



Through The Looking Glass Breaking Barriers in STEM

Shaping inclusivity in STEM through action

Prepared by

Alison Hughes and Dr Alison Dun

March 2021

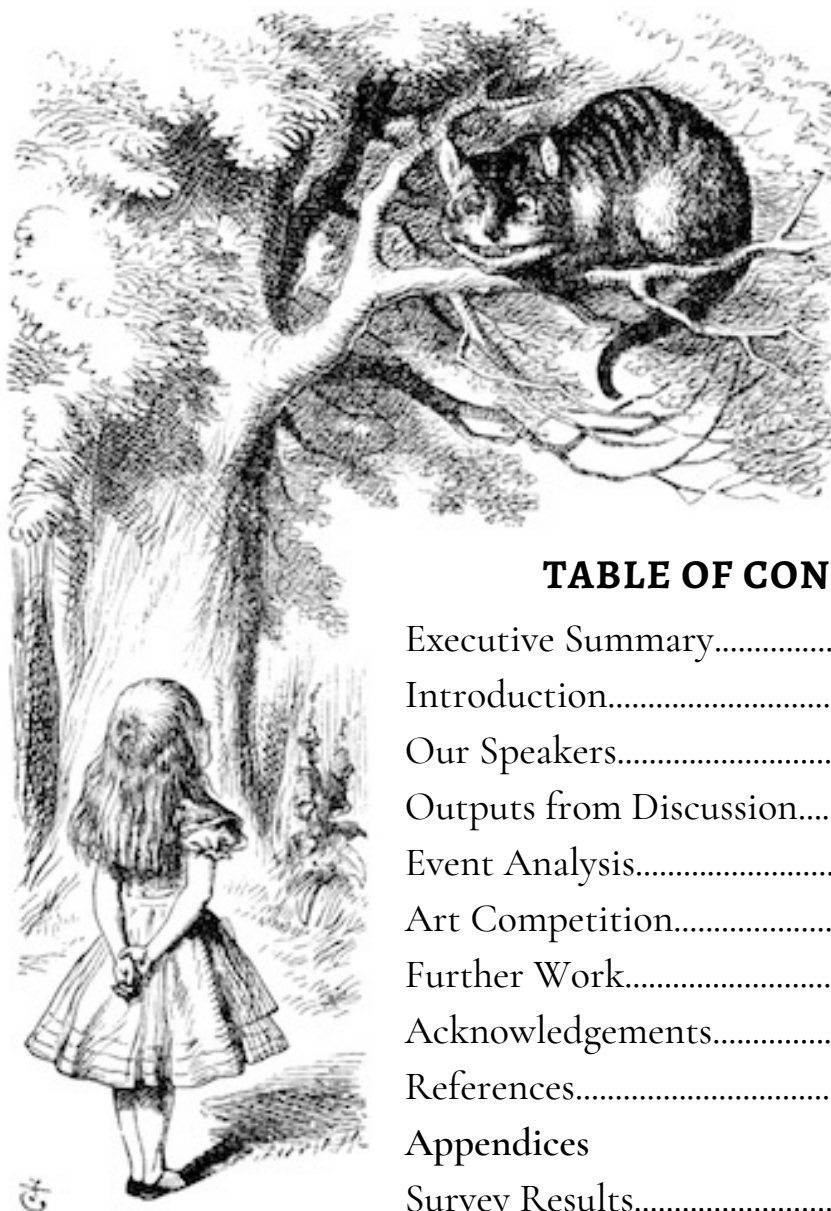


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Executive Summary

This report summarises the outcomes of the event Through the Looking Glass: Breaking Barriers in STEM, an interdisciplinary and intersectional event which aimed to address issues around Equality, Diversity, and Inclusion. The event took place online on October 28th 2020 and comprised of a webinar, opened by MSP Richard Lochhead, with presentations from four early career researchers in life sciences, chemistry, and engineering. The webinar was followed by discussion groups focusing on four main themes; **Decolonising the Curriculum, The Leaky Pipeline, Expanding Our Reach, and Mental Health and Wellbeing.**

The event attracted attendees from academia, industry, and governmental organisations, as well as those in positions spanning from PhD students to university deans and company CEO/directors. The discussion groups comprised a facilitator from a Scottish Research Pool or Innovation Centre and up to seven participants. Each group identified key areas for action within their chosen theme. The event was also used to recruit volunteers for our Working Groups based on these themes.

These Working Groups met in March 2021, with Research Pools: SULSA (Scottish Universities Life Science Alliance), ScotCHEM (Scottish Universities Chemistry Research Pool), SINAPSE (Scottish Imaging Network: A Platform for Scientific Excellence), and SICSA (Scottish Informatics and Computer Sciences Alliance) each leading one working group. These groups will aim to assess the current landscape and determine where they can add value, within their designated topic, through cross-University collaboration. All groups will come together quarterly and present their progress at the follow up Breaking Barriers in STEM event - **Through the Looking Glass: Breaking Barriers in STEM 2.0.**



Thank you to our supporters



“There are many keys to success, the problem is unequal access to the door”

INTRODUCTION

Working in STEM (Science, Technology, Engineering, and Mathematics), whether it be in academia or industry, is an exciting but challenging career choice. A report from the University and College Union found that in the 2016-17 academic year there were only **25 Black female professors in the UK** compared to 14,000 White men [1]. Disabled academic staff members reported feeling “**intense isolation**” within the university environments [2], whilst 89% of LGBTQ+ students felt there was a need for peer support in Universities [3]. These descriptors – gender, ethnicity, sexuality – may be used to build parts of our personal identities, but they should not be the basis for inequity, discrimination, or poor mental health. With **86% of PhD students in the UK reporting feeling some level of anxiety** (2019) [4], changes need to be made to create a community and environment in STEM that is as diverse as our areas of research.

There is a great deal of effort and energy to identify and tackle these issues from institutions across Scotland. In 2018, the University of Glasgow published a report exploring the organisation's link with slave trade and enacted a programme of repatriation with the West Indies [5]. They also surveyed 500 students and 20 staff members, and have begun implementing a detailed action plan to address racism in the institute and wider society [6]. In 2017, the University of Strathclyde released the Equally Safe in Higher Education Toolbox after surveying staff and students about interpersonal safety and gender-based violence on campus [7]. In 2020, the University of Aberdeen released a statement that they are committed to eliminating pay gaps and have embedded equality and diversity in the university's 2040 strategic plan [8, 9].

The Scottish Research and Innovation landscape in Scotland, with our Scottish Research Pools and Innovation Centres, demonstrate the value the Scottish Government and our communities hold in collaboration and the view that no one organisation can solve the complex challenges we face as a society. Our organisations provide an opportunity to bring together students, researchers and managerial staff from across our Universities and across disciplines, to break down barriers to a more inclusive and diverse STEM environment, with a whole system view.

With an aim to create a more inclusive and diverse environment in STEM the Breaking Barriers in STEM Project was created by SULSA, with support from SICSA, SINPASE and ScotCHEM. **Through the Looking Glass: Breaking Barriers in STEM** was our kickstart event on 28th October 2020. This event aimed to gain insight into the challenges faced by researchers and to identify gaps in support that we could fill. This was designed as an intersectional event, as no one characteristic defines a person and there is some overlap in those that would benefit from particular support structures.

Our Themes

Decolonising the curriculum – how can we ensure that future generations are taught a diverse and inclusive version of science and history?

The Leaky Pipeline – how can we support students from minority backgrounds through undergraduate and postgraduate study?

Expanding our reach – how can we engage with developing countries to create a truly international scientific community?

Mental Health and Wellbeing – how can we support postgraduate students and early career researchers with the stress of STEM careers?

Through the Looking Glass - Breaking Barriers in STEM

The Through the Looking Glass: Breaking Barriers in STEM event on October 28th 2020 included a webinar followed by focused break out discussion groups. Our webinar welcomed over 150 attendees and was opened by Richard Lochhead, Scottish Minister for Further Education, Higher Education, and Science. Our attendees then heard from 4 exceptional and inspirational women, bringing with them a wealth of experience and insight into our 4 themes.

OUR SPEAKERS



Diana Githwe (She/Her)  @dianagithwe

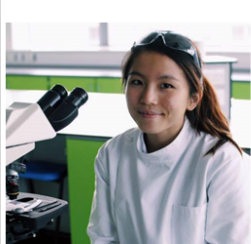
I am a Black Kenyan woman who grew up in Scotland and I'm working towards my PhD at Newcastle University

Education Background: MSci Microbiology from the University of Strathclyde in Glasgow, Scotland. I'm currently undertaking a PhD in Molecular Microbiology at Newcastle University on the NLD DTP.

What is your research on? I will be researching the molecular machineries that control the sugar degradation conducted by human gut bacteria.

What are your hobbies/interests? In my spare time, I dance, run a blog and spend time with friends and family. I also love travelling, reading and cooking.

What does inclusion in STEM mean to you? Inclusion for me is seeing people who look like you doing the things you dream of doing one day. To be included is to have the power to make decisions that will create a positive and meaningful impact within your spaces.



Yen Peng (Apple) Chew, (she/her)  @_applechew

I am a straight Asian woman from Malaysia, a developing country studying, for my PhD in Scotland

Education Background: MBiol in Biotechnology & Microbiology from University of York. Currently studying PhD in Molecular Plant Science at the University of Edinburgh.


What is your research on? I'm developing CRISPR editing boosters for microalgae and plants using *Chlamydomonas reinhardtii* as a model

What are your hobbies/interests? I love hiking on the weekends, street dancing, sparring in judo and crocheting in my leisure time.

What does inclusion in STEM mean to you? To me, it means that everyone should be given equal access and opportunities in STEM irrespective of their background. Everyone should also feel acknowledged, represented and celebrated in the STEM community.



Dr. Jessica (Jessie) Louise Boland, she/her

 @drjessboland

I'm a deaf lecturer in electrical engineering at University of Manchester

Education Background: PhD in Condensed Matter Physics

What is your research on? I use terahertz radiation to look at new nanomaterials for next-generation devices

What are your hobbies/interests? I love singing and playing the piano, used to be a ballerina and am mad about giraffes.

What does inclusion in STEM mean to you? Inclusion means everyone feeling like they belong. It also means that everyone can achieve what they want to, there are no barriers for anyone.



Lara Mosunmola Lalemi (she/her)

I am a 3rd year postgraduate student in chemistry at the University of Bristol, born and bred in London

 @Lara_2L

Education Background: MSci in Chemistry from the University of Bristol in Bristol, UK. I am currently conducting a PhD in Aerosol science at the University of Bristol on the NERC DTP

What is your research on? The Impact of Properties on Photoinitiated Chemical Processing on Climate Relevant Aerosols

What are your hobbies/interests? During my spare time, I am an artist, radio presenter, CEO of company, BME in STEM consultant, QTIPOC organisation leader and trustee.

What does inclusion in STEM mean to you? Inclusion means everyone having an equal seat at the table. It means sharing the labour of progress

To access the talks please visit this link:
<https://www.youtube.com/watch?v=s5G86ltKhPk>

“didn't beat around the bush and addressed the issues head on - refreshing”
(Attendee feedback)

The insight and issues raised by our speakers led attendees expertly into the discussion section of the event, where we had 50 people participate in focused groups. This section was introduced by Katie Nicoll-Baines, a Project Leader from Evidence Base - an organisation that works to promote and execute a system based approach to equality, inclusion and diversity. An action-based approach was fundamental in working toward tangible steps to reach our overall goal. The 4 focus areas were covered through group discussion and information from these groups went on to support our working groups, established in March 2021 (see Next Steps). See Facilitators in Acknowledgments.

OUTPUTS FROM DISCUSSION AROUND OUR THEMES

Decolonising The Curriculum

During the session the following topics were discussed:

- Scientific credit and authorship of collaborators being overlooked
- Discoveries from minorities are glossed over in teaching
- Decolonising the curriculum needs to happen at an institutional level

These are problems that are apparent at all levels, but a top-down approach is vital to bring about real and substantial change. Considerations were therefore given as to what influence this working group can have, who can be influenced, and how changes may be brought about through lobbying and campaigning regulatory bodies (e.g., UKRI) and University level.

“It's great to hear from people genuinely passionate about making change and helping people to do so. .”
(Attendee feedback)

The Leaky Pipeline

During the session the following topics were discussed:

- Short-term contracts, "publish or perish" attitude, lack of work-life balance
- Lack of standardised support structures for those with disabilities and/or caring responsibilities
- Lack of role models and the additional pressure and workload put on role models to "fix" the systems that disadvantage them

Consideration in particular was given to the last topic and the idea of tokenism, not only do under-represented groups have to work harder but are also expected to be the driving force in diversity, equality, and inclusion committees and educate their colleagues and employers on issues affecting them. The expectation and workload becomes unmanageable and they often become more well-known for this extra work rather than their research/teaching.

“a constructive approach to all of today’s presentations and the discussion”

(Attendee feedback)

Expanding Our Reach

During this session the following topics were discussed:

- Supporting international students in Scotland through skills training, funding opportunities, and professional development.
- Personal support for international students in Scotland through social networks.
- Raising international awareness of research excellence in Scotland.

The financial burden placed on international students is monumental and thus prohibits many students from studying abroad at more reputable institutes that are recognised for their excellence around the world. Many grants and funding opportunities are only available for UK or EU students. This topic requires both a top-down approach in terms of reducing fees and increasing professional support, but also requires actions from research groups and supervisors to foster an inclusive and supportive environment

“excellent talks on the concerns and difficulties faced, conveyed eloquently and with passion.”

(Attendee feedback)

Mental Health and Wellbeing

During this session the following topics were discussed:

- Toxic supervisors and working environments
- Lack of work-life balance, "publish or perish" attitude, expectation to work 2far more than 40 hours per week
- Imposter syndrome and isolation from personal support systems

The conversation in this session strongly focused around research groups and the working environment set by the supervisor or department. This was the greatest concern of students that had strong feelings of imposter syndrome and compared themselves to other students around them. It was agreed by all participants that students, particularly postgraduate students, were suffering with their mental health.

"I wasn't aware of how bad the situation was until this event. It was eye opening."

(Attendee feedback)



"It takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"

- Lewis Carroll

EVENT ANALYSIS

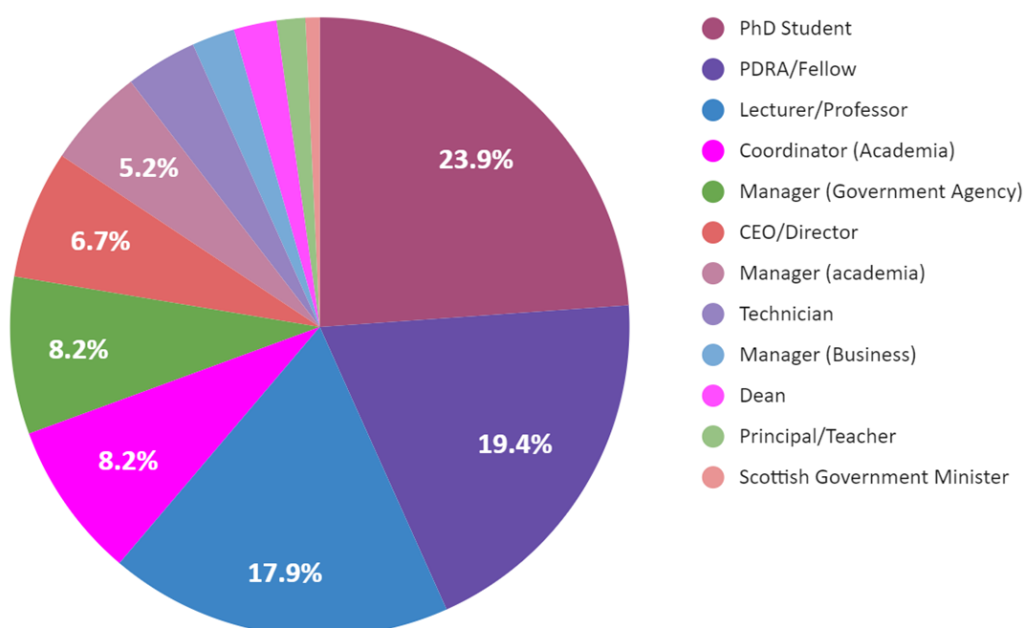
Webinar attendees were asked to complete a survey so we could capture the diversity of those engaging with the event. Attendees were asked the following questions:

- What category does your host organisation best fit under?
- Where are you joining us from?
- What is your ethnic group?
- What is your gender?
- Do you have any long-term illness, health problem, physical or mental impairment which has a substantial and long-term adverse effect limits on your ability to carry out normal day-to-day activities?
- What brought you to this event today? What do you hope to gain?

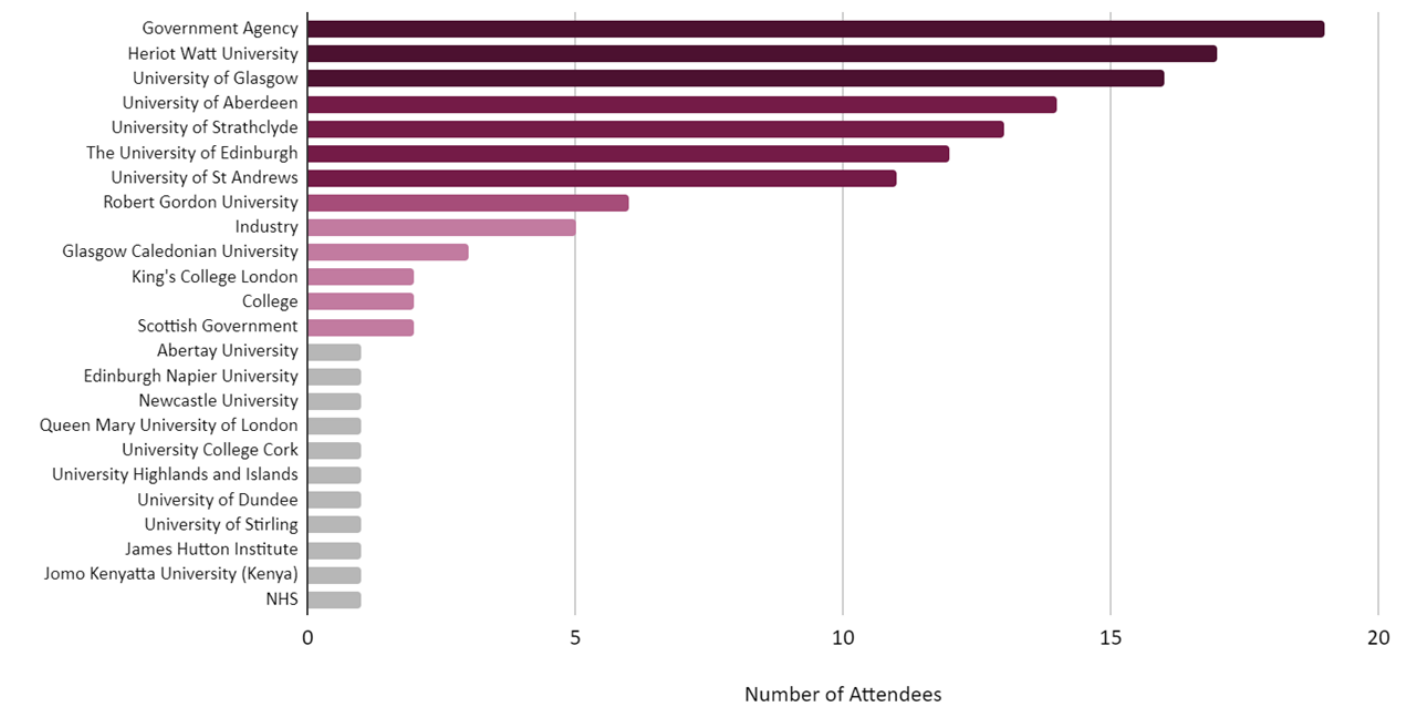
Full details of all responses are available in the appendices. Below we highlight some of the responses.

One objective of this event was to bring in those in positions of influence, with **8% of participants being at director/CEO level** we were really pleased to have met that objective.

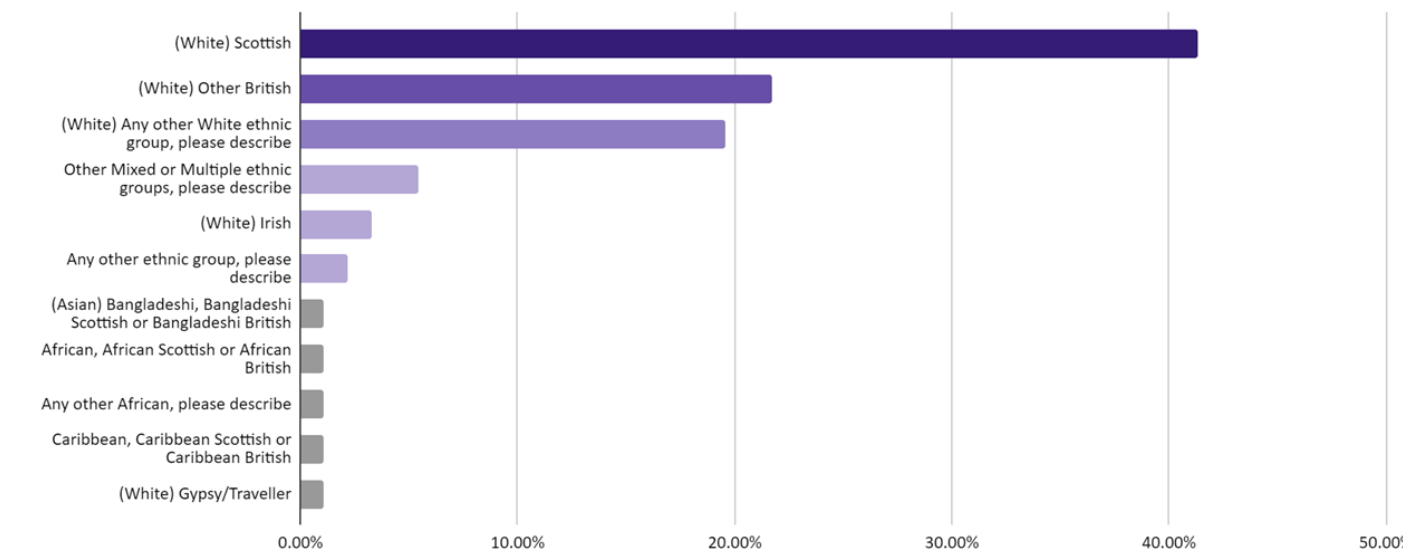
74% of attendees said the event was better than expected



77% of the participants were from Universities from across the UK (96 attendees), Ireland (1) and Kenya (1). The remaining participants were from a government agency (19), industry (5), college (2), the Scottish government (2), and the NHS (1).



We also asked attendees about their personal identifiers, including gender and ethnicity (according to the Scottish government's classification of ethnic groups). 74% of attendees identified as female (23% male, 1% non-binary, 1% gender fluid, 1% other). We were pleased to note that 86% of attendees identified as White as our target audience for these types of events are not ethnic minorities, but rather White people, particularly those in positions to drive change.



WHAT DOES INCLUSION AND DIVERSITY IN STEM LOOK LIKE TO YOU?

To accompany the event, we ran an art competition asking entrants "What does inclusion and diversity in STEM look like to you?" The competition ran from October-December 2020 and a winner and runner-up prize were awarded. They winner received a £150 voucher and the runner-up received a £50 voucher for a company of their choosing. Below are the winning entries.



Runner-up: 'Daddy is trying to write his Astrobiology lecture'

Nicholas Tucker, [@Tucker303](#)

University of Strathclyde



Winner: Everywhere

Roxanna Munir, [@roxannamunir](#)

Glasgow Caledonian University



"It's no use going back to yesterday,
because I was a different person then."

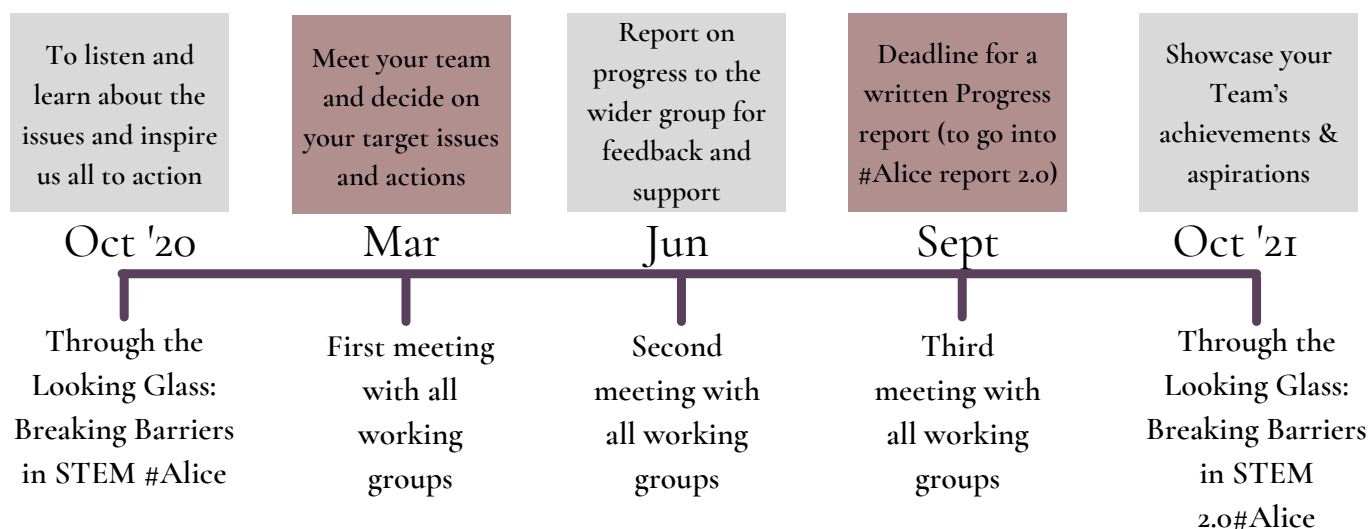
- Lewis Carroll

FURTHER WORK

The event showed the appetite for action in this area across our communities and since October SULSA has teamed up with 3 Research Pools to deliver this project as a cross-discipline effort: the Scottish Imaging Network: A Platform for Scientific Excellence (SINAPSE), the Scottish Informatics and Computer Science Alliance (SICSA) and the Scottish Universities Chemistry Research Pool (ScotCHEM).

In March 2021 our Working Groups were established, these groups consist of enthusiastic and dedicated volunteers from the academic sector, who will be driving forward projects for change within the 4 areas: Decolonising the curriculum, The Leaky Pipeline, Expanding our reach and Mental Health and Wellbeing. To learn more about any of these groups you can contact the designated Research Pool Facilitator;

- Decolonising the Curriculum - Alison Dun, SULSA, alison.dun@glasgow.ac.uk
- The Leaky Pipeline - Alan Wiles, ScotCHEM, aaw9@st-andrews.ac.uk
- Expanding Our Reach - Kristin Flegal, SINAPSE, kristin.flegal@glasgow.ac.uk
- Mental Health and Wellbeing - Aileen Orr, SICSA, aileen.orr@glasgow.ac.uk



These Working Groups currently comprise participants and will aim to create meaningful action in a priority area for each theme. The groups will work independently within their theme with the help of their research pool facilitator who can offer connections, technical support, and funding where necessary. Each working group is expected to meet regularly, and all four working groups will be brought together in June and September to discuss progress and receive feedback. Dr. Katie Nicholl Baines of Evidence Base has provided guidance on how to prioritise ideas and enact meaningful change. The actions resulting from these working groups will be presented at Breaking Barriers in STEM 2 in October 2021.

If you would like to learn more about this initiative or get involved, please contact Dr. Alison Dun at alison.dun@glasgow.ac.uk

ACKNOWLEDGEMENTS

A sincere thank you to everyone that helped make this event so successful. It was an incredible learning experience and we are grateful for everyone's involvement:

Organising Team: Dr. Alison Dun, Dr. Kirsty Robb, Alison Hughes

Speakers: Richard Lochhead MSP (and Laura Dougan, Policy Manager - University Research and Knowledge Exchange), Diana Githwe, Apple Chew Yen Peng, Dr. Jessica Boland, Lara Lalemi. An extra thank you to Lara Lalemi, who helped us shape this event at the initial stages.

Facilitators: Dr. Alison Dun, Dr. Kirsty Robb, Alison Hughes, Diana Githwe, Apple Chew Yen Peng, Dr. Jessica Boland, Lara Lalemi, Dr. Alan Wiles, Dr. Kristin Flegal, and Dr. Katie Nicoll Baines, Dr. Sylvia Soldatou.

Event Artwork: Nicola Williams

Video Editing: Dave Kelly, Dave Kelly Designs/Lacuna

Support Resources: Dragonfly Mental Health, Creative Tuition, Zöe Ayres posters, Queer Engineer, Tiger in STEMM, Mothers in Science, National Association of Disabled Staff Networks, An Abundance of Melanin, LGBTQ+STEM Cast, Global Science Show, Aspires, Virtual Writing Retreat.

We would also like to thank all attendees and participants for their engagement, thoughtful questions, and insightful input in the discussion groups.

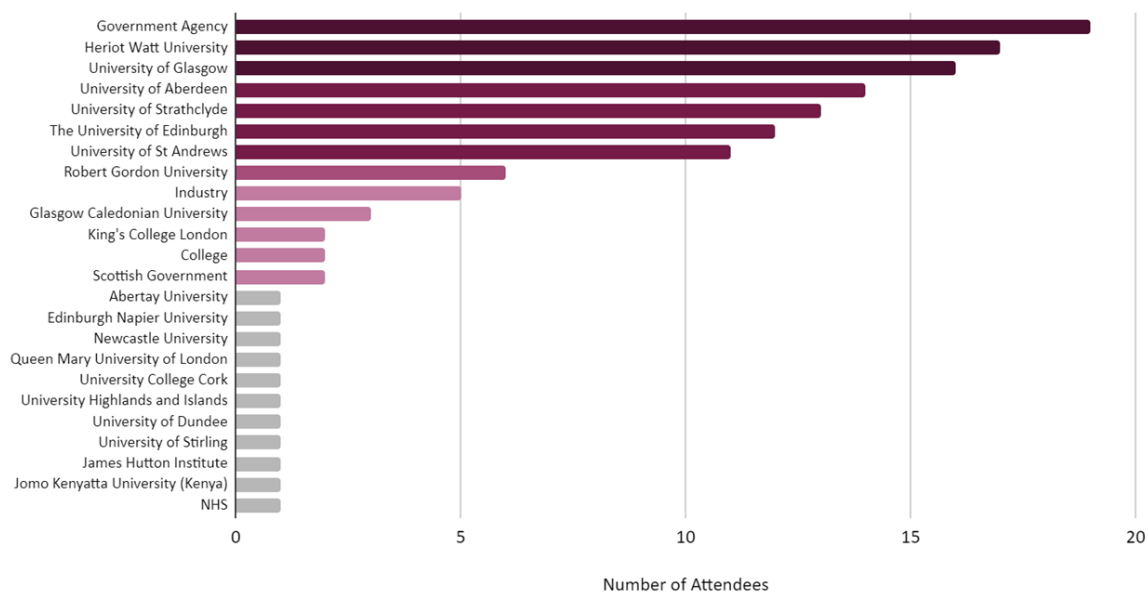


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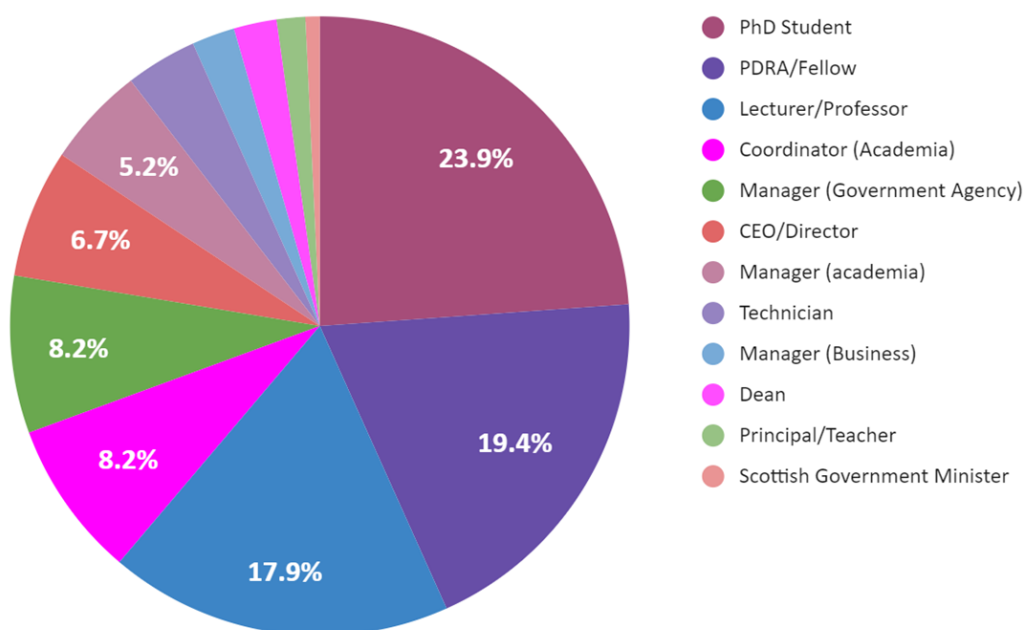
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APPENDIX - SURVEY RESULTS AND FEEDBACK

What is your host organisation?



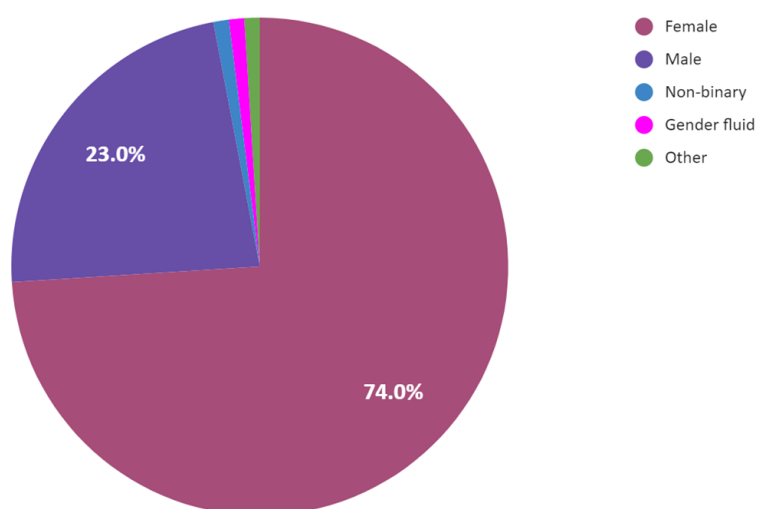
What is your position?



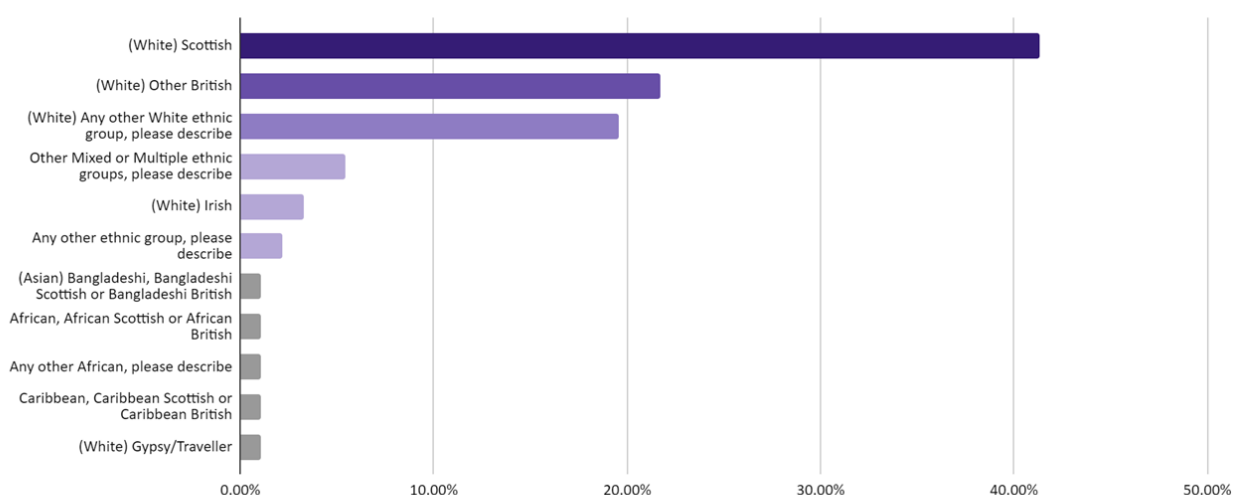
Where are you joining us from?

	% Attendees
Scotland	91
UK (exc. Scotland)	8
Africa	1

What is your gender?



What is your ethnic group?



Do you have any long-term illness, health problem, physical or mental impairment which has a substantial and long-term adverse effect limits on your ability to carry out normal day-to-day activities?

	% Attendees
Yes	14
No	86

APPENDIX - CODE OF CONDUCT FOR EVENT

This event is designed to be an inclusive and welcoming space for every person in STEM or interested in pursuing a career in STEM. As such, we have set the following rules for attendees:

- **No hateful speech.** This is a safe space and anyone using language that is offensive will be permitted to stay in the event.
- **Do not interrupt.** Each breakout room will have a facilitator to ensure a smooth session. If you wish to speak, please click the raise hand button and you will be called in turn to speak. We want to encourage discussion in these sessions but it can be difficult to do via Zoom with a large audience so please be patient.
- **This is not fight club.** Sensitive issues will no doubt be covered during this event so please be mindful of your tone and language when voicing your opinion. We want to encourage a discussion but will not allow aggression or bullying.
- **Do not “other” groups.** Please refrain from using “the” or “them” when referring to specific groups of people as a whole. E.g. say “people who are blind” rather than “the blind.”
- **No normalising.** There is no such thing as a normal or average person so refrain from assuming that any individual or group had a normal experience and equally that any individual or group had an abnormal experience.
- **Capitalise in the chat.** Please do have conversations in the chat window but remember to capitalise when referring to specific groups. E.g. Black, Asian, Deaf, Queer.
- **Shout it from the rooftops (politely).** We would love for you to engage in social media throughout the event, however please do so respectfully. The breakout rooms will be guarded as safe spaces so please do not share anyone else’s experience on social media.

A word cloud shaped like a map of Africa, set against a dark blue background. The words are in various colors (yellow, white, light blue, purple) and sizes, representing different institutions and fields. The most prominent words are 'SULSA' and 'University'. Other visible words include 'Industry', 'Government', 'College', 'Scotland', 'London', 'Marine', 'KTN', 'MASTS', 'NHS', 'SINAPSE', 'SUERC', 'SRPe', 'Equate', 'RSE', 'Education', 'Scotland', 'SICSA', 'SQA', 'SUPA', 'BiolC', 'Newcastle', 'ScotCHEM', 'Kenya', 'SDS', and 'SQUA'.

Industry
SULSA
University
Government
College
Scotland
London
Marine
KTN
MASTS
NHS
SINAPSE
SUERC
SRPe
Equate
RSE
Education
Scotland
SICSA
SQA
SUPA
BiolC
Newcastle
ScotCHEM
Kenya
SDS
SQUA