth generation QACs are sometimes termed “dual chain” or “twin chain” products. These are quaternary products with linear dialkyl chains without benzene ring, such as didecyl dimethyl ammonium chloride or chloride, dioctyl dimethyl ammonium chloride or octyl decyl ammonium. Under laboratory conditions, these quaternaries are superior in germicidal activity. They also present advantages when applied on a larger scale for facility decontamination in that they are low foaming and have a higher tolerance to protein loads and they are less prone to deactivation if they are mixed with hard water.

Fifth generation QACs

Fifth generation products are a synergistic combination of fourth generation products with second generation developments. Examples include didecyl dimethyl ammonium chloride + + alkyl dimethyl ammonium chloride and alkyl benzyl ammonium dimetiletilbencil +. The advantages of the fifth generation products relates to more potent germicidal performance in harsher conditions and lower toxicity.

Sixth generation QACs

The sixth generation are polymeric QACs (28). This involves the integration of QACs with materials, most commonly medical devices, to avoid secondary infections from organisms like Methicillin-Resistant Staphylococcus aureus (MRSA). Applications include medical implants, food processing, and surface sanitizing. The materials are often abbreviated to ‘polyQACs’ and they have good therapeutic indices and a reduced likelihood of developing antibacterial resistance in comparison to their monomers, making them suitable materials for wound dressings, catheters, and other biomedical applications (29).

Seventh generation QACs

Seventh generation products are primarily Bis-QACs combined with polymeric QACs (the term 'Bis' is used to denote the presence of two identical but separated complex groups in one molecule). Bis-QACs consist of two identical alkylpyridinium rings, with the bridge structure linking these rings to each other having a methylene bridge. These are a variant of the sixth generation developments, such as lysine coupled to bis(hexamethylene)triamine to develop a scaffold (30). While most research into Bis-QCS is with polymerics, some studies have been conducted into liquid products (31). Other on-going research is into gemini-QCs, such as gemini QAC, 1, 5-bis(dodecyl)–1, 1, 3, 5, 5-pentamethyl-3-aza-1, 5-pentanediammonium ditetrafluoroborate (PMT12-BF4), designed to improve anti-fungal efficacy (32).

Current use

Based on the sixth and seventh generation QACs being largely products bound to materials, for domestic and industrial use, including clinical settings, the first, fourth and fifth generation QACs are the most commonplace. For many applications, QACs have been formulated for specific applications and organisms; these are combinations of QACs or QACs with other ingredients added to enhance efficacy.

Within Europe, QACs are classified into four grouping:

- Group I QAC cluster is composed of alkyl or hydroxyalkyl substituted QACs,
- Group II contains non-halogenated benzyl substituted QACs,
- Group III consists of di- and tri-chlorobenzyl substituted QACs,
- Group IV is made up of QACs with unusual substituents (such as charged heterocyclic ammonium compounds).

Based on a given formulation, QACs are extensively used in food processing and the food service industry due to their low toxicity. However, with the need for a low toxicity to safeguard human health, combined with a widespread use, several recent studies have focused on the potential for the development of resistance among bacterial pathogens (33). Here there is empirical data being reported that indicates that some bacteria can develop resistance to many types of disinfectants (and, according to some studies, this phenomenon is progressing at a rapid rate driven by the over-use of biocides) (34). With QACs in particular, a resistance gene qac has been detected in different bacterial species, often embedded in plasmids or transposons, facilitating their spread within bacterial populations (including human pathogens) (35). There is also evidence that QACs can lead to changes within the microbial cell (such as the workings of efflux pumps, which serve to push out toxins from the cell) that have an association with antibacterial resistance to antibiotics (36).

Safety

Any chemical intended to kill is hazardous to human health. That said, the toxicology of many QACs presents a lower risk compared with more aggressive agents. For example, most QACs are not readily absorbed from the gastrointestinal tract following oral dosing; most is excreted unchanged in the faeces (37). However, all QACs will be irritating or corrosive to the skin and eye (38). There is no evidence that QACs are genotoxic or carcinogenic (39 – 41).

Environmental impact

QACs, along with other chemicals, present a challenge to the environment as a pollutant. QACs, given their widespread use, are a considerable contributor of environmental toxins. QACs have been detected in wastewater and the aquatic environments, where the risk of ecotoxicity is high for marine and freshwater life. Furthermore, considerable amounts of QACs reach agricultural fields by the application of manures, sewage sludge or wastewater for nutrient recycling (42).

The most significant environmental impact is persistence in soil. While QACs may be utilised by microorganisms as a source of carbon and energy, under aerobic conditions the biodegradation typically decreases with the number of non-methyl alkyl groups attached to the quaternary nitrogen. Furthermore, little if any biodegradation occurs under anaerobic conditions (43). As well as affecting soil fertility, the presence of the chemicals creates issues in terms of antimicrobial resistance and disinfectant resistance (as discussed above). This issue indicates that more needs to be done to protect the environment from carelessly discarded chemicals, especially from the healthcare and industrial sectors.

Conclusion

QAC chemistry is a continually evolving area, with new product formulations appearing. Sometimes these developments take the form of new generations; in other cases, improvements are made to older generations, sometimes in combination with other chemicals. Some of these developments are driven by the challenges posed by emerging pathogens, especially within healthcare settings. It also stands that each QAC formulation has its advantages and disadvantages for a particular situation, for which toxicity and environmental issues need to be considered. It can sometimes be the case that the most effective QACs based on microcidal kill from

laboratory studies may not be the safest for particular settings.

This article has provided an overview of the development of this century-old area of antimicrobial chemistry, where a first generation product remains in widespread use and where science continues to advance in the form of seventh generation developments. QACs are set to remain the predominant hard surface disinfectants for both home and industrial use, pharmaceutical product preservatives, and a secondary skin disinfectant, for many years to come.

Author:

Dr. Tim Sandle, Ph.D. CBiol, FIScT

Dr. Sandle is a pharmaceutical microbiologist. He is a lecturer at UCL and the University of Manchester as well as the Head of Compliance and Quality Risk Management at Bio Products Laboratory Limited (a pharmaceutical organization. Dr. Sandle is a chartered biologist (Royal Society of Biology) and holds a first class honors degree in Applied Biology; a Masters degree in education; and obtained his doctorate from Keene University.

References

1. Sandle, T. (2016). The CDC Handbook: A Guide to Cleaning and Disinfecting Cleanrooms, 2nd Edition, Grosvenor House Publishing: Surrey, UK
2. Sandle, T. (2022) Advantages of quaternary ammonium compounds, The Clinical Services Journal, 20 (1): https://www.clinicalservicesjournal.com/story/37627/advantages-of-quaternary-ammonium-compounds
3. Merianos, J.J. (2001) Surface-active agents, p 63–320. In Block SS. (ed), Disinfection, sterilization, and preservation. Lippincott Williams & Wilkins, Philadelphia, PA
4. Choi SM, Roh TH, Lim DS, Kacew S, Kim HS, Lee B-M. (2018) Risk assessment of benzalkonium chloride in cosmetic products. J Toxicol Environ Health B Crit Rev 21:8–23
5. Committee for Human Medicinal Products (CHMP). 2017. Questions and answers on benzalkonium chloride used as an excipient in medicinal products for human use. EMA/CHMP/495737/2013. European Medicines Agency, Amsterdam, The Netherlands
6. Fu, E.; McCue, K.; Boesenberg, D. (2007) Chemical disinfection of hard surfaces-household, industrial and institutional settings. In Handbook for Cleaning/Decontamination of Surfaces, 1st ed.; Johansson, I., Somasundaran, P., Eds.; Elsevier: Oxford, UK, Volume 1, pp. 573–592
7. Kim M, Hatt JK, Weigand MR, Krishnan R, Pavlostathis SG, Konstantinidis KT. (2018) Genomic and transcriptomic insights into how bacteria withstand high concentrations of benzalkonium chloride biocides. Appl Environ Microbiol 84:e00197-18. doi:10.1128/AEM.00197-18
8. Ertekin E, Hatt JK, Konstantinidis KT, Tezel U. (2016) Similar microbial consortia and genes are involved in the biodegradation of benzalkonium chlorides in different environments. Environ Sci Technol 50:4304–4313
9. Hansen, Steen Honoré; Nordholm, Lars (1981) N-alkylation of tertiary aliphatic amines by chloroform, dichloromethane and 1,2-dichloroethane. Journal of Chromatography A. 204: 97–101
10. Chrank CL, Minbiole KPC, Wuest WM. (2020) Are Quaternary Ammonium Compounds, the Workhorse Disinfectants, Effective against Severe Acute Respiratory Syndrome-Coronavirus-2? ACS Infect Dis. 6(7):1553-7
11. Sandle, T. (2016) Evaluation of Quaternary Ammonium Compound Disinfectants against Mycobacteria in Dental Practices, Dental Update, 43, 723-726
12. Vijayakumar, R., Al-Aboody, M. S., AlFonaisan, M. K., Sandle, T. (2016) In vitro susceptibility of multidrug resistant Pseudomonas aeruginosa clinical isolates to common biocides, International Journal of Research in Pharmaceutical Sciences, 7 (1): 110-116
13. Jennings MC, Buttaro BA, Minbiole KPC, Wuest WM (2015) Bioorganic Investigation of Multicationic Antimicrobials to Combat QAC-Resistant Staphylococcus aureus ACS Infect. Dis 1: 304–309
14. Vijayakumar, R., Kannan, V.V., Sandle, T., and Manoharan, C. (2012). In vitro Antifungal Efficacy of Biguanides and Quaternary Ammonium Compounds against Cleanroom Fungal Isolates, PDA Journal of Pharmaceutical Science and Technology, 66 (3): 236-242
15. Hora, Priya I.; Pati, Sarah G.; McNamara, Patrick J.; Arnold, William A. (2020). Increased Use of Quaternary Ammonium Compounds during the SARS-CoV-2 Pandemic and Beyond: Consideration of Environmental Implications, Environmental Science & Technology Letters. 7 (9): 622–631
16. Merianos, JJ (2011) Surface-active agents. In: Disinfection, sterilization, and preservation. Philadelphia, PA: Lippincott Williams & Wilkins
17. Jia, Z.; Shen, D.; Xu, W. (2001). Synthesis and antibacterial activities of quaternary ammonium salt of chitosan. Carbohydrate Research. 333 (1): 1–6
18. Bello, A.; Quinn, M. M.; Perry, M. J.; Milton, D. K. (2009) Characterization of occupational exposures to cleaning products used for common cleaning tasks-a pilot study of hospital cleaners. Environmental Health. 8: 11. doi:10.1186/1476-069X-8-11
19. Jacobs W.A. (1916) The bactericidal properties of the quaternary ammonium salts of hexamethylenetetramine, J. Exp. Med 23: 563–568;
20. McDonnell GE. (2007) Antisepsis, disinfection, and sterilization. ASM Press, Washington, DC.
21. Domagk, G. (1935) A new class of disinfectants. Dtsch. Med. Wochenschr. 61: 829–832
22. Price PB. (1950) Benzalkonium chloride (zephiran chloride) as a skin disinfectant. Arch Surg 61:23–33
23. Rahn, O. and Van Eseltine, W. P. (1947) Quaternary Ammonium Compounds, Annual Review of Microbiology, 1: 173-192
24. U.S. Environmental Protection Agency (EPA). 2006. Reregistration eligibility decision for alkyl dimethyl benzyl ammonium chloride (ADBAC). EPA739-R-06-009 U.S. Environmental Protection Agency, Washington, DC.
25. Nayak, R. and Padhye, R. (2015) Antimicrobial finishes for textiles. In Paul, R. (Ed.) Functional Finishes for Textiles, Elsevier, Cambridge, UK, pp361-385
26. Vijayakumar, R. and Sandle, T. (2019) A review on biocide reduced susceptibility due to plasmid-borne antiseptic-resistant genes—special notes on pharmaceutical environmental isolates, Journal of Applied Microbiology, 126 (4): 1011-1022
27. EMA (2017) Questions and answers on benzalkonium chloride used as an excipient in medicinal products for human use, European Medicines Agency, EMA/CHMP/495737/2013: https://www.ema.europa.eu/en/documents/scientific-guideline/questions-answers-benzalkonium-chloride-used-excipient-medicinal-products-human-use_en.pdf
28. Xiao, H.; Qian, L. (2014) Water-soluble antimicrobial polymers for functional cellulose fibres and hygiene paper products. In Polymeric Materials with Antimicrobial Activity: From Synthesis to Applications, 1st ed. Muñoz-Bonilla, A., Cerrada, M.L., Fernández-García, M. (Eds.); Royal Society of Chemistry: Cambridge, UK, pp. 75–96
29. Zubris DL, Minbiole KP, Wuest WM. Polymeric Quaternary Ammonium Compounds: Versatile Antimicrobial Materials. Curr Top Med Chem. 2017;17(3):305-318

30. Konai MM, Samaddar S, Bocchinfuso G, Santucci V, Stella L, Haldar J, (2018) Selectively targeting bacteria by tuning the molecular design of membrane-active peptidomimetic amphiphiles Chem. Commun 54: 4943–4946

31. Gerba, C.P. (2015) Quaternary ammonium biocides: efficacy in application. Appl Environ Microbiol 81, 464–469.

32. Hsu, LH., Kwaśniewska, D., Wang, SC. et al. (2020) Gemini quaternary ammonium compound PMT12-BF4 inhibits Candida albicans via regulating iron homeostasis. Sci Rep 10, 2911: https://doi.org/10.1038/s41598-020-59750-5

33. Holah JT, Taylor JH, Dawson DJ, Hall KE. (2002) Biocide use in the food industry and the disinfectant resistance of persistent strains of Listeria monocytogenes and Escherichia coli. J Appl Microbiol 92 (Suppl):111S–120S. doi:10.1046/j.1365-2672.92.5s1.18.x

34. Sandle, T. (2021) Disinfectant resistance: The next threat to pharmaceutical contamination control?, European Journal of Parenteral and Pharmaceutical Sciences, 26 (3). DOI: https://www.ejpps.online/post/vol26-3-editorial-disinfectant-resistance-the-next-threat-to-pharmaceutical-contamination-control

35. Mulder, I., Siemens, J., Sentek, V. et al. (2018) Quaternary ammonium compounds in soil: implications for antibiotic resistance development. Rev Environ Sci Biotechnol 17, 159–185

36. Cole EC, Addison RM, Rubino RM, Leese KE, Dulaney PD, Newell MS, Wilkins J, Gaber DJ, Wineinger T, Criger DA. (2003) Investigation of antibiotic and antibacterial agent cross-resistance in target bacteria from homes of antibacterial product users and nonusers. J Appl Microbiol 95:664–676

37. Loveless, SE, Ladies, GS, Gerberick, GF, et al. (1996) Further evaluation of the local lymph node assay in the final phase of an international collaborative trial. Toxicology 108: 141–152

38. Cusano, F, Luciano, S. (1993) Contact allergy to benzalkonium chloride and glutaraldehyde in a dental nurse. Contact Dermatitis 28: 127

39. EPA. Chemicals evaluated for carcinogenic potential annual cancer report. https://apublica.org/wp-content/uploads/2020/05/chemicals-evaluated.pdf

40. Fujitani, T, Ohyama, K-I, Ogata, A. (2011) Effects of quaternary ammonium sanitizer on mice fetus and dam. Ann Rep Tokyo Metr Inst Pub Health 62: 265–268

41. Hostetler, K . (2018) Comments on “ambient and dosed exposure to quaternary ammonium disinfectants causes neural tube defects in rodents”. Birth Defects Res 110: 543–544

42. Zhang C, Cui F, Zeng G et al (2015) Quaternary ammonium compounds (QACs): A review on occurrence, fate and toxicity in the environment. Sci Total Environ 518–519:352–362

43. Tezel U, Pierson JA, Pavlostathis SG (2006) Fate and effect of quaternary ammonium compounds on a mixed methanogenic culture. Water Res 40:3660–3668

Applying for IST Fellowship

Fellowship of the Institute is the most senior grade available and is an indicator of the highest level of achievement within the profession. Individuals may apply, or be nominated, according to the guidance laid down by the Executive and, if suitable, will be elected by the Fellowship Committee. Applicants for Fellowship would be expected to have at least one year’s membership at MIScT level prior to a Fellowship application/nomination, but in exceptional circumstances the Executive may elect Fellows who have not previously been members.

The Fellowship Committee will take into consideration your qualifications, professional work experience, length of service, supervisory ability, and any contribution to the advancement of science, technology, education and training.

Fellows are expected to contribute in some way to the activities and/or development of the IST and/or the UK technical workforce and the nature and extent of that potential contribution will be taken into account when Fellowship applications are assessed and renewals reviewed. Contributions could include the submission of Journal articles, support for professional registration, enhancement of the IST profile in the workplace – to name just a few examples. We will expect Fellows to be able to evidence how and when they contributed in support of the IST and/or the technical community if such activities are not already known to us. We would be happy to discuss options with potential applicants.

Fellows may be nominated (by two or more Executive members) and/or applications made on the designated form, which is available for download. Nominated candidates would be subject to the same review/ assessment channels as per individual personal applications.

Application forms and guidance documents can be downloaded at: *istonline.org.uk/membership/fellow*
E: ***office@istonline.org.uk***

Andragogy in Science and Technology

Kevin Fletcher

Andragogy can be briefly defined as ‘how adults (as distinct from children) learn'. The following provides an overview of the important facets of adult learning, with particular reference to Science and Technology.

The teaching of adults may be fundamentally different to the teaching of children because adults have more life experience and already-formed opinions. Some may have significant subject knowledge (and in some cases, superior knowledge in some areas compared to the teacher) and subject experience (if they have been working in the Science and Technology sector previously).

Figure-1: Adult Learners involved in a practical demonstration.

Adult Learners also often share the qualities listed below:

a) **The need to know.** Adults often need to know why they need to learn something in Science and Technology before starting to learn it. Whereas children will simply follow the lead of the teacher without question on most occasions.

b) **Selfconcept.** The selfconcept moves from teacher dependence to selfdirection in the learning process. Adults have a selfconcept of being responsible for their own lives. Once they have arrived at this selfconcept a need is developed to be seen by others, and treated by others, as being capable of selfdirection. This may be another contrast with children’s maturity and learning.

c) **Experience.** Adults have a reservoir of experience upon which to draw for their learning. Very often children do not have this experience and may be encountering a situation for the first time, which is again in contrast with adults.

d) **Readiness to learn.** Adults are motivated to learn those things they need to know and be able to do, in order to cope effectively with their reallife situations. This is particularly important in work related environments where effectiveness, efficiency or performance may be monitored/ evaluated or pay-related. Again, this is a different to children’s needs or experiences.

e) **Orientation to learning.** Adults are motivated to learn when it will help them to perform Science and Technology tasks or deal with problems that they meet at work or in reallife situations. Adults in employment make this very relevant as compared to children who will not have “employed-status” or as much experience of life.

f) **Motivation.** While adults are responsive to some external motivators (like promotion) the best motivators are internal pressures (like increased job satisfaction and selfesteem). These motivators are very different from those that affect children’s learning.

In short, the teaching of adults is, and has to be, different to
the teaching of children because of the different natures of the learners themselves.

Andragogy, as a professional perspective of adult educators, must be defined as an organised and sustained effort to assist adults to learn in a way that enhances their capability to function as selfdirected learners. We, as teachers of adults, need to help the learning that will continue after our students have left us and have gone into (or returned to) Science and Technology employment.

Some of the aims or intentions of Androgogy might then be summed up as being to:

- Help students use resources in Science and Technology
- Decrease teacher dependency
- Help students define needs
- Help students define objectives
- Foster student decision making
- Distinguish between helping students with range of choices and choosing
- Emphasise experimental methods in Science and Technology
- Facilitate problem posing and solving
- Reinforce student selfconcept
- Foster a reflective approach
- Organise learning in relation to Science and Technology needs
- Encourage self evaluation

As such, it provides the teacher with a set of principles upon which to base lesson planning. For instance, an effective Science and Technology teacher should always tell students the objectives of the session and should negotiate with students about the objectives that they are to achieve and how they, as individuals might achieve them. It is good practice to get them to make their own decisions and encourage their own self-valuation.

An effective Science and Technology teacher should treat students as individuals who will not be dependent upon them as the teacher, but instead help them to be selfdependent.

Summary

In this short article I have sought to define and discuss androgogy and show that the teaching/ learning of adults is different to that of children. As a result our teaching methods must also be different, depending on our learners. In a future article I hope to look at the difference between “surface” and “deep” learning.

Author:

Kevin Fletcher, BA, BSc(Hons), AdvDipEd, MA, MEd, MEd, Cert. IT & Comp, FSET, CBiol, MRSB, MIScT, QTLS, is the retired Head of an East Yorkshire Further Education College. Having spent the first ten years of his career as a Laboratory Technician & Manager in various secondary schools, Kevin’s first degree took him into secondary school teaching for a further ten years, ending up as Head of Science and Deputy Headteacher. Finally, he moved into Further and Adult Education for a further ten years as Head of School in Hull before becoming Head of Goole College. Throughout his career, Kevin maintained a teaching commitment in his areas of interest which are Science, Education/ Psychology and Management. He still keeps abreast of developments in these areas despite having retired.

Acknowledgement

Much of the material for this article was taken from worksheets and hand-outs developed and used by the Teacher Training Team at Hull and Goole Colleges over many years. I freely acknowledge these documents, images and my colleagues as the source material.

IST MEMBER BENEFITS

SPONSORED BY DELL TECHNOLOGIES

EXCLUSIVE DISCOUNTS

Dell UK is proud to partner with the Institute of Science & Technology to provide a range of discounts on selected products.

Benefits for IST members include:

- Up to 20% off Dell Technologies laptops, desktops, and accessories
- Access to additional savings during seasonal Dell promotions
- One-to-one tech advice from Dell advisors

DELL Technologies | IST istonline.org.uk

Offer Benefits

7% off all Vostro and Inspiron

14% off all Latitude, Precision, and Optiplex

10% off all XPS, Alienware, Dell Gaming and monitors

20% off all accessories

Email for exclusive offer codes:
office@istonline.org.uk

Use voucher code at the Dell checkout or contact SBAUK@Dell.com for assistance.

For home shop - *here*
For business shop - *here*

(Subject to availability. Some restrictions may apply. Available to use online or offline)

Empowering Women in Technical Leadership

Michelle Jackson & Lucy Hudson (Case Study)

Did you know that in Higher Education women are underrepresented in technical leadership and management roles 1? This year I was lucky enough to be part of a ground-breaking initiative, 'The Herschel Programme for Women in Technical Leadership' that was specifically designed to address this disparity. Launched in early 2022, I had no idea how successful it would be, and of the impact it would have on the individuals that took part.

A Bespoke Programme

The programme was part of a wider project (MI TALENT) funded through the University of Nottingham and Research England, and aptly named after Caroline Herschel, a pioneer in astronomy and an early 'technician'. I was part of a team that included both technical and organisational development experts, and our aim was to tackle topics specifically relevant to women in technical roles.

The core modules were designed to be interactive, include contributions from women currently in technical leadership positions and cover a range of topics such as 'Confidence and Empowerment' and 'Influencing and Negotiating'. We knew that a key component of the programme was going to be the opportunity for participants to build networks spanning disciplines and levels, and the plan included the creation of Action Learning Sets to allow smaller groups to meet on a regular basis to explore common issues and discuss different approaches.

With our programme schedule finalised, applications were opened in late 2021, we knew we had created some great content, but we had no idea what sort of interest it would generate. Over 180 applications from more than 50 UK HEIs later, we were slightly shellshocked but delighted to begin with our first cohort in January 2022.

A Life Changing Experience

I don't think I really appreciated how successful the programme had been until we had our end of course celebratory event in July. The statistics told one story, over 170 women from 53 HEIs had participated, but it was the feedback from the Action Learning Sets and individuals that was most powerful. The participants told us about newfound confidence, their amazing experiences of networking and even new roles as a consequence of taking part.

"The Herschel Programme has been the best thing that has ever happened to me and has changed my life for the better. It has helped me to find the confidence to recently apply for a secondment within a higher technical role that I got with the help of the course. I used the knowledge that was passed down to me from these inspiring women and will be forever grateful. I am very excited for the future and what's to come."

- Sarah Goodwin University of Salford

"When we launched this brand-new leadership pilot programme we were overwhelmed by the response and number of applications. This shows the value of tailored leadership and management training for the technical community."

- Claire Cawthorne, Herschel Programme Director, University of Nottingham

Going Forward

Building on our experiences, and feedback from our alumni, The Herschel Programme opened for applications again in October 2022. At the time of writing there were more than 200 applications which speaks volumes to the need for a programme such as this. I know that the second cohort will reap the benefits of participating as much as, if not more than, the first.

I would like to finish by thanking our Programme Director, Claire Cawthorne (University of Nottingham), Senior Programme Manager Lucy Williams (MI TALENT), all the module leaders, Emma Colley (Keele University), Jenna Shaw (University of Leicester) Lindsay Davies (MI TALENT), Denise McLean (University of Nottingham), Sandy Sparks (MI TALENT) and Tania Usherwood-Pye (University of Nottingham) and the MI TALENT Lead Kelly Vere for their dedication and hard work which made all of this possible.

Case Study

The Herschel Leadership Programme, from a Participant's Perspective.

By Lucy Hudson (Operations Manager, dept. of Biology, University of York).

Why apply?

I have worked for more than 30 years as a technician, across bioscience research disciplines, from cancer to plants, to immunology. I took a vocational path, completing my HNC, HND and degree part-time whilst working in the biology department at the University of York. My current role is operations manager of the Department of Biology, I manage the technical support, services, and facilities, for more than 1,100 students, 150 researchers, 70 academics and 90 technicians. I hold voluntary positions as an external advisor for the NTDC, I am a Fellow and sit on the executive board for the IST, and I am a trustee of the Royal Society of Biology.

I know what you are thinking, why would I feel the need to apply for the Herschel Leadership programme? Was it my imposter syndrome telling me to apply and gain more skills, yes, a bit, but mostly it was the uniqueness of the Herschel programme that attracted me to apply.

A course designed and facilitated by women, led by Kelly Vere, MBE, who, over the last five years has enriched and professionalised the role of a technician working in HEIs and research institutions. I knew I could trust Kelly and the MITalent team to design and deliver a programme that would hit the spot when it came to what is required for women who are either thinking of leadership or acting in a leadership role.

Figure-1: Herschel Poster Display.

I also knew, especially managing the technical support and facilities of a large research department, that I must constantly learn, to keep up with the evolving research trends, methods of teaching, and managing the technical services which underpin these activities.

Although I have established some external networking previously that has helped me build my confidence, these were not in leadership positions, which I felt is what I lacked for my role at the University of York.

I applied because it appealed to me to learn from other women who had been in a similar position to myself, how did they overcome imposter syndrome, common to all technicians, not only women. And how did they set about deciding on their career routes, what was their plan to achieve their career goals?

The application process gave me the drive to think and plan personal study time, to accompany the programme, something that I think many of us find difficult to commit to.

What did I get out of the programme?

Without sharing too much of the content of the course, as it is far more exciting and engaging to hear for the first time on the programme about the course content; I will say that I came away with at least one or two pointers, thoughts, or behaviours to explore after every session.

I especially enjoyed and valued the Action Learning Set, in my 30 years as a technician I have never had such a unique opportunity to meet a group of like-minded colleagues in a safe environment. Our group was a mixture of roles, science, arts, and stages of career, it was fantastic to be able to speak entirely without boundaries. We spoke about the themes, and this invariably led to one of us talking in depth about a positive experience or an issue related to a theme, and everyone was able to contribute to the discussion. We still meet online and we have looked out for each other at conferences too.

What was different about the Herschel programme was the relevant content for women; the friendliness and relaxed atmosphere that created a safe environment for everyone to participate and not just attend and observe.

It reminds me of a similar situation where I took part in the Moon Walk for breast cancer research. My friend and I stood near the back of 10,000 women, ready to start the twenty-six mile walk around Edinburgh, through the night. The atmosphere made us all feel comfortable, being ourselves in our bras, in the street. When the whistle blew, we could see from the steady incline of the street 10,000 women walking, not running or competing and, most of all, have you ever heard 10,000 women chatting at once?!

We were asked at the celebratory event for three words to reflect our personal journey, I cannot remember my words at the time but today they are: Unique, protected, and worthwhile.

References

Find out more about the Herschel Programme - *click here*.

Find out more about MI TALENT - *click here*.

https://www.stemm-change.co.uk/wp-content/uploads/2020/01/Equality-Diversity-Inclusion-A-Technician-Lens-Web.pdf

Authors:

Michelle Jackson, FIScT

Michelle is the MI TALENT Technical Careers Manager and IST Registrar. Michelle has worked in a number of universities across the UK, in post-doctoral, technical, technical management and operational roles. She held the position of HEaTED Development Manager for a number of years before becoming a consultant working on several challenging projects for the Institute of Science and Technology, the S-Lab project and HEIs.

Lucy Hudson, BSc, FIScT

Lucy is an Operations Manager (Biology) at the University of York. Lucy actively supports technical staff in their technical careers. Lucy is a member of the IST and has also been appointed as a Specialist Advisor for the National Technician Development Centre. Lucy has been instrumental in aiding the IST in planning the IST Technical Conference and contributing to articles.

Communications and the IST

We are working hard to ensure that we provide our members with the best service that we can, and one of the areas that we have updated is our communications. There are now a number of ways in which we can stay in contact and provide information for our members.

Email – This continues to be our preferred method for direct contact with our members, particularly as we have a significant number of overseas colleagues for whom hardcopy mailings can be problematic (and costly).

Our main email addresses are:
office@istonline.org.uk – general enquiries
memberships@istonline.org.uk – enquiries regarding new memberships and
renewalsregistrations@istonline.org.uk – enquiries regarding CSci/RSci/RSciTech registrations and renewals.

It is important that we have everyone's up-to-date email address so if yours changes please let us know.

Website (istonline.org.uk) – We post both important announcements and general information that we think will be useful for our members on our website, so visit us there on a regular basis to see updates.

Social Media – We use social media routes for quick communications, networking and hope to encourage both members and non-members alike to engage in online discussions and provide ideas and feedback. The platforms that we use are:
Twitter (@istonline) – we encourage ideas, feedback, and discussions using #istforum
Facebook (@istonline.org.uk) – feedback, ideas and comments welcome
LinkedIn and Google+ – join in group discussions, links through to these groups (and our Twitter account and Facebook page) are available on our **website**.

The parable of the technician, the manager and the visionary

John-Paul Ashton

Throughout your career, you will come across various individuals, variable styles of working, and varying attitudes to how you should act and how you will be treated. In most cases, you will venture into your career and come across the most interesting and supportive individuals you could ever imagine. However, there will be a minority of characters who will not be as supportive of your position or to your career. As a technician, this can put you off your chosen path. This leads to industries losing their best asset, you!

Figure-1: An illustration of moving step-by-step up the career ladder.

Moving along the career ladder can be incredibly rewarding but can also throw in many obstacles that we should all strive to overcome. Having a better perspective of how individuals work together, can help individuals understand, why certain people, in certain roles, carry out their work the way they do.

If you work in Schools, Higher Education or in an Institute then you, the technician, will most likely have a supervisor that 'manages' you and you, as well as your supervisor, will be accountable to the head of department or head of a facility. If you work in industry, business or as a consultant, you may be a technician who is looked after by your line manager and accountable to your boss/director 'the entrepreneur' or 'the visionary'.

Some technicians will assume that **they** should be the manager or the head of department and can at times wonder "who are they to 'micro-manage' me".

Because the technician is indeed an individual with specialist skills, carrying out the technical work of a business or a department, the technician believes that they understand the business or department that **does** that technical work. This assumption can be fatal and prevent you from progressing unless you understand the differences.

The technical work of a department/business, and a department/business that does technical work, are two totally different things. The single greatest asset for a technician is their practical skills/expertise. If the technician was to be put in charge of that very same department, that can then become the technician's greatest liability. This means simply, that the technician can carry out the practical work to a very high level, but then has many other priorities on top of this to do which they do not yet possess the experience or skills to do so.

For a department or a business to do well and promote growth and future direction, the three roles are vital to making that happen.

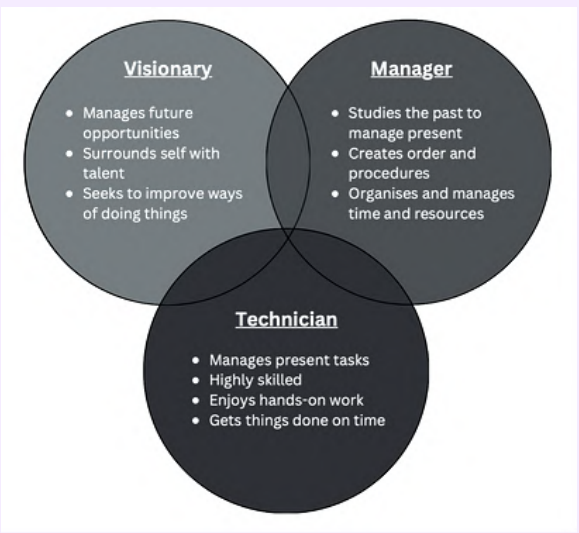


Figure-2: The Venn diagram shows the logical relationships between each of the three key roles.

The visionary is the entrepreneur, the dreamer, the energy and drive behind the activity. The creator of new methods. The visionary needs to be in control of people and events in the present time, so that they can concentrate on the future goals. This can cause the visionary to become distanced from others. The further forward they go, the greater the effort required to ensure everyone is on the same page. The visionary then has a problem trying to get everyone to the same page as them, whilst not hindering their creativity, which most likely will be unpredictable in nature.

The manager is responsible for the planning, order and predictability. If the visionary works at taking steps into the future, then the manager works based on the foundations of their past (studies the past to manage the present). Where the visionary needs control, the manager needs order. Where the visionary sees opportunities, the manager sees the problems, and works to solve those problems.

The technician is 'the doer'. If you want a job doing right, the technician goes in and does the job themself! If the visionary works in the future, and the manager works in the past, the technician works in the present. The technician knows how to manage the tasks required in a logical order and can be satisfied when they are in control of their workflow. The technician is the backbone of the department or business; If the technician didn't do it, it wouldn't get done.

Now, because the visionary wants more and more work done than is practically possible, the technician can mistrust the visionary and can misunderstand this pressure to do more. The visionary creates work for the technician but can also throw in problems or ideas that require the technician to come up with solutions. This can harness a symbiotic relationship between both, but does not always play out this way, because most ideas don't go to plan. This can make the technician frustrated with the visionary and build up a slight resentment.

The manager can also be a problem to the technician because the manager imposes a systematic order to the technician's work. This goes against the individual nature of the technician. This 'system' goes against a technician's individuality. To the manager however, the system of results they achieve is down to the work of the technician. The manager needs to manage the technician, but the technician sometimes doesn't like the idea of being managed.

In some ways, you could describe each of the three roles as different personalities. If all three of these personalities were equally balanced, they would create an incredibly competent individual. In the real world, however, the perfect balance does not generally happen the way we believe it will.

Instead, as a technician, you will most likely be 10% visionary, 20% manager and 70% technician.

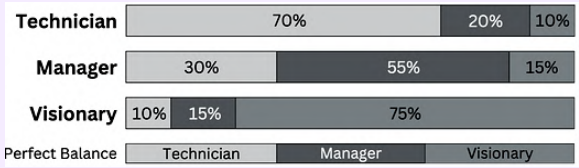


Figure-3: The figure shows the balance of each role compared to each other (technician, manager and visionary) and what ratios each of the individuals may present with.

This is good news. The message to take home here is, that every individual has the capability of stepping up the career ladder and taking on manager responsibilities, and everyone also has the capability of creating and leading on visions as a head of facility, department or an entrepreneur. Understanding each of these roles and how they fit with each other will allow you, the technician, to focus on what skills and experience you need to move into a managerial role.

This message can also be related to small-to-medium enterprises (SMEs). Not understanding this difference and not appreciating their relationship with each other, can show us the number one reason why SMEs fail. In the UK, 20% of companies are dissolved within the first year of opening. If they do happen to survive, 30 – 40% of companies are dissolved within 36 months and over 50% close within 5 years (data from the Office for National Statistics). **Only 25% of new businesses make it to 15 years or more.**

As of 2022, in the UK, there is an estimated 5.5 million SMEs, which means that 4.125 million companies will fail by 2037. This is a frighteningly large number of companies. Many of them closing due to not understanding the relationship between the visionary, the manager and the technician.

The success of our future industry, department or facility is down to everyone to play their part, not forgetting the valuable work the technician carries out at the coal face. Your success climbing those ladders, relies on your ability to understand each of those roles.

Good luck!

Author:

John-Paul Ashton, MIScT RSci

John-Paul currently runs a number of businesses in different sectors; medical events, property and marketing/training. JP worked as a technician in Industry and in HE and provided support in advisory capacities to the IST, NTDC and HEaTED.

Improving training consistency with Training Master Kits

Dr. Tim Sandle PhD FIScT CBiol

Effective training is an essential part of what it takes to be a good technician. One area of the training process that contributes to the training process is documentation and here having a standardised approach is useful for driving consistent practices, as well as helping those undertaking training in terms of familiarity. This article presents some thoughts in technical training, it is not intended to replace or counter advice from IST.

What should training documentation look like? While there is no 'one size fits all' approach, there are certain elements that make some training master kits better than others. The training master kits can include the training folder and training materials, with materials best organised around a set of competencies for specific tasks or processes. The materials can be hard copy or digital.

By way of example, this article discusses some approaches that training can take and the types of supporting documentation that can prove useful. Starting with the technician's training record, this could include:

- Attendance at an initial theoretical training course. Here the trainee should describe the science behind the activity and provide trainees with the appropriate laboratory SOPs, and safety system manuals. This should include explaining to the trainee why the test is important and how much their contribution matters.
- Visit to the area where the activity is taking place (if the workspace is unfamiliar to the trainee).
- Evidence of completion of an interim assessment. Interim assessments are not always required, this will depend on the complexity of the task and the number of stages. The trainee could ask specific questions relating to the activity and record these together with the trainee responses.
- Evidence of effective execution of the task (such as observed, supervised and unsupervised).
- Results of the practical activities.
- Results review.
- Final evaluation and assessment.

In terms of evidence, the following can be used:

- A copy of the learning plan.
- Records of any professional discussions (a specific learning activity and it is typical to document the questions asked and trainee responses).
- A performance evidence record.
- Records of reflective learning. This is a record of any learning activity observed, witnessed or for which a reflective or self-account has been produced.
- A record of update training.

In devising a training programme it is important to engage the trainee. Even the most comprehensive training programme will not be retained by a disinterested audience. The continual challenge for trainers is how to capture and maintain the interest of the audience throughout the training process.

Training should ideally begin with a learning plan. This is a document put together by the training provider, and it may involve consultation with the trainee and the trainee's mentor or line manager. It is important that the trainee and the trainer agree a learning plan at the outset of training and document what learning activity needs to take place to support individuals through their full training programme.

The learning plan should be a prospectively outline the planned learning activity including assessment, review and feedback (including action plans and follow up). For quality auditing purposes, dates must be recorded and signed for as they form part of the audit trail. At the end of the process, the learning activity should fulfil or consolidate all training requirements.

To reiterate, there is no universal approach for technical training. This article presents some thoughts which can be considered when developing a training plan, with the aim of driving consistency within an organisation and to help to ensure that each person going through a given training process is subject to the same rigorous process.

T-levels and our future technicians!

Jan Brett

A "T-level" is a two-year technical qualification designed by businesses and employers to give students the skills that UK industry needs. The qualification was developed as part of a national response to increase the number of skilled UK technicians across all sectors.
https://www.tlevels.gov.uk/

T-levels are now one of the three major options for 16 to 19-year-old students to study at level 3; alongside apprenticeships and A' levels.

Each T-level is split into 3 sections:

1. A Technical Qualification (TQ) – where students will learn about their chosen sectors through a curriculum designed by employers. This will be 1800 hours of learning over the 2-year course.

2. Industry placement – for a minimum of 45 days - that will give students practical insights into their sector and an opportunity to embed knowledge and skills learned in the classroom. Students will be treated like an employee in the workplace.

3. English, maths and digital skills.

T-levels are now starting to be taught at some schools and further education colleges and a list of providers can be found here;
https://www.gov.uk/government/publications/providers-selected-to-deliver-t-levels

Numbers of T-level students will grow over the coming years as more T-levels are rolled out and more providers come on board. This means the numbers of students needing a placement is going to increase and it is vital therefore that we, as local employers, engage with our near providers to facilitate students in gaining these technical qualifications.

One of our local colleges is Birkenhead 6th form college and they started, in September 2022, to run a T-level in Science with an occupational specialism in Laboratory Sciences. *https://www.bsfc.ac.uk/tlevels*.

The college has a designated T-level coordinator (Jacqui Hammond, now Sarah Callicott) and a T-level lead (Jo Hartley – Metcalf) who reached out to all local employers in the region about offering placements. Fortunately, this included us at Liverpool University and luckily for me; the email was forwarded to me as the Technical Development and Planning Officer in the Faculty of Health and Life Sciences.

I first had a conversation with Jo and Jacqui in January 2022 and we were all really excited about the potential to work together and create something really special for our local children. For us at the University it is about training future technicians to be exactly what we need, in order to get really skilled applicants coming to work with us in the future. It's a chance to give back to the local community and inspire these young scientists. It will help us create a really creative and diverse workforce while at the same time upskilling our own technicians in supervisory and leadership skills. It's a win-win all round!

I pitched the proposal to offer placements during the regular meetings I hold with our faculty technical managers and then arranged for Jo and Jacqui to speak to those that were both interested and had capacity to take a student on. As I also sit on our university technician commitment steering group, I took the proposal there and gained more interest from colleagues in the Faculty of Science and engineering as well. Outreach to schools and engaging with T-levels is one of our actions for Sustainability of our technical workforce in our 36-month action plan submitted as our Technician Commitment.
https://www.liverpool.ac.uk/researcher/technicians-hub/commitment/

We are hoping to offer five placements initially and Jo and Jacqui came into the University to visit technical leads and look at our facilities in each area we are offering one. We then wrote job descriptions for the students explaining what they would be working on in in their placement.

Photo left to right: Sarah Callicott (T level placement coordinator), Jan Brett (Technical development and planning officer) Jo Hartley Metcalf (T level lead).

This September the T-level course began at the college and seven students have enrolled. I was invited in to meet the students and give an overview of the placements at Liverpool University. The students are really engaged and positive, so we then arranged visits for the group to come on site and look at the facilities themselves. We are now waiting to hear if the students want to apply for our placements and the college have said we can be involved in the "recruitment" phase as much as we like - even getting involved in any "interviews" if we want.

If the students do come to us, the college will arrange all DBS checks needed for the placement supervisors and we would expect the students to begin working with us from January 2023.

We will also be following our University Policy on the Safeguarding of Children. The college will support us as providers throughout the placements, I will help liaise and will also take on a pastoral role looking after our T-level students.

It is a really exciting time for the T-level students, for us at Liverpool University and for the whole UK as these new qualifications are rolled out. So, join up with your local community and get involved!

Author:
Jan Brett, FIScT
Jan is the Technical development and planning officer at the University of Liverpool.

Leading Your Technical Team (LYTT)

istonline.org.uk/training

The **Leading Your Technical Team Programme (LYTT)** consisting of the **Leading Your Technical Team and Building on Your Leadership Skills** courses is now offered through the IST.

The **Leading Your Technical Team** programme has a long and highly respected history. It has been running for well over 30 years. The programme content has continued to adapt and develop in line with changes in HE and it continues to be held in very high regard by HE senior managers and staff developers. It's high reputation is maintained through delivering a very high standard of technical management training via experienced HE managers, in a practical context with the reality of managing in a university technical environment.

The courses are geared toward delivering the fundamental and key skill elements for leading and managing people, particularly in a technical team. Both programmes follow a similar format, in that the learning is enhanced through informal and highly participative sessions that include active discussion, exchange of ideas and delegate group work.

Each programme is delivered in the context of a higher education environment but is not aimed at any specific job role or discipline. Participants are from a very broad range of higher education institutions, and from a very diverse range of academic disciplines and departments or service sections.

Leading Your Technical Team is intended for anyone, who might now or in the future, have technical management or supervisory responsibilities and is interested in developing their fundamental management/ leadership skills. It is a two-day programme that introduces the fundamental building blocks of management and leadership specifically in the context of technical support in universities and higher education colleges. The programme links practical leadership theories to dynamic team leading in context with the reality of managing in a technical university environment.

Deligate feedback:

"I have learned more about the supervisory skills that I require in my job, how to develop these skills and especially in the way I communicate to other members of staff. I really enjoyed sharing views and experiences with fellow participants from other universities."

"I was able to learn the skills to solve some of the problems which I am facing in my leadership role."

Building on Your Leadership Skills is particularly suited to people who have completed Leading Your Technical Team or those who have previously attended similar programmes and have a few years experience in a technical managerial or supervisory role and want to further develop their management/ leadership skills. The programme is applicable to support staff from academic and service areas. The programme builds on the fundamentals learned in Leading Your Technical Team and provides a further opportunity to look at the practical challenges of managing or supervising technical staff. The programme again puts practical leadership theories into context with the reality of managing and leading a technical team in a university environment.

Deligate feedback:

"A different way of looking at the way I respond to my team to improve all our performances. A way of understanding the individual members of my team. A chance to discuss with people from different institutions and areas of work how they deal with difficult members of their teams."

"Felt I came away from the course feeling better about being a team leader; focusing on management issues."

Following a period when the course has been unavailable because of COVID restrictions we are now taking expressions of interest for 2022. Courses will be 'live' and locations for 2022 are now being explored. For full course details and availability please contact:
office@istonline.org.uk

iST®

SUPPORTING THE
TECHNICAL COMMUNITY FOR

1948 - 2023

75 YEARS

DIGITAL ENGINEERING SCIENCE CREATIVE

BREAKING NEWS

New Professional Register for the Creative Industries

IST In collaboration with Creative UK

A joint statement from IST and Creative UK

Creative UK and the IST (Institute of Science & Technology) are excited to announce that agreement has been reached to introduce a new Professional Registration Framework for the technical workforce within the creative industries. Endorsed by Creative UK, the Creative Registration Framework (CRF) will aim to provide parity of professional accreditation with existing schemes currently available to the science and engineering sector workforces (e.g., professional registers offered by the Science Council and the Engineering Council).

Terry Croft MBE, Chair of the IST said "We have been working with Creative UK and other arts organisations for some time now and although delayed by the pandemic for more than a year, all parties were determined to get over the line and deliver a professional register for the Creative Industries. We have listened to the technical communities across the sectors, and their demand for a specific creative industries register, and now this has come to fruition. I look forward to the roll out in 2023 and the award of the first certificates".

Lee Hornsby, Lead Development & Partnerships Manager, Creative UK said "The UK's Creative Industries are driven by our exceptionally talented, innovative, and entrepreneurial workforce; experts in their creative disciplines and learning all the time. It makes complete sense that those creatives have additional opportunities to receive further accreditation as their careers and skills develop, and I'm delighted to be working with the IST on delivering this in line with those working in our crucial STEM fields. I'm particularly excited to develop this first and foremost with colleagues working in creative higher and further education.'

Both parties have agreed that the next stage in development of the Register is to commence immediately, managed by the IST, in close collaboration with Creative UK and supported by a Steering Group comprising representatives from key stakeholders, providing guidance and direction, and related committees overseeing competencies and regulations.

It is envisaged that registrations awarded under the new CRF will become available from early in 2023, with the initial rollout focussing on the creative industries educational sector.

Creative UK

Creative UK is the national network for the Creative Industries. We are an independent membership organisation that champions the value of the Creative Industries. We know that talent is everywhere, but opportunity is not. Creative UK connects talent, business and organisations across the Creative Industries; from arts and culture, film and TV and video games to design, publishing and architecture and everything in between. At Creative UK, we support companies and people working in the creative sector by offering development opportunities at a local and national level, through our network of partners across the UK. We invest by identifying untapped potential to accelerate growth, providing tailor made resources and financial expertise. We do all of this because we believe in the power of creativity to change lives. wearecreative.uk

For further information contact: lee@wearecreative.uk

Institute of Science & Technology (IST)

The IST is the professional body for specialist, technical and managerial staff. Whilst we have been serving our members for over 70 years, our aim is to continually move forward and expand our horizons so that we can best position ourselves to support our members, and the wider technical community, in respect of their needs within the ever-changing and challenging 21st century.

We reach out to provide focused support for technical practitioners, specialists and managers in the creative, digital, engineering and science technologies, working across a broad range of sectors including industry, local authorities, schools, FE, HE, research/analytical/health facilities, government departments and organisations in the UK and overseas.

We are licenced by the Science Council to award to their science/technical registers at Chartered Scientist (CSci), Registered Scientist (RSci) and Registered Science Technician (RSciTech) levels. istonline.org.uk
For further information contact:
office@istonline.org.uk

IST Technical Conference 2022

14th September 2022 - Spring Lane Building, University of York

MANY THANKS TO OUR KEY SPONSORS

UniGreenScheme
The Asset Resale Service For Universities
https://unigreenscheme.co.uk

CRYO STORAGE SOLUTIONS
Safe & Secure
https://cryostoragesolutions.com

Key Theme: Teams behind the Scenes

On 14th September 2022, delegates arrived from across the country to attend the IST Annual Technical Conference at the fantastic facilities provided by in the University of York's Teaching Building on Spring Lane. We were especially delighted to be able to meet with our delegates in our first face-2-face Conference since the pandemic, and it proved to be as enjoyable and inspiring as we had hoped.

The facilities at the venue were excellent and the staff and volunteer support were extremely helpful in directingattendees around the venue and out to visits to nearly University of York facilities. We were joined on the day by arrange of sponsors and exhibitors who all played a key role at the event, and who our delegates enjoyed interacting with.

After everyone had arrived, **IST Chair, Terry Croft MBE** made a prompt start and welcomed everyone to the Conference and after holding a one-minute's silence in memory of Queen Elizabeth II, introduced our Chair for the day, our **President, Dr Helen Sharman, CMG OB**E. Helen then formally opened the Conference andintroduced Professor Charlie Jeffery, Vice Chancellor of the University of York, who welcomed delegates to York, voiced his appreciation of the contribution of technical community and hoped everyone enjoyed their visit to York. Helen then introduced the first **Keynote Speaker, Dr Hannah Roberts.** Her fascinating talk **"The Psychology of Selves: Beyond Imposter Syndrome"** received consistently positive feedback following the Conference:

"Very interesting and insightful. I will be applying knowledge from this in my daily life, both in and out of work."

"One of the best talks I've attended, very useful self help tips to take home."

Following Hannah's keynote talk, there was a short break and then delegates split up for the first session of workshops. The themes for the day, were:

- **Career development**
- **Arts & media technologies**
- **Health and safety**
- **Digital skills & AI**
- **Environment & sustainability**

The workshops and demonstrations available in the first session were:

Workshops:

1. Science Museum: The Technicians Gallery - Kara McLoughlin and the Science Museum Team
2. Digital skills - Introducing Python for non-specialists - Richard Saldanha, Kanupriya Bhargava & Andrew Blance (IST AI Group)
3. Enhancing Student Employability Using Live Briefs - Evan Wilson and Sam Heitzman (MMU)
4. Enhancing H&S Management using Technology - Rachael Peters (MMU)
5. Cryogenic storage and the safe use of cryogenic fluids - Bob Wiltshire (Cryo Storage Solutions)

Demos:

1. Film: Easy when you know how - Erik Olafsen, (University of York)
2. Mechanical Research Workshop – Mark Bentley (University of York)

A few of the comments made about the above sessions are below:

"Really interesting to hear about the Technicians Gallery at the Science Museum- seems really well thought out."

"Really interesting and forward thinking, a new chapter for the role of technicians in enhancing student employability and independence."

"Interesting, its not just knowing which button to press its the knowledge and creativity that technicians have - this applies across the range of types of technician, arts, science etc. :-)"

"This was a fantastic session, great to see the technician presenting what they work with."

The workshops and demonstrations available in the 2nd session were:

Workshops:

1. Becoming a STEM Ambassador and how it could help your career - Chris Snowden-Smith (STEM Ambassador Hub Manager)
2. Supporting sustainability and the key role of technical staff - Racheal Peters, Robert Crapnell, and Clare Dean, (MMU)
3. Women in Tech Network Group Update - Marie Oldfield, Margaret Ross and Joan Ward, (IST Women in Tech Group)
4. The OpenSTEM Labs: An internet of laboratory things – James Smith (open University)
5. The asset resale service for universities. Case studies of laboratory equipment resale from University of York and other universities. - Michael McLeod (UniGreenScheme)

Demos:

1. Measure the speed of light - Andy Firth (University of York)
2. Deliver Clearer Results Through Accessibility - Richard Hagan (University of York)
3. Green Impact and the Sustainable Laboratory - Rebecca Sutton & Dave Hay (University of York)

A few of the comments made about the above sessions are below:

"The speaker was extremely engaging and gave a lot of great information during the session. It made the topic approachable and was very inspiring."

"Good to listen to three different technicians from three different STEM background and their contribution towards supporting sustainability."

"I hadn't heard of the openSTEM labs prior to the talk. The talk itself was very interesting and the interactive elements were enjoyable. I could see how 'digital experiments' could be utilized more in our own labs and STEM engagement activities."

"Interesting to hear about how easy it is to have old equipment sold on, given the volume of redundant and no longer used equipment lying around universities."

Following the morning sessions, the break for lunch provided everyone with a chance to catch a breath and do some networking, meet the exhibitors and prepare for a busy afternoon.

After lunch some delegated chose to take tours of the various facilities around the University of York Campus:

Music Facility - Ben Eyes (University of York)

Engineering Manufacturing Facility - Andy White (University of York)

Horticulture Research Facility – Jason Daff (University of York)

Institute for Safe Autonomy - James Hilder (University of York)

A couple of the comments made about the above tours are below:

"The technician leading this was very knowledgeable and engaging."

"Despite not being fully open and set up yet, the facility was extremely interesting and the tour guide was very approachable."

Those delegates who were not attending the facilities tours gathered in the theatre for the **2nd Keynote** of the day and Helen welcomed everyone back from lunch and **Michele Fisher** for her talk **"From Lab to Leadership"**. Michelle's career journey was very well received, as reflected in the comments below:

"Was a very interesting talk, she was a very engaging speaker."

"As an earlier career technician, this talk resonated with me due to similarities in beginning of their journey. It highlighted potential routes that I could take. As well as putting me at ease that not having a idea, plan or path already in mind is ok."

Following Michelle's excellent talk, Terry and Helen were delighted in being able to announce some awards, including **5 new IST Fellows**, and these included **Julia Barkans** (Open University), **Jan Brett** (University of Liverpool), **Melissa Sterry** (Bioratorium Limited), **Gillian Riddell** (Queens University Belfast) and **Simon Breeden** (University of York). We were very pleased that both Gillian and Simon were able to attend the Conference to receive their Fellowships.

In addition to the Fellowships Terry announced the winner and commendations from our **Image Competition** for which the theme was "Teams behind the Scenes". The winner of the image competition was **Morgan Shaw**, a Research Technician at Newcastle University, and her photo depicted her colleague Nicola Dyson, a Research Technician in the Newcastle University's Transplant Regenerative Labs.

Other images commended were from **Joanna Scamp**, a Facilities and Operations Technician came second place with the pencil drawing, Unsung Heroes, which depicted Antonio Mendoza, an Electronics Technician at the University of University of Kent. Also, **Paula Boeira,** a Research Technician at the Hepatology Research Group, University of Plymouth, for her photo submission of technician Helge Mruck collecting liver cells from liquid nitrogen.

Once all the awards had been dealt with Terry and Helen thanked the delegates for joining us for the day and wished everyone a safe journey home when the final sessions had finished.

It was time again to have a short break prior to splitting up into the workshop groups for the final session. Delegates having attended the external tours rejoined the delegates and enjoyed a little more networking and visits to our sponsors and exhibitors stands before dropping into the final workshops of the day.

The workshops and demonstrations available in the 3rd session were:

Workshops:

1. Unlock the Technician survey data and discover Educational Development for Technical Staff at HEaTED - Sarah Baggely & Jared Carnie (NTDC)
2. Professional Registration - whats in it for me? – Michelle Jackson and Laurence Dawkins-Hall (IST)
3. Introducing the IST's Artificial Intelligence Special Interest Group - Alicia Colson, Murray McMonies, Marie Oldfield, Murray Webster, Andrew Blance & Richard Saldanha (IST's AI Group)
4. Laboratory Plastic & Sharp Bin Recycling Schemes – James Fox (University of York)
5. Lab planning & design: putting safety first? - Catherine Davidge (University of Manchester)
6. How To Be Transferable – John-Paul Ashton-Kinlin (Pro Vital Medical Services Ltd)

Demo:

1. Spinner construction lab – Andy White (University of York)

A few of the comments made about the above sessions are below:

"I am now going to look into professional registration"

"It is great to see techs being recognised and the growing number of courses we can attend"
"Very informative, inspired me to see what recycling options could be implemented in my work"

"We are always told that technicians have transferable skills, but this talk opened my eyes as to using those skills to look into furthering my career"

The final workshop/demo session completed, the bulk of our delegates headed for home, tired, but hopefully inspired by the day's activities. At this point the IST was proud to be able to host an extra event in collaboration with **UKRI-Research England and MI TALENT** as they joined us in York to launch their report **"Research Culture: A Technician Lens"**. The project and report aimed to provide greater understanding of research culture from the perspective of technicians as key research enablers and teachers. We were joined by representatives from key stakeholder organisations.

The IST Executive certainly enjoyed the day and took away lots of ideas for 2023! We would like to say a sincere thanks to all the delegates that joined us for the day, the Conference planning team who developed the day's programme, Keynote speakers, workshop/demo presenters and the University of York. We would also like to say a special thank you to our **Key Sponsors, UnigreenScheme** and **CryoStorage Solutions** and our exhibitors and career zone supporters. The Conference would not happen without every single person who supported this year's event, and we hope to see you all in 2023.

Key Sponsors

UniGreenScheme – The Asset Resale Service For Universities

CRYO STORAGE SOLUTIONS – Safe & Secure

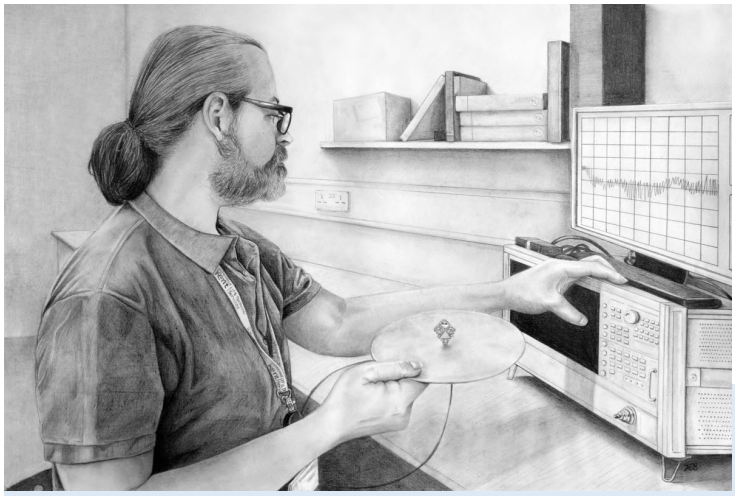
Exhibitors

Astell, CEM, ELKay – A CALIBRE SCIENTIFIC COMPANY, eppendorf, OHAUS, KNF, LSG – LIFE SCIENCE GROUP, medline scientific – A CALIBRE SCIENTIFIC COMPANY, SISO, SCIENTIFIC LABORATORY SUPPLIES

Career Zone Supporters

WOMEN IN TECH Group, AiSG, HEaTED, National Technician Development Centre – Providing a sustainable future for technical staff and services, The Open University, SCIENCE MUSEUM, Royal Society of Biology, ROYAL SOCIETY OF CHEMISTRY, Science Council

Image Competition Commendations



By Joanna Scamp

By Paula Boeira

Image Competition Winner

Morgan Shaw, a Research Technician at Newcastle University, and her photo depicted her colleague Nicola Dyson, a Research Technician in the Newcastle University's Transplant Regenerative Labs.

IST Technical Conference 2023

Wednesday 13th September

London South Bank University

Theme: Coming Soon...

Keynotes | Networking | Workshops | Sponsors/Exhibitors | Poster Display | Awards

IST Conference 2022 Photos

Photography - engaging speakers and networking with exhibitors

Photography - engaging speakers and networking with exhibitors

Credit: Alex Holland, University of York

The Technician Gallery

Science Museum Announces – Technicians: The David Sainsbury Gallery

Visitors are greeted as they enter the Technician Gallery by a large sculpture: a beautifully crafted kit of parts showcasing the critical tools and equipment technicians need to do their work.

The Science Museum has recently announced Technicians: The David Sainsbury Gallery, a first-of-its-kind interactive gallery aimed at 11 to 16-year-olds which celebrates the vital but often hidden role technicians play in all our lives.

Young people can learn about technicians working in four different areas; advanced manufacturing, creative industries, health science and renewable energy to explore where they work, and what they love most about being a technician.

Visitors can actively use equipment that technicians use every day and try the interactive exhibits first hand which replicate the important tasks technicians perform.

Thanks to close collaboration with Marvel Studios, the NHS, National Grid, the University of Sheffield Advanced Manufacturing Research Centre (AMRC) and many other organisations, including the Institute of Science and Technology (IST) the gallery has one of a kind exhibits.

As visitors move around the five areas of the gallery, the world of technicians is brought to life through large-scale illustrations featuring technicians in a wide range of workplaces.

Funded by Lord Sainsbury's Gatsby Charitable Foundation, Technicians: The David Sainsbury Gallery aims to start conversations and change perceptions around technicians while inspiring future generations to consider technical careers. Although career guidance has improved in recent years, young people's understanding of the role of technicians remains worryingly low with just over a quarter of 13-16 year-olds believing that technician roles are good jobs according to an April 2021 survey by Gatsby's Technicians Make it Happen campaign.

The gallery will address this urgent need by offering a unique career-focused space for young people, where they can imagine themselves as technicians, engage with people whose technical jobs are keeping industries moving and discover the difference technicians make in many walks of life.

Although an estimated 1.5 million technicians currently work in the UK – from archaeological and civil engineering technicians to veterinary nurses and welding technicians – too few young people aspire to be technicians or know about these roles and the pathways to them. Demand for these highly skilled roles is increasing, with 800,000 technicians and apprentices desperately needed across the STEM sector.

Inspiring more young people to become technicians is crucial to UK innovation, future economic success, and our net zero ambitions.

IST Networks

Networks are at the heart of how we as a professional body functions. Professional networks are vital in ensuring the growth of any organisation and such networks bind together people to help us achieve our goals. Networks can help individuals and their organisations realise new opportunities with an existing part of a network, or forge new relationships through recommendations and professional references. This year we established 2 new network groups, each with specific goals in terms of providing support and routes via which members can get involved.

Women in Tech

The Women in Tech Group will aim to advance the knowledge and interests of Women in Tech, support and empower females and help to overcome barriers to, or within, technical careers.

We will do this through events, both professional and related, informative events. We will look to create sub committees to advance the Women in Tech impact and vision. We would like to put an emphasis on young women in tech and working on getting more women interested in STEAM.

We have exciting events planned for the year and we have plan to develop a supportive community. Some of the benefits you can expect are:

- Talk on subjects such as Overcoming barriers to analytical careers, Impostor Syndrome, Consultancy, Leadership and Negotiation
- A supportive community
- Women in STEAM profiles showcase
- Young Professionals in STEAM Showcase
- Career Talks
- Workplace Support
- Networking
- CPD Benefits

If you are interested in joining the Women in Tech network group please let us know via **office@istonline.org.uk**

Artificial Intelligence (AI) Group

The IST's AI Special Interest Group chaired by IST Fellow, Dr Marie Oldfield, is now just over 18 months old. The AI SIG seeks to engage and promote healthy and informed debate among the widest possible range of people from diverse industries on AI development, everything from algorithms and ethics to societal concerns and AI explainability.

The Group was delighted to present some of its work at the IST's Annual Conference in York in 2022. This included a Python technical workshop in the morning followed by a more general discussion about what AI actually is, its use and misuse in the afternoon. The AI SIG's Online Seminar Series is now well established, boasts a strong pipeline of superb speakers and is open to all via Eventbrite. Recordings have begun to be posted on the IST's YouTube channel and are well worth a look.

You are likely to see an increase in articles from the Group in IST publications as well as responses to public calls for evidence on AI, machine learning and data science matters in the coming months.

The Group is looking forward to being in action again at the IST's Annual Conference taking place in London in September 2023 People interested in becoming members of the AI SIG should email **aigroup@istonline.org.uk** but the Group is equally happy with interest from IST Members from afar. For more information about the Group please visit our web page - *https://istonline.org.uk/networks/ist-ai-group/*

Member news

Science Council CPD Awards 2022

Rae Freestone – RSci CPD Awards Winner

We are proud to share that one of our members, Rae Freestone, has been recognised in the Science Council's CPD Awards, they won the award in the RSci category. Many congratulations Rae.

The Science Council's CPD Awards celebrate outstanding professional development in science. The awards showcase the achievements of registrants across the four Science Council registers; Registered Science Technician (RSciTech), Registered Scientist (RSci), Chartered Scientist (CSci) and Chartered Science Teacher (CSciTeach).

"Early this summer I prepared my nomination for the Science Council's CPD awards. I went through all my CPD between 2020 and 2021, added my reflections on how CPD has helped my professionalism and being part of the scientific community. I have found that keeping a diary of all my professional development a useful tool in keeping a record for when I annually renew my registration and for preparing my nomination. When I was told I was receiving an award in the Registered Scientist category at the CPD awards, I was over the moon and proud to be part of a wonderful community of like-minded people. In the future I hope I can assist others to become professionally registered and become recognised for their achievements. I love also being a member of the Institute of Science and Technology and being a Registered Scientist. The benefits for myself have been amazing – such as becoming more confident in my work, being passionate about what I do and using this passion to encourage others."

- Rae Freestone

Rae attended the CPD Awards ceremony to be presented her award with an audience of Science Council membership representatives, CPD Award Judges and peers. The ceremony was held on 21st November at One Birdcage Walk in London and formed part of the Science Council's Celebration of Science evening reception alongside the Sir Gareth Roberts Lecture. This year's speaker was Professor Dame Ottoline Leyser, Chief Executive of UK Research and Innovation (UKRI). Her chosen lecture topic was "Powering the future: a research and innovation system for the 21st century".

Once again very well done, Rae, we are delighted and proud.

Laurence Dawkins-Hall wins Citizens Award 2022 at the University of Leicester

We were delighted to learn recently that Laurence was to be the recipient of a Citizen Award 2022 at the University of Leicester, in the Category of "Technician". The award, given to technicians at the University of Leicester on an annual basis, recognises "Outstanding contributions over and above the recipients pay grade, which demonstrate innovative thinking and action in a particular arena, contributing to excellence of service at the University of Leicester".

Laurence was nominated back in May 2022, during a Trip to Belfast on behalf of the IST, where he was providing a talk on Professional Registration at the Queens University of Belfast (QUB) Technician Showcase 2022. The nomination, by Laurence's manager, was based on his recent award of a Royal Society Fellowship with the Royal Society of Biology (FRSB). This Fellowship award recognised Laurence's portfolio of work as a professional registration mentor with the Science Council (as one of their "Applicant Support Mentors"), his role with the IST as a Fellow and "Assistant Registrar" and his "Special Advisor on Registration and STEM" position with the NTDC. These workshops, lecturing, tutoring and mentoring activities with the IST and Science Council were pivotal in the award of his FRSB, which constituted the basis of his Citizen Award nomination. During 2022 Laurence also started to lecture and mentor in-house technicians at the University of Leicester.

Laurence's nomination was shortlisted as one of three finalists in the category of "Technician" based on this national registration portfolio. On the night of the awards, he was announced as winner of this category.

"For gaining a Fellowship with the RSB, and for promoting professional registration and the Technician Commitment more widely on a national platform, by working with both the Science Council and IST"

"I am thrilled to be the 2022 recipient of this Award because it doesn't just recognise my efforts on the national stage, but also the hard work of registrants I have tutored; and lends credence to the importance of the Technician Commitment and professional registration therein, both nationally and at the University of Leicester itself.

I wish to thank Milly Veselis for my nomination, Professor Sarah Davies, (together with other members of the selection panel, for recognising my "exceptional efforts" at Leicester and last but by no means least the IST, NTDC and Science Council, for affording opportunities to pursue and continually expand this working portfolio since 2017. I will give a special mention to Joan Ward in this regard."

- Laurence Dawkins-Hall

The IST is proud to be able to report this richly deserved award.

Congratulations and well done, Laurence!

New IST Fellows 2022

The IST were delighted to announce 11 new Fellowship awards during 2022.

The awarded Fellowship, as below, are outstanding individuals who are not only making significant contributions to their workplaces but also to the wider technical community and the IST. We look forward to working more closely with them in the future.

This senior class of membership indicates a very high level of achievement in the field and an outstanding contribution to the profession. Fellowship candidates will require considerable experience gained over a number of years of responsible work and be able to demonstrate important achievements relating to the application of science, technology and/or management skills. Fellows of the Institute are elected by the IST Executive on the recommendation of a Fellowship Panel which comprises at least 3 Fellows of the Institute in good standing. The Fellowship Panel will take into consideration, in support of each application, qualifications, professional work experience, and contribution to the advancement of science and/or technology.

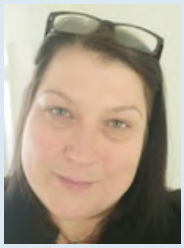
Fellows are expected to contribute in some way to the activities and/or development of the IST and/or the UK technical workforce and the nature and extent of that potential contribution will be taken into account when Fellowship applications are assessed and renewals reviewed. Contributions could include the submission of Journal articles, support for professional registration, enhancement of the IST profile in the workplace – to name just a few examples. We would be happy to discuss options with potential applicants.

For more information please visit the *Fellows page* on our website.

Paul Ashford

Julia Barkans

Simon Breeden



Jan Brett

Rob Carter

Karen Henderson

Lucy Hudson

Gillian Riddell

Richard Saldanha

Melissa Sterry

Caleb Wright

FISCT

John Amaechi joins University of Exeter Business School as Honorary Professor

We are delighted to report that one of our members and Chartered Scientists, John Amaechi OBE, founder of the consultancy APS Intelligence, has been appointed Honorary Professor at the University of Exeter Business School.

John is an international bestselling author, a public speaker, organisational psychologist, and executive coach. The recent honorary appointment recognises the growing relationship between the University of Exeter Business School and John, whose perspective on responsible leadership and the importance of ethical and inclusive leadership have resonated with the business school's strategic priorities.

As a chartered scientist, a chartered fellow of the CIPD, a research fellow at the University of East London, and a fellow of both the Royal Society for Public Health, and the Association of Business Psychologists, John's vast contribution to education and research is well renowned.

Professor A Gerbasi, Deputy Pro-Vice Chancellor of the University of Exeter Business School said:

"We are absolutely delighted that John is joining us as an Honorary Professor. Our students and Faculty are consistently inspired by his thought leadership on the key topics of equality, diversity and responsible and inclusive leadership. We look forward to continuing to build our relationship with John in his new role of Honorary Professor"

- Professor Alexandra Gerbasi

John commented:

"It has been refreshing to speak to the students at the University of Exeter Business school over the last few years. That joy is only eclipsed by the collegiality and instant bond I've developed with leaders and faculty members who made me feel a part of the university long before this honour. I can't wait to see what 'good trouble' we can get into together!"

Our congratulations go to John on this prestigious appointment.

Honorary Professor John Amaechi, FIScT

IST membership

Membership of the Institute is open to specialist, technical, and managerial staff in a broad range of environments such as science, engineering, technology, digital, media, arts, industry, local authorities, schools, FE, HE, research/analytical/health facilities, government departments, and many more in the UK and overseas. There are five grades of membership in the Institute. An applicant does not initially apply for a specific grade of membership, the grade offered by the Institute being dependent upon the qualifications and experience of the applicant.

Why Join?

To help us maintain, build and expand the (IST) community. IST can help by supporting and developing your:

- career and interests
- professional standing
- knowledge and skills
- network of contacts

Together we can be a voice to be heard and listened to.

Download IST Main Leaflet at ***istonline.org.uk/membership*** Application for membership at Junior, Affiliate, Associate and Member grades can be made by email or by post to the IST office using the standard application form which is available for download at ***istonline.org.uk/membership*** (**Membership Application Form** – docx, or **Membership Application Form** – pdf). The form must be accompanied by a copy of each relevant certificate, diploma etc (scanned copies sent electronically are accepted). Completed applications should be emailed to memberships@istonline.org.uk or posted to our Sheffield Office.
Membership Application Notes for those applying for membership are available at istonline.org.uk/membership

When an application has been accepted, the applicant will be notified of the grade offered, at which time a full subscription payment will be required (within one month of notification). After the subscription has been received the new member's name will be added to the Register of Members and a Certificate and members card will be sent. Following entry on the Register members are entitled to the designated post-nominal letters relevant to their grade.

Membership fees are: from 01/01/2022

- Junior: £10
- Affiliate: £25
- Associate: £41
- Member: £54
- Fellow: £68

*Retired or unemployed members can claim a reduction of 50% off the normal rate
** Please note that IST membership subscriptions of employees are eligible for UK tax relief, under Section 344 of the Income Tax (Earnings and Pensions) Act 2003. Claims needs to be made by members individually directly via HMRC

Previous members whose membership may have lapsed can apply for reinstatement by completing and returning one of the following forms to **office@istonline.org.uk**
Membership Reinstatement Form (docx), or
Membership Reinstatement Form (pdf)
Payment of subscriptions can be via:

- credit/debit card/Paypal online at *https://istonline.org.uk/membership/*
- bank transfer (please contact office@istonline.org. uk for bank account details)
- invoice (please supply a purchase order number to office@istonline.org.uk)

NB: All applications are subject to review; the IST reserves the right to decline any membership application.

GOLD LEAF Award secured by Tracey Davey, MIScT

Tracey Davey has secured a GOLD LEAF (Lab Efficiency Assessment Framework) award for the Electron Microscopy Research Services core facility in FMS.

Tracey, Senior Experimental Scientific Officer and Manager of the *Electron Microscopy Core Facility*, has worked tirelessly with colleagues as part of the sustainable campus initiative to secure national recognition for the high standards achieved here at the University.

LEAF is a green lab standard to improve the sustainability and efficiency of laboratories. The LEAF programme, developed at University College London (UCL), is a self-assessment tool targeted at research, teaching and medical laboratories.

LEAF contains actions that lab users can take to save plastics, water, energy and other resources. By taking part in the programme, laboratories reduce their carbon emissions and create an environment that supports research quality.

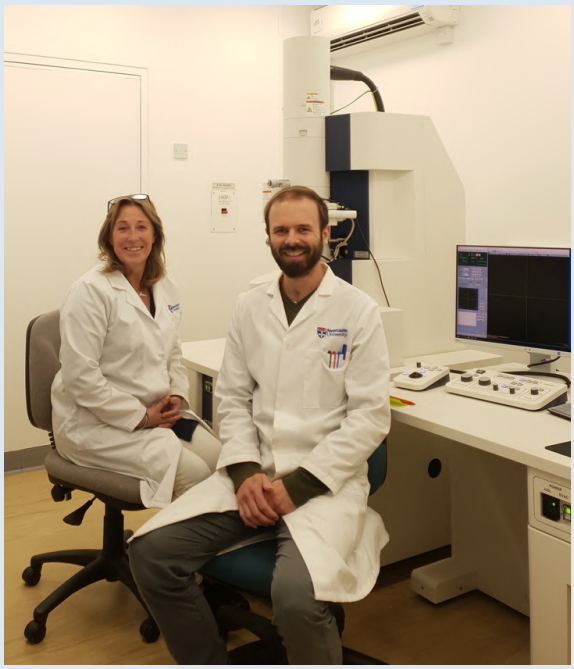
Laboratories are awarded either a Bronze, Silver, or Gold level depending on how many sustainability actions they take. The lab and written application was audited and approved by Katherine Smith of the NCL - Newcastle sustainability team.

Commenting on the award Katherine said:

"Tracey is leading sustainability in EMRS and says that herself and colleagues are always asking themselves - is there something we can do with X instead of wasting it? No doubt the lab will continue the sustainable practices put in place and continue to increase action. It is great to see a core facility taking so much direct action, and lab users from elsewhere at the University will see this when they visit, hopefully inspiring them to adopt LEAF in their own workspaces."

With dozens of institutions and funders supporting certification, LEAF is an important nationwide standard in laboratory operation. You can find out more about LEAF at Newcastle University by visiting our colleague action pages *here*.

Find out more about LEAF.



Tracey Davey and Ross Laws in front of our Transmission Electron Microscope

Production: Ashton Industries Ltd

The Official Journal of the Institute of Science & Technology

The Professional Body for Specialist, Technical and Managerial Staff

ISSN 2040-1868

7th Floor, 2 Pinfold Street, The Balance, Sheffield, S1 2GU

T: 0114 553 1401 office@istonline.org.uk

www.istonline.org.uk