

Scottish Crucible Alumni Network

Examples of tangible impacts of undertaking Scottish Crucible programme

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Dr Lisa Boden - Scottish Crucible 2016

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I was very fortunate to be able to participate in the Scottish Crucible workshops in 2016. Since then, I have become a Senior Lecturer in Population Medicine and Animal Health Policy at the University of Edinburgh. I think part of the reason I may have been offered this role, is because of my strong research interest and experiences in interdisciplinary working – which were influenced and strengthened by the opportunities and collaborations enjoyed as a result of the Scottish Crucible.

The Scottish Crucible made it possible to develop new academic networks across different universities and different disciplines (for example between veterinary epidemiology, physics, engineering, law and information management). Our Scottish Crucible team are still working together to explore the use of hyperspectral imaging, vehicle-based epidemiology to improve early warning systems for

infectious disease outbreaks (HIVE project). The Crucible small grant funding enabled us to provide research project opportunities for a Masters student (in physics) and an undergraduate veterinary student over the summer in 2017. As a direct result of the time we spent together as Cruciblists during the workshops, our team was also able to submit 2 grant proposals to GCRF and ESRC. Although these were ultimately unsuccessful, this provided useful foundation steps for our successful application for PhD funding at the University of Glasgow from the Serth and Gates Foundation.

Importantly, the Crucible programme gave participants the space, freedom and time to think and reflect on the importance of creativity and interdisciplinary research, and the tools to better communicate our research to policy and the public. These experiences have continued to inform my research at the science-policy interface and the work I do as part of the Knowledge Exchange Advisory Committee for EPIC (Scottish Government's Centre of Expertise on Animal Disease Outbreaks). For example, "Contingency planning for animal disease outbreaks: Why we need the humanities" at <http://www.epicScotland.org/about-epic/knowledge-exchange/epic-conference-2017/contingency-planning-for-animal-disease-outbreaks-why-we-need-the-humanities/>.

I feel grateful to be an alumnus of the Scottish Crucible. It has become an important network of collaborators and friends that I will value throughout the remainder of my professional career.

Dr Blesson Varghese - Scottish Crucible 2015

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The Scottish Crucible was an incredible experience that boosted my confidence and opened my eyes to the wealth of opportunities in pursuing multi-disciplinary research. Since attending Scottish Crucible while at University of St Andrews, I was privileged to:

(i) Transition to my first academic position at Queen's University Belfast in Northern Ireland and be awarded an honorary lectureship at the University of St Andrews.

(ii) Obtain a Santander Scholarship and an Eaton Fellowship that allows me to develop my research in Edge computing, a technology enabler for future Internet applications, in collaboration with partners from Spain and Canada, respectively.

(iii) Become a Co-investigator leading the Edge computing theme on a £0.5m grant funded by the Science Foundation Ireland and Department for

Employment and Learning Northern Ireland.

(iv) Provide an expert comment on the benefit of Edge computing, which was available on 85 media outlets, including Yahoo Finance.

(v) Become the first academic member of the EdgeX Foundry, which is an industry led consortium that develops commercial Edge computing solutions.

Dr Stephen Mansell - Scottish Crucible 2014

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Since September 2013, I have been an assistant professor in the Institute of Chemical Sciences at Heriot-Watt University. I attended the 2014 Scottish Crucible, which was great timing as my lab was being refurbished at the time. Scottish Crucible was an excellent experience in meeting new people, discovering different areas of research and allowing yourself the time to develop a longer-term focus for your career and research ambitions. As part of a team, I was awarded a grant from the Scottish

Crucible to develop outreach activities using 3D printing. I took this opportunity to demonstrate 3D printing at the Dunbar Science Festival (Scifest) and the Midlothian Science Festival as well as helped to display Heriot-Watt's expertise in 3D printing at the 2016 Opening of the Scottish Parliament. One action can trigger others, and this programme of outreach has been hugely beneficial in engaging chemistry PhD students with outreach, and they have since developed their own programme of outreach which has gone from strength-to-strength.

Scottish Crucible has also aided my research programme because it helped me establish a collaboration with Dr Stuart Robertson (Scottish Crucible 2014). We have since worked together on a joint project carried out by an ERASMUS student that resulted in a publication (*J. Organomet. Chem.*, 2018, **857**, 101) which then subsequently led to a successful grant application to the Carnegie Trust (project starting April 2018). The Scottish Crucible was an important experience at the beginning of my research career, and I have since achieved successful grant applications with the EPSRC and the Leverhulme Trust, as well as published papers in the field of catalysis, which is my area of expertise.

Latest Publication:

R. J. Newland, A. Smith, D. M. Smith, N. Fey, M. J. Hanton and S. M. Mansell, [Accessing Alkyl- and Alkenylcyclopentanes from Cr-Catalyzed Ethylene Oligomerization Using 2-Phosphinophosphinine Ligands](#) *Organometallics*, **2018**, 37, 1062–1073

Dr Andrea Caporali - Scottish Crucible 2014

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The Scottish Crucible 2014 has been for me an intellectual and networking hub for keeping up-to-date with science and promoting innovative ideas. A unique scientific environment which allow me to evolve as a PI and to accelerate research progression of my lab. I feel that being part of Scottish Crucible further strengthened my career path, my research ambition and the confidence in my research. Moreover, I had benefit from an encouraging environment that favours different thinking and support collaboration between different research fields.

I have attended the Scottish Crucible at the beginning of the Chancellor's Fellowship at University of Edinburgh and it has been a crucial experience to establish my lab in Edinburgh from Bristol. Through the Scottish Crucible, I became aware of the Scottish

Universities environment and network and I have learned of the possible funding opportunity of the Scottish Government.

Since then, I have since obtained successful grants with the British Heart Foundation and MRC, as well as published papers in the field of vascular regeneration medicine. Moreover, together with Ewan Campbell, I was awarded a grant from the Scottish Crucible 2014 to develop a RNA delivery system using nanotechnology. We are still working together towards the publication of data showing an unexplored application of nanotubes.

Dr Ewan Campbell - Scottish Crucible 2014

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My participation in Scottish Crucible has really shaped my research in a positive way. I am far more confident in working outwith my area of expertise and am excited by such collaborations. Funding agencies, stakeholders and the general public are now more than ever realising that our big real world problems need to draw on multiple fields in order to find solutions.

I have since managed to gain funding for interdisciplinary PhD studentships across social sciences, international development and food security and have worked with industry to commercialise research outputs for applied solutions in the field of food security and insect biology.

Recently a collaborative grant from Scottish Crucible in 2014 between myself and fellow cruciblist, Dr Andrea Caporali, has been successful in testing functionalised nanotubes as a means to deliver effector agents to silence genes in insects. Gene silencing as an effective pest control strategy has undergone a bottleneck of late due to problems with delivering effector agents. By combining Andreas expertise with nanotubes in the medical field and my knowledge of insect physiology we are about to publish what will be an important step forward in this field.

Dr Leah Macaden - Scottish Crucible 2013

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I was delighted with my success to attend the Scottish Crucible in 2013, which was the first of many blessings to follow with my nursing academic career in Scotland that began in Nov 2012.

Despite the significant breadth and experience for over 17 years in nurse academia in one of the finest institutions for nurse education in India (College of Nursing, Christian Medical College, Vellore <http://www.cmch-vellore.edu/>), my idea of research was limited to discipline specific projects and research supervision of postgraduate students. Scottish Crucible opened my eyes to a very different research world with some fascinating and creative ideas. The highlights for me at Crucible 2013 were the launch event at the Royal Society of Edinburgh, visiting the Scottish Parliament to understand the strategic links

between research and health / social care policies, engaging with media professionals and presenting a mock pitch to a panel in the final lab. The central tenets of innovation, collaboration, interdisciplinarity and coproduction of modern research that I imbibed from the Crucible still stay afresh with me whilst I plan not just research projects but also pedagogical initiatives and educational programmes. In 2013, I was able to secure one of Crucible's interdisciplinary seed grants and confident to lead my first interdisciplinary and innovative project with Fellow Crucibilists (Webster E and Munoz SA 2013) and a Crucible Alumnus (Kyle RG, 2012). The project titled Human Dignity Narratives and Nurse Education, focused specifically on the care of older adults in the context of co-produced models of care integrating expertise in nurse education, human rights law and participatory research resulted in significant research outputs as outlined below. We are now developing the next phase of this project that is very relevant and timely within our rapidly shifting landscape of health and social care delivery.

In 2015, I was a successful co applicant on another interdisciplinary CSO funded project collaborating with three Scottish universities on pharmaceutical care for older people with sensory impairment, which has significant potential to inform policy for this group of vulnerable service users and led to three publications that are currently under review. As the PI on another Health Partnership project with India funded by the Tropical Health Education Trust. Participation in the Crucible added value to my recognition as a Senior Fellow of the UK Higher Education Academy and a special recognition award from the University of Stirling in 2016 in addition to being consistently successful in securing three funded PhD studentships as outlined below.

- ***Operational Research on Uptake of Kangaroo Mother Care (KMC) for Low Birth Weight (LBW) Infants along a Facility-Community Continuum in a selected Sub District of Northern Karnataka, India*** (2016) funded by the University of Stirling International Impact Fellowship.
- ***Technology Enabled Dementia Education and Support (TEDES) for Health Care Professionals in Rural Scotland*** (2017) – funded by the European Structural and Investment Funds. Jointly supervised by University of the Highlands & Islands & University of Edinburgh.
- ***Bringing the Virtual into Reality: Immersive Virtual Environment Technology and Wellbeing for People Living with Dementia in Rural Settings: An Action Research Project*** (2018) - City Region Deal PhD Studentship, University of the Highlands & Islands.

As a proud ambassador of the Scottish Crucible, I have been able to disseminate the Crucible idea locally and with my Alma Mater in India. As a beneficiary of the Scottish Crucible, I can affirm that this is a fantastic initiative and model to transform research, build research capacity and capability for Scotland and beyond.

- Macaden, L., Kyle, R., Medford, W., Blundell, J., Munoz, S. A & Webster, E. (2017). What promotes or inhibits dignity in the care of older adults? Student Nurses' perceptions and insights. *British Journal of Nursing*, 26 (5), 274 -80.
- Kyle, R. G., Medford, W., Blundell, J., Webster, E., Munoz, S. A., & Macaden, L. (2017). Learning and unlearning dignity in care: Experiential and experimental educational approaches. *Nurse Education in Practice*, 25, 50-56.
- Munoz, S. A., Macaden, L., Kyle, R., & Webster, E. (2016). Revealing student nurses' perceptions of human dignity through curriculum co-design. *Social Science & Medicine*. DOI: 10.1016/j.socscimed.2016.12.011

Dr Sandhya Patidar - Scottish Crucible 2013

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I participated in the Scottish Crucible programme in 2013 and it was a highly stimulating experience for me. It provided me with a unique opportunity to meet and engage with a highly talented group of ambitious researchers coming from a range of disciplines and based at various universities, institutes and organisations in Scotland. I was able to network with these like-minded researchers who were enthusiastic to cross their disciplinary boundaries and think creatively about developing innovative research ideas/solutions aimed at impacting our Society. I am an applied mathematician and I mostly work in engineering applications of mathematics but, at the Scottish Crucible programme, I discussed the opportunity to engage with

researchers from many non-engineering disciplines, such as social sciences and arts. This type of engagement activity has certainly pushed my research boundaries beyond the engineering realm and helped me to see wider possible applications of my skills. Since then I have managed to successfully collaborate with social scientists and delivered several high impact research outcomes.

I found that the overall structure of the Scottish Crucible programme is very carefully and strategically designed to break the barriers that, quite often, successful researchers can struggle to cross when attempting to engage outside of their disciplinary boundaries. It facilitates a very friendly and supportive environment for participants to boost their confidence, think creatively and explore the wider potential of their research within an interdisciplinary team set up. I found the whole setting and programme structure well balanced and that it has certainly enhanced my personal skills in leading my discipline much more effectively and independently within an interdisciplinary team.

After successfully completing the programme, I collaborated in many high profile interdisciplinary research projects where, in different roles (PI/CI/post-doc researcher), I successfully led the development of innovative mathematical and statistical ideas/conceptual frameworks for application in science, engineering and social science research projects. Since 2013, I saw a career acceleration and my research work (conducted as part of interdisciplinary team) has been published in more than 20 high impact journal papers. These have been published in 13 different interdisciplinary journals with total citation numbers currently reaching 169 (Scopus), 261 (Researchgate) and 298 (Google Scholar) in the last five years. During that time, I have also written 3 invited book chapters, 3 technical reports directed to an industrial audience and 25 international conference papers. These were presented at top conferences in my area (e.g. IAHR, IBPSA and WREC) with two winning best paper awards and one, best presentation award.

Dr Mary Doherty - Scottish Crucible 2011

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I took part in Scottish Crucible in 2011. I had just returned to Scotland after 10 years in the USA and England and it was a great way to rediscover the Scottish research landscape. I joined the programme with a little trepidation. It was outside my comfort zone as an analytical chemist. What would I have in common with a composer, a historian or even an engineer? What I didn't expect was one of the most rewarding and enriching experiences of my career. I met many new people and joined a network of young(ish) academics, all keen to collaborate and expand on their subject areas, to take a leap right out of their comfort zone. It gave me a new confidence to develop collaborations and confirmed my

recollection of Scotland as a place where working together was encouraged and promoted. Working in a relatively young university that didn't have a long track record in research, it also provided me with credibility.

Seven years on, I can reflect on the difference it has made to me. I have published with fellow cruciblists, we have joint projects and only today I interviewed prospective PhD students with two former Crucible participants. Perhaps importantly, we were not from the same cohort but each from a different year but in common, we have Scottish Crucible. I became a member of the Young Academy of Scotland following my time at Crucible – and found that many of my colleagues had followed the same path. Since Crucible, my career has taken a slightly different turn. Research isn't all I do now. I have a responsibility for the development of our PhD students (and supervisors) at UHI, providing training and support across all subject areas and representing them nationally, influencing policy and practice at the highest level. I am also the University lead for Athena Swan and delivered our Institutional Bronze Award in 2016. This means I am out at meetings a lot – and at almost every one, I meet somebody connected to Scottish Crucible. What did Scottish Crucible provide? Connections, confidence and credibility.

MORRICE N, MCILROY GD, TAMMIREDDY SR, REEKIE J, SHEARER KD, **DOHERTY MK**, DELIBEGOVIĆ M, WHITFIELD PD, MODY N. (2017): Elevated Fibroblast growth factor 21 (FGF21) in obese, insulin resistant states is normalised by the synthetic retinoid Fenretinide in mice, *Scientific Reports*, **7**, 43782.

PLUCINSKA K, DEKERYTE R, KOSS D, SHEARER K, MODY N, WHITFIELD PD, **DOHERTY MK**, MINGARELLI M, WELCH A, RIEDEL G, DELIBEGOVIC M, PLATT B. (2016): Neuronal human BACE1 knock-in induces systemic diabetes in mice, *Diabetologia*, **59**, 1513-1523.

MCILROY GD, TAMMIREDDY SR, MASKREY BH, **DOHERTY MK**, WATSON DG, DELIBEGOVIĆ M, WHITFIELD PD, MODY N. (2016): Fenretinide mediated retinoic acid receptor signalling and inhibition of ceramide biosynthesis regulates adipogenesis, lipid accumulation, mitochondrial function and nutrient stress signalling in adipocytes and adipose tissue, *Biochemical Pharmacology*, **100**, 86-97.

Dr Ian Overton - Scottish Crucible 2010

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Since August 2017, I have been Head of the Medical Bioinformatics Research Cluster and lead the Data Intensive Biomedicine Research Group at the Centre for Cancer Research and Cell Biology (CCRCB), Queen's University Belfast.

Scottish Crucible was without doubt the most productive and stimulating professional development training programme that I have ever attended. I participated in the 2010 cohort, soon after taking up a five-year Scottish Government Personal Research Fellowship at the MRC Human Genetics Unit in Edinburgh. Scottish Crucible provided rich fertiliser for intellectual development across a whole range of areas; including in public engagement, policy, innovation, winning funding, collaboration and knowledge exchange.

I particularly valued the opportunities to interact with so many highly talented people in an environment that was carefully crafted for me to benefit from their knowledge and experience; including experiential learning. My work was therefore energised by Scottish Crucible because it instilled critical insights to enhance my competency across many areas. For example, in contributing to the development of Diagnostics and Knowledge Exchange partnerships with LifeArc (formerly MRC Technology); in publishing a patent; and in becoming a founding member of the Royal Society of Edinburgh 'Young Academy of Scotland' (2011), where I have led the writing of policy advice documents at national and European levels.

I have become very active in public engagement, including as a STEM ambassador; working with press officers leading to research being featured in national and local media; developing an interactive activity on bioinformatics/precision medicine for a stall at the CCRCB open day; and delivering outreach lectures (such as: www.forthvalley.ac.uk/news-events/renowned-scientist-talks-to-fvc-students) - some of these activities simply would not have occurred without the impetus from Scottish Crucible.

My group's research has been funded from a range of sources, including the Medical Research Council, Wellcome Trust (UoE-ISSF), Marie Curie Actions, Prostate Cancer UK and Carnegie Trust.

Recent Publication:

Lubbock *et al.* "Overcoming intratumoural heterogeneity for reproducible molecular risk stratification: a case study in advanced kidney cancer." *BMC Medicine* (2017) 15:118

<https://bmcmmedicine.biomedcentral.com/track/pdf/10.1186/s12916-017-0874-9>

Dr Jano van Hemert, FRSE - Scottish Crucible 2009

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I direct the research at Optos plc, a Nikon company, founded and based in Dunfermline. My research group pioneers novel medical technology—software and hardware—for diagnostic retinal imaging. We collaborate intensively with academics, healthcare practitioners and technology businesses to mature technology into prototypes for clinical trials and then into commercialisation. Examples where we have succeeded to turn ideas into products include a new medical standard for anatomically-correct measurements on the retina [1], automatic montaging of ultra-widefield images [2] and ultra-wide indocyanine green angiography.

Back in 2009, I headed up a research group at the University of Edinburgh's Informatics with a focus on data-intensive science. I took part in the inaugural Scottish Crucible where together with Dr Wendy Gidman and Alison Dawson we were awarded an interdisciplinary project. Soon after, I started at Optos and about a year later I heard about a new initiative, the Young Academy of Scotland. I immediately applied. Again, I found myself part of a diverse group of enthused and ambitious people that were part of a new venture. As my focus had shifted from research to business my main focus was on the industry theme, now more aptly named the enterprising theme. Through the Young Academy of Scotland mentorship programme I had the opportunity to join the Royal Society of Edinburgh's Business Innovation Forum, which I am still a member of today. This really suited my passion: interdisciplinary collaboration that spans both business and university. So much so that I applied to become a member of the Scottish Funding Council's Research and Knowledge Exchange Committee. I now represent the voice of business during committee discussions when formulating advice on policy making. Two months ago, my story culminated when I became a Fellow of the Royal Society of Edinburgh. I am certain that is the result of my first steps into 22-26 George Street to attend the first meeting of the Scottish Crucible way back in April 2009.

I would like to highlight the benefits of mixing with a group of ambitious people from a broad range of disciplines. I have always sought out such collaborations as they have given me the most fascinating context and rewarding results. Perhaps to no surprise I have had the pleasure to work with more than 200 of my co-authors. One such collaboration originated from meeting Professor Ik Siong Heng at the Young Academy of Scotland. He works on analysis techniques for the detection of gravitational waves. After several collaborative projects [3] and with a jointly-supervised EngD student we have made the leap to translate his techniques into Optos manufacturing processes [4] to increase the yield in a major component of our medical devices.

[1] Sagong M, van Hemert J, Olmos de Koo LC, Barnett C, Sadda SR. Assessment of accuracy and precision of quantification of ultra-widefield images. *Ophthalmology*. 2015 Apr;122(4):864-6.

[2] Croft DE, van Hemert J, Wykoff CC, Clifton D, Verhoek M, Fleming A, Brown DM. Precise montaging and metric quantification of retinal surface area from ultra-widefield fundus photography and fluorescein angiography. *Ophthalmic Surg Lasers Imaging Retina*. 2014 Jul-Aug;45(4):312-7.

[3] Why does it matter?, *Science Scotland* (20), ISSN 1743–6230.

[4] Big bang in big data, *Science Scotland* (20), ISSN 1743–6230.

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