Computational Foundry
Ffowndri **Gyfrifiadol**

Swansea University
Prifysgol **Abertawe**

Engineering and Physical Sciences Research Council
UKRI

EPIC CDT
ANNUAL REPORT 2024

EPSRC Centre for Enhancing Human Interactions and Collaborations with Data and Intelligence Driven Systems (EPIC)

"Front cover image created by Dall-E. Inspired by Wittgenstein's insight that, 'If a lion could talk, we could not understand him.'"

Introduction

This year began with the induction of our 5th Cohort in October 2023. As with previous intakes, it was a delight to see a diverse, focussed and purposeful group join the Centre. At the time of writing, these fledgling PhD researchers are moving from their Masters' research into the full PhD phase.

Cohort 5 is our final EPSRC funded group – we are so very thankful for their funding and support, enabling a new generation of people-first AI researchers to be nurtured. We are also very grateful to our International Advisory Board and Stakeholder Steering Groups - they ground us, challenge and inspire us. We are proud too of our first PhD graduates who have left us to become post-doc researchers or to take-up exciting roles in industry.

The Centre is a key part of our human-centered and responsible AI focus at the Computational Foundry. As such, this year has seen our Centre members engage in and interact with work that has includes a 5-year programme aimed at exploring a novel interactive AI paradigm[1]; the UKs Responsible AI Programme[2]; along with a diverse range of visiting speakers. While the Centre began life as a Doctoral Training Centre, it has grown to become a recognised beacon for multidisciplinary world-class research that drives data and intelligence-based systems with and for people, globally.

This report will give you a glimpse of our community – the people, projects, partners and ethos. To really understand us, though, you need to visit and engage. You'd be so welcome to do so!

Matt Jones
Director

[1] https://e-v-e.ai/
[2] https://rai.ac.uk/

> **We see people as a source of wonder that can be exposed, expressed and celebrated through their use of interactive data and intelligence-driven systems that prioritise freedom, control and creativity.**

The Centre's Home

The EPIC Centre continues to be housed in the Computational Foundry at Swansea University's Bay Campus, with the Cohorts having unlimited access to bespoke laboratories for each specialism of computational research (maker lab, theory lab, security lab, user experience lab, biometrics and vision lab, visualisation lab, IoT lab), and quality teaching, training and formal meeting spaces.

The EPIC Centre has a dedicated 271m^2 of space including collaboration and interaction spaces, as well as an allocated desk and storage space for each member of the Cohort. The EPIC Centre also has its own dedicated social breakout space.

Our Leadership Team

There have been no major changes to the management and leadership of our Centre.

Matt Jones (PI) continues to be the EPIC Centre Director and Co-I Markus Roggenbach (Deputy Director) continues to lead the theoretical computer science elements of the Centre and deputises for the Director as needed.

All Co-Is have dedicated time allocated to the EPIC Centre, and have provided their experience to support its delivery. Since the inception of the EPIC Centre, the Co-Is have provided the following: ensured that key scientific agendas emerging in their respective fields are reflected in the Centre; assisted the Director in leading the Sandpits; assisted in the recruitment of Cohorts 1–5; and been active advocates for the Centre and liaison points of contact for relevant stakeholders and partners.

Dr Jennifer Pearson
Co-Director of the MSc first year programme

Professor Markus Roggenbach
Centre Deputy Director

Professor Matt Jones
Centre Director

Dr Matt Roach
Strategic Stakeholder Lead

Dr Sherryl Bellfield
Centre Manager

Dr Simon Robinson
Co-Director of the MSc first year programme

Tashi Gyaltsen
Senior Business Engagement Officer

Oliver Williams
CDT Project Officer

Equality, Diversity and Inclusion

Equality, Diversity and Inclusion (EDI) continues to be a key driver of our activities and ethos of the Centre. Our management and governance structure includes EDI monitoring, reporting and assessment. Through the work of our internal EDI committee we continue to evolve the EDI strategy and policies of our Centre. The committee members include supervisors, students and external stakeholders.

The Cohort 5 recruitment cycle was deemed a success having received 91 applications. From analysis of the applications, the diversity of applicants once again is from a wide range of disciplines and backgrounds. We believe that this has been achieved through promoting the ethos and 'people first' approach of the Centre. We continue to make improvements to our website and promotion material.
We have also further refined our recruitment process; including using our international networks to promote our Centre.

Our students act as ambassadors to promote the vision of the Centre and we believe this has contributed to improve the diversity of applicants.

Diversity of our student Cohort has improved this year. We have continued to keep a thorough recruitment process, including interview panels with 3-4 members and a panel to reduce unconscious bias and establish a fair process. This has resulted in recruiting a Cohort of high calibre and diverse students.

The Centre maintains good representation across different protected characteristics, in terms of gender balance, disability, age, ethnicity and sexual orientation (Figures 1 to 5). We are proud of the diversity of our Centre and what we have achieved.
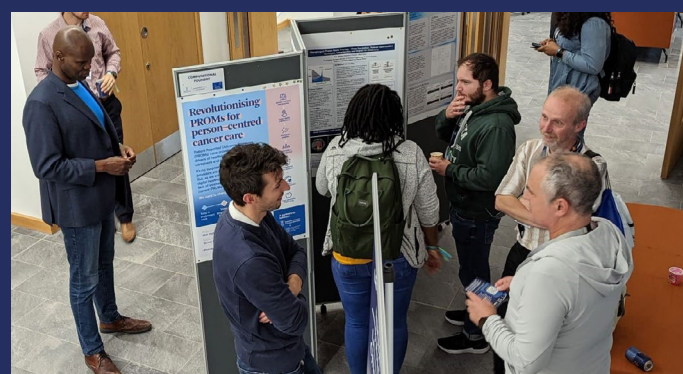
Figure 1 — Gender Balance of our CDT Students

Gender	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
Female	17%	17%	40%	67%	36%
Male	83%	75%	60%	25%	46%
Other	0%	8%	0%	8%	0%
Prefer not to say	0%	0%	0%	0%	18%

Figure 2 — Ethnicity of our CDT Students (student ethnicity data not collected for Cohort 1)

Ethnicity	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
Asian	N/A	8%	10%	15%	27%
Black	N/A	8%	10%	0%	9%
Chinese	N/A	0%	10%	0%	0%
Mixed	N/A	17%	0%	8%	0%
White	N/A	67%	70%	77%	55%
Prefer not to say	N/A	0%	0%	0%	9%

Figure 3 — Disability Characteristics of our CDT Students

Disability	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
Known disability (n)	N/A	25%	10%	23%	9%
No known disability (n)	N/A	58%	90%	62%	64%
Prefer not to say (n)	N/A	17%	0%	15%	27%

Figure 4 — Age Distribution of our CDT Students (age distribution data was not collected for Cohort 1)

Age	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
24 or under	N/A	59%	40%	54%	46%
25-29	N/A	8%	50%	15%	27%
30-34	N/A	17%	10%	15%	9%
35-39	N/A	8%	0%	8%	0%
40-44	N/A	0%	0%	0%	0%
45-49	N/A	8%	0%	0%	0%
50-59	N/A	0%	0%	8%	0%
60 and over	N/A	0%	0%	0%	0%
Prefer not to say	N/A	0%	0%	0%	18%

Figure 5 — Sexual Orientation of our CDT Students (sexual orientation data was not collected for Cohort 1)

Sexual Orientation	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
Bisexual (n)	N/A	25%	0%	15%	9%
Gay man (n)	N/A	0%	0%	0%	9%
Gay woman/lesbian (n)	N/A	9%	10%	8%	0%
Heterosexual (n)	N/A	50%	90%	54%	64%
Other (n)	N/A	8%	0%	0%	0%
Prefer not to say (n)	N/A	8%	0%	23%	18%

In December 2022, the National Centre for Diversity was commissioned to undertake a survey with members of our Centre (staff and students) to understand perceptions of how Fairness, Respect, Equality, Diversity, Inclusion, Engagement (FREDIE) is managed within the Centre.

The National Centre for Diversity reported that analysis of the results demonstrated positive results for the Centre stating:

'There are some very good responses, in particular around a feeling that colleagues are respectful, value and include each other. There is also an excellent level of awareness of what unconscious bias is among respondents, and not letting this affect their behaviour in a negative way. Respondents also feel that the Centre is committed to improving its FREDIE culture through ensuring that there is a 'zero tolerance' approach to discrimination, bullying and harassment.

There are also excellent results for how respondents feel about having an equal opportunity to succeed within the Centre, and fairness in terms of: recruitment, training & development, promotion, reward, and remuneration.'

# International Advisory Board

Our members

To ensure our Centre is inspiring, successful, challenged and of international relevance, we have set up an Advisory Board with academic members who are experienced in innovative training and who are setting the global computational science agendas.

Corporation for National Research Initiatives and the Defence Advanced Research Projects Agency and on the faculty of Stanford University. Vint Cerf sits on US National Science Board and is a Visiting Scientist at the Jet Propulsion Laboratory.

Vicki Hanson

Vicki Hanson FACM FRSE FBCS, is an American computer scientist noted for her research on human-computer interaction and accessibility and for her leadership in broadening participation in computing. She was named the Chief Executive Officer of the Association for Computing Machinery (ACM) in 2018 having served as its President from 2016 to 2018. Dr Hanson was a Distinguished Professor at the Rochester Institute of Technology within the HCI and Accessibility research groups. She was also Professor and Chair of Inclusive Technologies at the University of Dundee where she led multiple efforts related to inclusion of older adults and individuals with disabilities
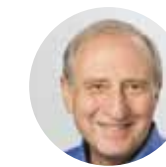
Ben Shneiderman

Ben Shneiderman is an American computer scientist, a Distinguished University Professor in the University of Maryland Department of Computer Science, which is part of the University of Maryland College of Computer, Mathematical, and Natural Sciences at the University of Maryland, College Park, and the founding director (1983-2000) of the University of Maryland Human-Computer Interaction Lab. He conducted fundamental research in the field of human-computer interaction, developing new ideas, methods, and tools such as the direct manipulation interface, and his eight rules of design.

Vint Cerf

At Google, Vint Cerf contributes to global policy development and continued spread of the Internet. Widely known as one of the "Fathers of the Internet," Cerf is the co-designer of the TCP/IP protocols and the architecture of the Internet. He has served in executive positions at the Internet Society, the Internet Corporation for Assigned Names and Numbers, the American Registry for Internet Numbers, MCI, the

Moshe Vardi

Moshe Vardi is an Israeli mathematician and computer scientist. He is a Professor of Computer Science at Rice University, United States. He is an expert in model checking, constraint satisfaction and database theory, common knowledge (logic), and theoretical computer science. He is the author of over 600 technical papers as well as the editor of several collections.

Elisabeth André

Elisabeth André is a full professor of Computer Science and Founding Chair of Human-Centered Multimedia at Augsburg University in Germany. She has a long track record in multimodal human-machine interaction, embodied conversational agents, social robotics, affective computing, and social signal processing. Drawing on the concept of computer-based role play with virtual characters, she has promoted a novel form of experience-based learning, for example, to help children and young people cope with bullying at school, develop intercultural sensitivity or master socially challenging situations, such as job interviews.

Anirudha Joshi

Anirudha Joshi is professor in the interaction design stream in the IDC School of Design, IIT Bombay, India. Anirudha is involved in designing interactive products for emergent users in developing economies. He has worked in diverse domains including healthcare, literacy, Indian language text input, banking, education, and industrial equipment. He received the IFIP Outstanding Service award in 2015 and the IFIP TC13 Pioneer Award in 2019. He is currently the VP Finance on the ACM SIGCHI Executive Committee, a member of the India HCI Steering Committee, and the chair of the INTERACT Steering Committee.

Charles (Chuck) Hansen

Charles (Chuck) Hansen is an IEEE Fellow and a Distinguished Professor of Computing in the School of Computing and a founding member of the Scientific Computing and Imaging Institute at the University of Utah. Chuck Hansen has published over 170 peer reviewed journal and conference papers and has been a co-author on three papers recognised with "Best Paper Awards" at the IEEE Visualisation Conference (1998, 2001, 2002). He was twice an Associate Editor in Chief (AEIC) of IEEE Transactions on Visualisation and Computer Graphics. His research has made contributions to the fields of scientific visualisation, computer graphics, parallel computation and computer vision.

Jinwoo Kim

Jinwoo Kim received his BS degree in computer science and statistics from Seoul National University in Seoul, South Korea. After receiving his master's degree from Courant Institute of Mathematical Sciences (New York University), he continued his study in the PhD program at the Real Time Compilation and Instruction Level Parallel Processing Lab of NYU as a research scientist. He subsequently became involved with the Center for Research in Embedded Systems and Technology (CREST) at the Georgia Institute of Technology in Atlanta, Georgia where he spent another two and half years conducting research funded by the Department of Defense, Hewlett-Packard and the State of Georgia.

Stakeholder Strategic Advisory Board

The purpose of our Stakeholder Strategic Advisory Board is to extend the pathways for cohort engagement during and after graduation; and provide horizon scanning input in terms of regional, economic and societal changes and how the Centre might respond to these.

Our Members

In 2023/24, the following people were members of our Strategic Stakeholder Advisory Board.

Elin Rhys

Elin Rhys grew up in Solva, Caernarfon and Llanelli. A graduate in Biochemistry from the then University of Wales Swansea in 1978, she worked as a scientist with the Welsh Water Authority before embarking on a career as a television presenter with HTV and S4C in 1984. In 1993, she founded her own television company with the aim of popularising science in the media, and to do so mainly through the medium of Welsh. Today, Telesgop is a multi-media company and has its headquarters in the city of Swansea. Telesgop productions – whether for television, radio or the Internet, in English and Welsh – are held in high esteem across the world. Fact-based programmes such as the Welsh-language farming and countryside magazine series, Ffermio, regularly attract the highest numbers of S4C's audience. The series Dibendraw, which highlights leading scientists of the past and present has provided a platform for some of Swansea University's science research stars to communicate their findings to the general public. Alongside science, Elin Rhys has produced documentaries that explore some of the foremost figures of Wales and the world. Among these are programmes such as Edward VIII's Murderous Mistress (Channel 4); The Davies Sisters: Bringing Art to Wales (BBC Wales); Heath v Wilson: the Ten Year Duel (BBC Four); Wallis Simpson: The Secret Letters (Channel 4); Darwin, Y Cymro a'r Cynllwyn (S4C); Syr Rhys ap Thomas – Cymro a laddodd Richard III (S4C); Gwirionedd y Galon: Dr John Davies (S4C) and documentaries on the musicians John Denver and Meat Loaf (BBC Four).
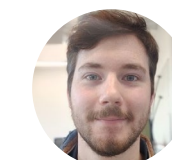
Rory Clark

Rory Clark is a member of Cohort 2 of our Centre. Rory's PhD centres around ethnographic study to ensure that, not only are current radiologists and radiographers comfortable and confident with the Machine Learning tools that they use, but are able to identify, critique and evaluate potential new machine learning systems that they may wish to implement in the future. Rory's external stakeholder partner is the National Imaging Academy of Wales.

Dr Jonathan Burnes

Joining from Swansea University, Dr Jonathan Burnes is tasked with overseeing delivery of the £1.3 billion investment portfolio throughout South West Wales. Dr Burnes has held a number of senior positions at the university in the last 12 years. These include Director of Information, Services and Systems; Digital Strategy Development Manager; and Associate Director of Planning and Strategic Projects. As the City Deal's Programme Director, Dr Burnes will establish and lead a new City Deal Programme Management Office that will coordinate a portfolio of major projects across the Swansea Bay City Region, which is made up of Carmarthenshire, Neath Port Talbot, Pembrokeshire and Swansea. The City Deal programme is aimed at creating conditions that attract business and simulate economic growth for the City Region, making it an even more attractive place to live, work, do business and invest.

Laura Clark

Laura Clark is the UKI NHS Value & Partnership Manager at Amicus therapeutics. As NHS Value & Partnership Manager Laura is responsible for leading strategic collaborations across the NHS, life science industry and academia. Laura began her career at Pfizer Pharmaceuticals and has over 15 years' experience of working within the pharmaceutical industry in a number of senior commercial and operational roles, developing and delivering strategic programs across the UK to support life science collaborations with health systems to improve health and well-being and achieve outcomes that matter to patients. Laura is currently leading the Amicus collaboration with Swansea University, focusing on improving patient outcomes in the area of rare disease.

Dr Peter Waggett

Dr Peter Waggett has had an extensive research and development career. He started work as a Senior Research Scientist at the Marconi Research Centre and is now IBM's Director of Emerging Technology. He has advised a number of public and private sector clients on how to harness innovative and disruptive technologies and acted as a subject matter expert on a number of major projects. He now leads teams of specialists who are charged with developing first of a kind and prototype systems using research and development assets for IBM's clients and partners.

The team is based at IBM's Hursley laboratory near Winchester and at the Hartree Centre near Daresbury. The teams include developers of IBM's Watson cognitive computing offerings and 'big data' analytic solutions.

Prof Helen Griffiths

Professor Helen Griffiths was appointed Pro-Vice-Chancellor with responsibility for Research & Innovation at Swansea University in August 2020. Prior to this, she was Executive Dean of the Faculty of Health and Medical Sciences at the University of Surrey. Previously, Helen was Pro Vice-Chancellor International following from five years as Executive Dean of Life & Health Sciences at Aston University. Helen has been a member of the respective University Executive Boards and Councils since 2009. Helen is responsible for leading the development, implementation and continuous improvement of Swansea University's Research & Innovation Strategy.

Mark Casey

Mark Casey heads up the UK Hydrographic Office's Research and Innovation function. Mark has 30 years' experience of utilising geospatial data to produce navigation products and services in both the Air and Maritime domains. Initially 22 years spent in the Royal Air Force making aeronautical maps, charts and publications for the RAF and wider joint forces and has spent the last 8 years at the UK Hydrographic Office leading the Research and Innovation team in exploring new technologies and tools to create new marine data and navigation Proof of Concepts for UK Defence and the commercial maritime markets.

Lizzie Hims

Lizzie Hims is the Human Computer Interaction (HCI) Portfolio Manager at EPSRC. They represent the ICT Theme on behalf of UKRI.

Centre Outputs

The Centre has produced some significant outputs. Table 1 shows PhDs Awarded and Submitted. Table 2 shows some destinations of Cohort 1. Table 3 shows all of the publications since the beginning of the Centre.

PhDs Awarded and Submitted

Cohort 1	PhDs Awarded and Submitted
Anna Carter	Co-creation InContext: An Evaluation of Interactive Technology Design for Enhancing Community Engagement with Public Spaces
Jakub Vincalek	Engineering Design Optimisation Using Computational Fluid Dynamics and Human-AI Collaboration
Connor Rees	Lessons for Extremist Content Moderation: Capturing a Visual Style of Extreme Right Imagery
Emily Nielsen	Beyond Rare Disease Patients: Exploring Machine Learning Interventions To Support People Experiencing a Diagnostic Odyssey
Luke Thomas	Deep Visual Place Recognition for Shoreline Imagery
Connor Clarkson	Human Interfaces with Machine Learning Recognition Systems

Destination of Cohort 1

Cohort 1	Destination
Anna Carter	Innovation Fellow – Northumbria University
Connor Clarkson	Research Assistant – Swansea University
Emily Nielsen	Senior Research Associate – University of Bristol
Suraj Ramchand	Post-Doctoral Researcher in Genetics for Diabetes – Exeter University
Connor Rees	Research Assistant – Swansea University
Luke Thomas	United Kingdom Hydrographic Office
Jakub Vincalek	HSBC
Ben Wilson	Research Assistant – Swansea University

Centre Publications

At the time of writing this report, all members of Cohort 1 have submitted their thesis except for four, who have been granted an extension to their candidature due to exceptional circumstances. Cohort 2 are in the process of completing their PhD. Cohorts 3 and 4 are progressing well with their PhD research. All members of Cohort 5 have successfully progressed into the PhD phase after completing their MSc thesis.

Publications by PhD researchers are listed below, with the researcher's name in **bold.**

Alan Dix, **Anna. R. L. Carter** and Miriam Sturdee. 2021. Where, Who, Why? Tools to Encourage Design In Context. In EduCHI 2021 Workshop, part of CHI 2021; May 15, 2021, Yokohama, Japan. https://educhi2021.hcilivingcurriculum.org/wp-content/uploads/2021/04/educhi2021-final90.pdf

Jakub Vincalek. It's the journey not the destination: building genetic algorithms practitioners can trust. In Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO '21). Association for Computing Machinery, New York, NY, USA, 231–232. July 10-14, 2021

Connor Rees. AVERT (Addressing Violent Extremism and Radicalisation to Terrorism) International Research Symposium – Violent Extremism at the Crossroads: Persistence, Change and Dynamism 20 years after 9/11. Islamic State's Exploitation of File-Sharing Sites: Which Platforms and Why? 2021, November 3–5. Symposium, Melbourne, Australia — Conference Presentation

Stuart Macdonald, **Connor Rees**, & Joost S. Remove, Impede, Disrupt, Redirect: Understanding & Combating Pro-Islamic State Use of File-Sharing Platforms. April 2022. https://www.resolvenet.org/research/remove-impede-disrupt-redirect-understanding-combating-pro-islamic-state-use-file-sharing

Pranjal Jain, Alex Jordan Blandin, Jacki O'Neill, Mark Perry, Samia Ibtasam, Paul G. Allen, Suleman Shahid, Beni Chugh, David Sullivan, Heloisa Candello, James Pomeroy, Rajat Jain, Robert Dowd, Matt Roach, Matt Jones. Platformisation of Digital Financial Services (DFS): The Journey of DFS in the Global North and Global South. CHI '22 Extended Abstracts: CHI Conference on Human Factors in Computing Systems Extended Abstracts, New Orleans, LA, USA, April 2022

Yashi Jain, **Pranjal Jain**. Donut Plugin: A Circular Design Tool to Implement Circular Economy. InCHI '22: ACM CHI Conference on Human Factors in Computing Systems, April 30 – May 06 2022, New Orleans USA.ACM, New York, NY, USA

Pranjal Jain, Anirudh Nagraj, Kartik Joshi, Taru Jain, Dilrukshi Gamage, Sayan Sarcar, Nova Ahmed. HCI Knowledge Dissemination in South Asia through both Coursework and Community Engagement. EduCHI'22, April 30-May 1 2022, New Orleans, LA, USA

Jennifer Pearson, Gavin Bailey, Simon Robinson, Tom Owen, Chi Zhang, Thomas Reitmaier, Cameron Steer, **Anna. R. L. Carter**, Matt Jones, Deepak Ranjan Sahoo, Dani Kalarikalayil Raju.l 2022. Can't Touch This: Rethinking Public Technology in a COVID-19 Era. InCHI '22: ACM CHI Conference on Human Factors in Computing Systems, April 30 – May 06 2022, New Orleans USA.ACM, New York, NY, USA. https://doi.org/http://dx.doi.org/10.1145/3491102.3501980

Alex Blandin, Matt J Roach, Matt Jones, Jen Pearson, Daniele Doneddu, David Sullivant. Co-Designing Explainable AI for a Mobile Banking App. InCHI '22: ACM CHI Conference on Human Factors in Computing Systems, April 30 – May 06 2022, New Orleans USA.ACM, New York, NY, USA. https://www.dropbox.com/s/etrs1qwio0avzh9/HCXAI2022_paper_23.pdf?dl=0

Craig MacDonald, Olivier St-Cyr, Colin. M. Gray, Leigh Ellen Potter, Carine Lallemand, Anna Vasilchenko, Jaisie Sin, **Anna. R. L. Carter**, Caroline Pitt, Eunice Sari, Deepak Ranjan Padhi, Ajit. G. Pillai. 2022. EduCHI 2022: 4thAnnual Symposium on HCI Education. InCHI '22: ACM CHI Conference on Human Factors in Computing Systems Workshops and Symposia,April 30 – May 06 2022, New Orleans USA.ACM, New York, NY, USA. https://doi.org/10.1145/3491101.3503703

Anna. R. L. Carter, Gavin Bailey, Jennifer Pearson, Matt Jones, Simon Robinson, Dani Kalarikalayil Raju, Jonathan Hicks, Spencer Winter. 2022. Designing and Embedding a Tangible Public Interface in the Covid Era. InCHI '22: ACM CHI Conference on Human Factors in Computing Systems Extended Abstracts,April 30 – May 06 2022, New Orleans USA.ACM, New York, NY, USA. https://doi.org/10.1145/3491101.3503556

Anna. R. L. Carter, Miriam Sturdee, Alan Dix, Dani Kalarikalayil Raju, Martha Aldridge, Eunice Sari, Wendy Mackay, Elizabeth Churchill. 2022. InContext: Futuring User-Experience Design Tools. InCHI '22: ACM CHI Conference on Human Factors in Computing Systems Workshops and Symposia,April 30 – May 06 2022, New Orleans USA.ACM, New York, NY, USA. https://doi.org/10.1145/3491101.3503739

Suraj Ramchand. Rare Clinical Event Modelling and Prediction for Covid Patients. Wales Data Nation Accelerator Event. 26th May 2022. Cardiff University Emily Nielsen, Think Zebra: 3 Minute Talk Finalist, June 2022. https://dl.acm.org/doi/10.1145/3531073.3531175

Anna R. L. Carter, Miriam Sturdee, Alan Dix. Prototyping InContext: Exploring New Paradigms in User Experience tools. AVI 2022: Proceedings of the 2022 International Conference on Advanced Visual Interfaces June 2022. https://dl.acm.org/doi/10.1145/3531073.3531175

Andy Gray, Alma A. A. Rahat, Tom Crick, Stephen Lindsay, Darren Wallace. Using Elo Rating as a Metric for Comparative Judgement in Educational Assessment. 2022 6th International Conference on Education and Multimedia Technology. July 13-15 2022. Guangzhou, ChinaUsing Elo Rating as a Metric for Comparative Judgement in Educational Assessment (researchgate.net)

R. S. Clark, M. Porcheron, M. Jones, P. Wardle, V. E. Whitchurch Perspectives On Machine Learning and Artificial Intelligence from Trainee Radiologists, Scientific Exhibit, July 13-17, 2022. https://dx.doi.org/10.26044/ecr2022/C-21806

Suraj Ramchand; Gavin Tsang; Duncan Cole; Xianghua Xie. RetainEXT: Enhancing Rare Event Detection and Improving Interpretability of Health Records using Temporal Neural Networks 27-30 September 2022 RetainEXT: Enhancing Rare Event Detection and Improving Interpretability of Health Records using Temporal Neural Networks | IEEE Conference Publication | IEEE Xplore

Macdonald, Stuart., **Rees, Connor**., and Joost S. Remove, Impede, Disrupt, Redirect: Understanding & Combating Pro-Islamic State Use of File-Sharing Platforms. Washington, D.C.: RESOLVE Network 2022. https://doi.org/10.37805/ogrr2022.1

Rees, C., Müller, B. All that glitters is not gold: trustworthy and ethical AI principles. AI Ethics (2022). https://doi.org/10.1007/s43681-022-00232-x

Ben Lloyd-Roberts, Phillip James and Michael Edwards. Mining Invariants from State Space Observations. https://nwpt.w.uib.no/files/2022/11/NWPT22_paper_3339.pdf

Luke Thomas, Michael Edwards, Austin Capsey, Alma Rahat, Matt Roach. Deep Visual Place Recognition for Waterborne Domains. The 29th IEEE International Conference on Image Processing (IEEE ICIP), Bordeaux, France in the period October 16-19, 2022

Matt Hall. Exploring Clinicians' Use and Perceptions of Patient-Reported Outcome Measures at a Tertiary Cancer Centre in Wales. ISOQOL 29th Annual Conference. 19-22 October 2022. Prague, Czech Republic

Jakub Vincalek, Sean Walton and Ben Evans. Evaluating the Effect of a Ducted Winglet on the Induced Drag of Wind Turbine Blade using CFD and Trefftz Plane Analysis. 19 April 2023. Engineering with Computers. Evaluating the effect of a ducted winglet on the induced drag of wind turbine blade using CFD and Trefftz plane analysis | SpringerLink

Colin. M. Gray, Craig. M. MacDonald, Carine Lallemand, Alannah Oleson, **Anna. R. L. Carter**, Olivier St-Cyr, Caroline Pitt. 2023. EduCHI 2023: 5th Annual Symposium on HCI Education. InCHI '23: ACM CHI

Ben Lloyd-Roberts, Phillip James, Michael Edwards, Simon Robinson, and Thomas Werner. 2023. Improving Railway Safety: Human-in-the-loop Invariant Finding. In Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (CHI EA '23). Association for Computing Machinery, New York, NY, USA, Article 389, 1–8. https://doi.org/10.1145/3544549.3573853

Emily Neilsen. CHI'23: A Patient Centered Approach to Rare Disease Technology; EICS23: Simulating the Rare Disease Diagnostic Journey; IDDHI'23: Motivations of Technology Use in Undiagnosed Rare Disease Patients (workshop)

Alex Blandin, Matt Roach, Daniele Doneddu, Jen Pearson, Matt Jones, David Sullivan. A position on establishing effective explanations from human-centred counterfactuals for automated financial decisions. 13/14 April 2023. AISB Convention 2023. Swansea University. aisb2023.pdf

L. Channon, M. Roach, L. Nouri Department and A. Rahat. The Use of Out-linking by the Far-Right. BISA 2023 Conference, 21-23 June 2023, Glasgow, Scotland

Anna R. L. Carter. Making Sense of Outdoor Public Places: Exploring the Role of Multisensory Interactions. 23rd June 2023. Northumbria University

Anna R. L. Carter, Marianna Obrist, Christopher Dawes, Alan Dix, Jennifer Pearson, Matt Jones, Dimitrios Zampelis and Ceylan Besevli. 2023. Scent InContext: Design and Development around Smell in Public and Private Spaces. In Designing Interactive Systems Conference (DIS Comapnion '23), July 10-14 2023, Pittsburgh, PA, USA. ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/3563703.3591455

Alex Blandin. Human-centred design study on establishing effective explanations based on counterfactuals for automated financial decisions. 23-28 July 2023. 25TH International Conference on Human-Computer Interaction. Copenhagan, Denmark

Jacub Vincalek - Analysing Extreme Right Visual Propaganda: Developing a Framework'. 20 Jul — 21 Jul, 2023. Terrorism Research in a Polarized World. 15th Annual International Conference.

Andy Gray, Alma Rahat, Tom Crick, Stephen Lindsay. A Bayesian active learning approach to comparative judgement within education assessment. Computers and Education; Artificial Intelligence Volume 6, June 2024 100245

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Centre Activities

Induction Event

On the 27th and 28th September 2023, we held an induction event at the Cawdor Hotel in Llandeilo to welcome our new Cohort of students. Key members of the CDT team were in attendance as well as some of our current CDT students. To encourage team bonding, the induction event included a visit to an iconic Welsh landscape at Dinefwr with acres of National Nature Reserve Parkland, a 17th Century manor house and castle ruins. Fun and thought provoking team activities were also organised throughout the event including "Picasso in a bag", quizzes and a creative animated video session.

Festival of Ideas

We were pleased to see the return of the Festival of Ideas on the 13th September 2023.

This year's Festival was organised by students from our Centre. The students wanted to share ideas, learn, network and have fun!

The agenda for the Festival was as follows:

Time	Session	Location
09:00 – 10:00	Registration, Breakfast and Welcome	Research Crucible (1st Floor)
10:00 – 11:00	Panel Discussion - Charting an Ethical and Inclusive Path: Navigating the Future of AI and Data-Intensive Systems	Research Crucible (1st Floor)
11:00 – 11:30	Coffee Break	Research Crucible (1st Floor)
11:30 – 12:30	AI Generated Paint Along Class with Jason Summers	Research Crucible (1st Floor)
12:30 – 14:00	Lunch Gower Dough Pizza	Computational Foundry Ground Floor
14:00 – 15:00	Presentations from PGR Students	Lecture Room 002 (Ground Floor)
15:00 – 16:00	Poster Showcase with Coffee	Ground Floor Foyer
16:00 – 17:30	Workshop - Zinemaking and Creative Crafts with Dr Angelika Strohmayer (Northumbria University)	Lecture Room 002 (Ground Floor)
18:00	Evening food, drinks and games	Research Crucible (1st Floor)

Feedback from the organisers and the attendees indicated that the Festival was a success, and in most cases, exceeded the expectations of all involved.

International Seminar Series and Masterclasses

We are proud of the calibre of people who have participated in our International Seminar Series and Masterclasses. These people and associated titles of their talks include:

Jonathan Lazar - A born-accessible model (BAM) of software and digital content development

Anirudha Joshi – Design for Unmet Needs

Madeline Balaam - Intimate Touch: Designing for Where Technology Meets the Body

Awais Rashid - Understanding Privacy Requirements of Marginalised and Vulnerable Populations

Duncan Brumby - Redefining Digital Engagement: Notifications and Productivity

Joel Fischer – Exploring the Capabilities and Potential of ChatGPT: A Deep Dive into Large Language Models and Interaction

Harold Thimbleby - Quack IT and How to Fix IT

Robert Bismuth - Fermat, Swansea University Alumni

Pejman Mirza-Babaei – Developing New Evaluation Methodologies, Tools and Data Visualisations for Games UX Evaluation

Richard Harper - Lancaster University - The Abstraction between User and LLMs: a discussion of the fundamental problem in interaction with State of the Art AI

All-Hands Research Retreat — Cardiff

This year we took all PhD cohorts on a research retreat to Cardiff. The programme was packed with a range of thought-provoking talks and activities including:

- An Introduction to Project Planning by Phillipa Salter-Remedios (Swansea University)
- An Audience with Dr Kevin McLafferty from HSBC
- An Audience with Reuben Mifsud from Tasika
- An Audience with Kevin Moss from Rescape
- Can we Collaborate with an Algorithmic System by Ben Wilson (Cohort 1 Researcher)
- Inspiring our next generation of postgraduates by Dr Louise Bright (University of South Wales)
- My Research: Why it Matters with Prof Matt Jones, Prof Markus Roggenbach, Prof Jen Pearson, Dr Pete Arnold and Prof Cinzia Giannetti
- An Introduction to ArtsArkade by Tunde Olatunji (Cohort 2 Researcher)
- My Research: Why it Matters with Prof Alan Dix
- Shaping Justice and Security Through Human-Centred Research with Dr Joe Whittaker and Dr Nicholas Micalef

As part of the Research Retreat, we also ran a 'Dragons' Den' activity. Cohort members were put into teams and tasked with developing a hypothetical artificial intelligence-based start-up idea. They were required to present their ideas for this start-up to an expert panel, in the style of the TV show Dragons' Den. The teams were given 10 minutes maximum in the Den to present their pitch. All team members were asked to contribute to the pitch, and present to the dragons. We recommended that each member of the team adopts the role of a senior executive in the start-up.

The goal of the activity was to get "investment" from the Dragons, who were asked to choose the most successful start-up, against the following set of key criteria/measures:

Criteria/measures

- The start-up idea should be based on the people-first movement
- The effectiveness and potential impact of your start-up
- The long-term sustainability of your start-up
- Your plans to promote your start-up
- Your influencing or persuasion skills
- How well, or otherwise, you manage the time
- Your engagement and communication skills
- The extent to which everyone played their part in your pitch
- Presenting skills

The expert panel, chaired by Dr Matt Roach, consisted of:

Prof Ian Mabbet – Deputy Pro Vice Chancellor for Research Culture at Swansea University

Elin Rhys – Founder of Telesgop media company with a specialist interest in producing scientific programmes

Dr Kevin Mclafferty – Head of Data and Analytics at HSBC

Emily Nielsen - (Cohort 1 Researcher)

Prof Alan Dix – Former Director of the Computational Foundry and Professorial Fellow at Cardiff Metropolitan University

The winning team, which was comprised of Alex Blandin (Cohort 2), Tunde Olatunji (Cohort 2), Jaquetta Robins (Cohort 4) and Manjiri Joshi (Cohort 4) proposed a citizen-science network for medical topics like prescription interactions, engaging with pattern recognition and recommendation, via federated and personalised learning; this would also provide a valuable data source for an underserved area that would be of significant benefit to research and prescribers at large.

The Research Retreat was deemed a huge success by all involved and we very much look forward to planning and executing our next event.

smirk experience

harnessing the power of comedy

Launchpad Crucible

Between the 6th March and 8th March 2024, the Centre organised its second 'Launchpad Crucible - Making Strong First Steps in Your Career' for Cohort 2.

Based on student feedback from the inaugural Launchpad Crucible, it was again facilitated by Sam Carrington - Founder of the Smirk Experience, and held off site in a venue in Llandeilo.

In 2012 Sam tried stand-up comedy and loved it. In the proceeding five years he's played close to 1,000 gigs, including a dozen or so festivals around the country and three full runs at the Edinburgh fringe festival.

He now promotes and mcs Smirk Experience nights for the public and corporations as well as participating in festivals and gigs as an independent comic. While combining his role at ITV and learning the ropes of stand-up comedy, Sam began observing the links between the corporate world and live performance, identifying areas such as public speaking, personal branding and creativity as possessing the most obvious crossover.

The Programme

This was the genesis of a concept that has now been successfully employed by Google, Investec, companies within Lloyds of London, leading UK media firms and more. The programme was designed to prepare the soon to-be PhD graduates to make strong first steps in their career outside of the Centre.

Basic Communications (*Sam Carrington*)
Ever wondered how stand-up comics remember a set, deal with nerves, bond with strangers (plus a million other things) and how you can use the same techniques in job interviews and presentations?

Personal Branding (*Sam Carrington*)
Branding is all around us. Jeff Bezos described it as 'what people say about you when you're not in the room' and if you aren't thinking about your personal brand then you should be.

How to Network (*Sam Carrington*)
People think this is a skill you either have or you don't, but they're wrong. Like anything, networking can be learnt and developed— you'll know how after this.

Creativity (*Sam Carrington*)
Children are some of the most creative people around, but adults can lose this skill easily unless checked. This module will show you how to have an endless stream of ideas for work, play or anything else.

An Introduction to Project and Time Management
(*Dr Steven Bidder, Planning and Strategic Projects Unit, Swansea University*)
Understand the basics of project and time management and why it is so important in any career you pursue.

Job Searching and Salary Negotiation
(*Sam Carrington*)
Learn how to job search properly and effectively and then practices, techniques and mindsets that will change how you approach negotiations about salary.

Team Working (*Sam Carrington*)
Individual achievements are dwarfed by what collaborations can do. Discover mindsets and techniques that will help you work with others to not only hit by surpass goals.

Resilience (*Sam Carrington*)
Contrary to common belief, everyone has to overcome obstacles. Successful people do it, unsuccessful people don't. Once you understand about how your primal brain can hold you back you won't hear from it again.

Positivity (*Sam Carrington*)
Henry Ford once observed 'if you think you can or can't do something you're probably right'. You'll learn how to foster and maintain a positive attitude for whatever life throws at you.

Advanced Communications (*Sam Carrington*)
For those who wish to, this is your chance to put what we learnt in the Basic Communication section into practice in a very safe, supportive environment.

Launchpad Feedback

'A first class, superbly executed and informative event'.

'The Launchpad Crucible has definitely boosted my confidence for moving into the next stage of my career'.

'Definitely an event not to be missed!'

The Masters' Year

As we enter the fifth and final cohort of the Centre, it is nice to be able to look back on four MSc training years. For Cohort 1 we were still as a Centre very much finding our feet. Now, as Cohort 4 enter their MSc projects, and we await the arrival of Cohort 5, we have a thriving hub of MSc and PhD researchers focused on putting people at the start and heart of the work they do. It is particularly great to see members of Cohort 1 approach their PhD thesis submission point after four years of excellent and purpose-driven research.

Last year we reported on a midpoint year of reflection and refinement, and outlined a range of improvements that have now been put into place to improve and enhance the operation of the Centre. Our physical home in the Computational Foundry is a much-improved and more welcoming space than when we first began, and is also increasingly lively and active after another year of in-person activities.

We have refined the range of taught modules and expanded the training opportunities available, and more of our members are able to get involved in cohort-led activities such as the Festival of Ideas (see details on page 18). Other highlights from this year include a Centre-wide retreat in Amsterdam to coincide with ACM CHI (in Hamburg). The timing of the conference meant that those in the MSc year were in the middle of their exam revision period during the event, but we extended the invitation to the whole Centre nonetheless, and were pleased that one Cohort 4 member chose to attend.

While timetabling of taught modules remains one of the key logistical challenges of the MSc year, the strong cohort-driven approach that we have created has helped and encouraged students to support each other. Because of this, Centre members have felt able to select modules across a broad range of subjects, and have benefited from the cross-disciplinary perspective that this brings.

In addition, as noted last year, the COVID-19 pandemic has led to lasting changes across the University that have supported this aspect. Course materials are available online to compensate for clashes, and cohort members help each other reciprocally, both strengthening bonds and enabling broader study across disciplines. As we write this, Cohort 4 are beginning their MSc projects, and looking forward to three further years of human-centred and impactful research. We welcome our fifth and final cohort in October, and look forward to another enjoyable and fulfilling MSc year.

Cohort Perspectives

Cohort 3 — Saskia Davies

Throughout my time studying at the Centre, this year has involved the most change. With the final cohort joining last September, the office has been livelier and more active than I can ever remember. All cohorts mingle together, discussing research, external activities and social plans. Social Impact Projects have also been successful so far, fostering productive collaborations between Cohorts 3 and 4.

From recent conversations, individual projects seem to be going well overall. Many of us have been busy meeting stakeholders, travelling to conferences, and presenting research to international audiences. Regular events and invited speakers involve us with state-of-the-art research, both directly related and tangential to our own, within an inclusive and influential community. With this support, most seem to be on track with their expected workload.

Lastly, being the final year for Cohort 1, we're about to see the first CDT graduations. While some members have now finished their studies and found successful jobs elsewhere, some are finalising their research alongside their preparations for future endeavours. Their absence is noticeable despite the new influx of students, and we're already missing them a lot. We wish them all the best!

Cohort 4 — Matt Plozajski

At time of writing I have completed the masters year of the course and am now 11 months into the PhD proper. As a non-computer scientist, I have often found it challenging to adapt to working with AI and machine learning. Despite the challenge (and probably because of it), I am really pleased with the skills and knowledge imparted during the MSc year and I have found these have set me up well for the PhD Project

I have found all of my supervisors to be very supportive and engaged in my project and in particular the other CDT students have been an ever-present support.

Having worked in healthcare and research for 8 years prior to starting this degree I sometimes found the taught elements of the course to be frustratingly low-stakes. With nothing but grades to be achieved, it was often difficult to motivate myself to spend my evenings writing school reports. However, now that the project has begun I am finding working in a team comprising academics, clinicians and industry stakeholders to address real medical challenges using cutting edge research to be really exciting. Even within the first year of my project I have traveled to SanDiego to present a poster, spoken to groups of doctors at the University Hospital of Wales and co-authored numerous publications.

In summary, I have found the course challenging, although I am very pleased with the skills that I am developing. The staff and students have been a constant support and I feel confident in my ability to continue to succeed as my project continues. Finally, working to address real world challenges with such a broad team of collaborators provides an stimulating environment and I am excited to see what comes next on my project."

Cohort 5 - Lewis Hall - Rudford

When joining the CDT, the first thing you notice is how welcoming and supportive the community is, both the staff and other cohorts. For Cohort 5, our journey began with an induction retreat, where we had the chance to socialise with fellow cohort members, students from other years, and the CDT staff. This experience quickly eased any initial anxieties and helped us feel integrated into the community right from the start. Following on from the induction, we were quickly made welcome in the office space and from there we were ready to go. Throughout the year, Cohort 5 has had the opportunity to develop invaluable skills through a diverse range of modules covering various disciplines. These modules have not only broadened our perspectives and equipped us with the tools necessary for conducting research, but also given us a chance to develop and mature together as a cohort.

New Stakeholders and Projects

Project allocation for Cohort 5 is as follows:

Stakeholder	Project Title & PhD Student
BEAM Connectivity	Addressing Automotive User-Centric Privacy and Security: AI-Based TCU Analysis **Reza Foratikashani**
GSK	User Interfaces, Visualisation and Modelling for Targeting Cancer Treatments – **Alex Gregory**
HSBC	Financial Behaviour Learning And Inference Via Graph Learning For Improved Customer Care – **Jumaira Miller**
HSBC	Uncovering Promoters and Detractors of Customer Experience Using Participatory Methods and Machine Learning – **Jade Logan**
HWB360	Deciphering Essential Factors in Predictive Air Quality Modelling: Informing Human-Centric User Behaviour and Environmental Design Decisions – **Lewis Hall-Rudford**
QinetiQ	Adversarial Autonomous Agents: Implementation and Application in the Context of Cyberterrorism – **Tom Wood**
Microsoft Research Africa	Transforming the Global South with Equitable Generative AI – **Boyd Migisha**
National Imaging Academy Wales	Trust-Enhanced Natural Language Processing for Standardisation of Radiology Reports – **Margarita Deli-Slavova**
Tasika	Proactive primary care with multimodal data integration – **Rewash Ale**
Protium	Human-Centric Predictive Maintenance to Optimise Asset Performance in a Hydrogen Plant – **Mathew Humphreys**

New stakeholder landscape:

This cohort marks the final group under the EPSRC EPIC Centre. We remain grateful to all stakeholders - private, public,and governmental agencies - for their invaluable support in advancing human-centred AI research through real-world challenges. Over the past five years, the Centre has established a strong reputation for understanding and addressing real-world issues by developing innovative, problem-driven, and personalised AI technologies for our stakeholders. We will continue to build on this foundation, supported by both existing and new stakeholders based in the UK and abraod,as well as the university's match-funded PhD research programme.

For our next cohort (the sixth), we are in advanced discussions with several new stakeholders. With AntiVerse, we will aim to design bispecific antibodies and develop predictive models for protein conformational changes. Our work with Jiva will focus on creating AI models for autonomous planning and decision-making, enhancing interoperability between AI systems. Collaborating with All Wales Medical Genomics Service, we aim to integrate multimodal genomic and health data to uncover cancer drivers. For Betsi Cadwaladr University Health Board, we are very excited to develop AI technology to unify fragmented Electronic Health Records for advanced predictive analytics. The Development Bank of Wales will benefit from our research on novel AI tools for improved loan decision-making and credit risk assessments. Finally, we are also looking to assist the DVLA in modernising data querying and testing processes using large language models. More discussions are ongoing with Pearson, Ordnance Survey, Infonetica, Net Consulting, Antillion, and The Financial Conduct Authority.

Social Impact Projects

Sustainable Footprints: Enhancing Community Group's Carbon Tracking and Reduction
Team: Megan Ford, Manal Ghanem and Jaq Robins

The project aims to enhance community engagement in managing carbon footprints by integrating advanced tools and action plans to address existing gaps in tracking methods. It involves reviewing and updating current carbon tracking tools, developing an app and dashboard for precise footprint calculation and visualisation, and collaborating with community groups for implementation and feedback. Additionally, the project will provide educational resources on sustainable practices. By combining technological innovation with community involvement, the initiative seeks to create practical tools for environmental awareness and empower communities to accurately monitor and reduce their carbon footprints. The impact extends beyond merely collecting data; it fosters sustainable behaviors and supports community-led environmental initiatives, offering tailored recommendations for continuous environmental improvement.

Age-Friendly Digital Banking Project
Team: Pranjal Jain, Aaron Rees, Tony Zhang

The project aims to enhance digital banking accessibility for older adults and people with disabilities in the UK, addressing significant challenges faced by these groups and promoting financial inclusion. To achieve this, the project will gather insights through diary studies, observations, and focus groups involving older and disabled users to identify usability issues. Based on this research, the team will co-design and develop digital banking solutions, creating prototypes informed by user feedback. The ultimate goal is to improve digital banking experiences for these users, ensuring that banking platforms are inclusive and tailored to their needs while countering misleading practices. By focusing on user-centric design, the project strives to make digital banking more accessible, equitable, and effective for older adults and people with disabilities, fostering a more inclusive financial environment.

Creating Supplementary Learning Material to Teach AI Concepts
Team: Manjiri Joshi, Daisy Walham

The project aims to improve the teaching of computing concepts, including AI, to school children by developing engaging supplementary materials and activities. It will create interactive resources such as activities, worksheets, tests, and lesson plans designed for a semi-supervised learning environment. The team will iteratively refine these materials based on feedback from educators to ensure they are effective. This initiative addresses the challenges of teaching computing and AI by providing innovative, practical resources that help students understand abstract concepts more clearly. It also supports educators with valuable tools, ultimately enhancing the overall educational experience and outcomes in computing.

Cronicl Enhancement for Community Science
Team: Jason Summers and Laura Smith

Building on the previous work with Down to Earth, we aim to improve the Cronicl web application by integrating gamification and refining its features, ultimately enhancing student engagement and community science efforts. The project involves synthesising realistic data to test gamification techniques, designing an inclusive achievement structure, and collaborating with previous team members to develop a functional prototype. A study will be conducted to assess how motivation features impact user engagement. By advancing Cronicl, the project aims to boost student participation in community science, facilitate better data collection for biodiversity, and encourage healthier lifestyles and community connections through interactive technology.

Discovery SVS Website Redesign and Functionality Improvement
Team: Rachel Hill and Meg Morgan
The project aims to boost accessibility for volunteers, streamline donation processes, and enhance efficiency through a comprehensive redesign of Discovery's website and the introduction of new features. The team will conduct user studies to inform the creation of a new donation page and a more accessible website. They will also integrate features for logging volunteer hours, ensure system compatibility, and develop a dedicated volunteer app with social media integration. This initiative will strengthen Discovery SVS's capacity to support the local community, improve the university's relationship with Swansea, and facilitate better reporting and management of volunteer hours.

Swansea's Musical Heritage - Strand 1: Music Archiving
Team: Matt Ploszajski, Dylan Parry, Andreas Christodoulides

The project is dedicated to preserving and digitising Swansea's musical heritage by creating a comprehensive digital archive of historically significant music. It aims to ensure the longevity and accessibility of this cultural legacy through meticulous collection, cataloguing, and digitisation of musical artifacts, recordings, and documents linked to Swansea's musical history. Key activities include researching local music history, collaborating with musicians and historians, and applying digital preservation techniques. The project will culminate in a digitised archive that will serve as a vital resource for preserving local culture, supporting research into Swansea's musical past, and broadening access to this rich heritage. Additionally, the archive is expected to enhance educational initiatives, boost cultural tourism, and cultivate local pride and identity through the celebration of Swansea's musical legacy.

Swansea's Musical Heritage - Strand 2: Website Development
Team: Charlie Bramble, Connor Atkins, Saskia Davies

Swansea Musical Heritage project aims to enrich the Swansea Music Hub's resources by developing an online platform to archive and showcase Swansea's musical history. This phase builds on information gathered in Strand 1, focusing on creating a digital resource that connects historical music sites in Swansea through QR codes. The project will involve collaborating with the Swansea Music Hub and the Digital Humanities Department to design the website, with ongoing updates based on their feedback. Key tasks include drafting the website's design, finalising a pilot version, and integrating geo-tagging to link digital content with physical locations.

Stakeholder Perspective

HSBC

Continuing our partnership with the Centre has been highly productive and professional. Their onboarding process was well-structured, with a strong understanding of our business needs and an ability to translate those into relevant research outputs. The research scoping sessions, along with the sandpit discussions, provided valuable opportunities to engage with students and refine our project goals. The selection of the excellent PhD students for the projects was thorough, ensuring alignment with our objectives and resulting in a beneficial collaboration. We appreciate the Centre's professionalism and efficiency throughout the process and look forward to furthering the collaborations.

We have two exciting projects this year – both aiming to transform HSBC's financial services by using advanced AI and deep learning to enhance personalisation, customer satisfaction, and accessibility. One project aims to leverage dynamic and evolving graph structures through deep learning techniques to understand individual financial behaviour more accurately and in real-time. The findings will help us to better understand user needs, personalise financial products, and ultimately improve accessibility and equality in financial services. The other project aims to address HSBC's Net Promoter Score (NPS) in its Commercial Banking division by investigating factors affecting customer satisfaction.

Dr Kevin McLafferty

Head of Data and Analytics, HSBC

Microsoft Research Africa

In addition to our ongoing collaborations with Swansea University, we are delighted to sponsor a novel PhD research that is strategically aligned to Microsoft Research Africa. Our collaboration with both the Centre and the University has been enjoyable, professional and productive.

The PhD research (Transforming the Global South with Equitable Generative AI) aims to adapt Generative AI (GenAI) to meet the unique needs of businesses and communities in the Global South, particularly in Africa. By addressing current limitations of GenAI—such as its inability to produce culturally relevant and coherent content—this initiative seeks to drive economic growth and disrupt global inequities. The research will fine-tune AI models for African contexts, focusing on healthcare and storytelling. Collaborating with local experts and leveraging ethnographic research, the initiative will develop scalable, low-bandwidth solutions that empower small businesses and ensure that AI technology benefits all, laying the groundwork for global applicability.

Dr Jacki O'Neill

Director of Microsoft Research Africa

National Imaging Academy Wales

We have developed a strong working partnership with the Centre and our experience to date has proven to be a successful collaboration. We look forward to building on the relationship in the years to come. Our collaborative project aims to develop an NLP system to transform unstructured radiology reports into structured formats,enhancing communication between radiologists and clinicians. This system will allow radiologists to maintain their personalised styles while ensuring clinicians receive clear, standardised information,and thereby improving the diagnostic efficiency. It will also provide rapid feedback for trainees,enhancing their training and care quality. By focusing on practitioner trust and integrating feedback, the project ensures a smooth transition to new technology.

Dr Phillip Wardle (Director) & Tracy Norris

(Academy Manager), National Imaging Academy Wales

Health and Wellbeing 360

Our collaboration with the Centre has strengthened the three key components essential for a successful academic-industry relationship: problem identification, timely solution-finding, and effective knowledge transfer. Our research collaboration will aim to leverage advanced machine learning techniques to enhance the understanding of indoor air quality (IAQ). The primary goal is to determine how various environmental factors, including building characteristics and human behaviours, affect IAQ. By doing so, the project seeks to develop predictive models that can inform guidelines and recommendations for both residents and designers of built environments. This research is crucial in addressing the high incidence of respiratory diseases in Wales and is aligned with global efforts to improve public health by enhancing IAQ.

Dr Phillip Webb

CEO, Health and Wellbeing 360

Qinetic

Our experience of engaging with the EPIC Centre at Swansea University has been both enjoyable and very rewarding. As a mission-focussed business that works exclusively for UK Government customers, we at Naimuri are principally concerned with one key goal: to make the UK a safer place. We achieve this by developing innovative software solutions which draw on the latest research and leveraging our close relationships with our academic network. Working with the Centre, we have found they understand the need for excellence, and have demonstrated a commitment to providing real-world value and mission impact. Their data-driven approach translates very well to industry and allows for immediate application from research to current and difficult problems. Their multidisciplinary team of academic staff and PhD candidates have provided additional expertise and knowledge across a number of domains that have strongly contributed to ensuring national security. We look forward to furthering our collaboration and continue bringing cutting edge developments in research to our customers.

James Ramsden

(Data Science Capability Lead, Naimuri) and Richard Bryant (Lead Academic Partnership, QinetiQ)

Protium

Our collaboration with the Centre has been extremely positive, characterised by open and inspiring discussions that have significantly influenced our project's direction. The Protium project focuses on advancing sustainable hydrogen production through innovative, data-driven methods. Our aim is to develop efficient, cost-effective, and environmentally friendly processes for hydrogen generation by researching new materials and techniques to improve efficiency and scalability.

The project specifically addresses the challenges of implementing predictive maintenance in a 2.5 MW electrolytic hydrogen production facility. By integrating digital twin technologies with human operators, we seek to forecast equipment failures before they occur, thereby reducing downtime and optimizing asset performance. This approach aims to enhance operational efficiency, reduce costs by preventing unexpected failures, improve safety by early identification of potential issues, and support our Net Zero ambitions through optimized energy use. The outcomes of this project are expected to advance both our understanding and capabilities in hydrogen production, paving the way for practical applications that benefit the industry and the environment. Working with the Centre has been a rewarding experience, and we look forward to continuing this fruitful collaboration.

Anthony Byrne

Head of Engineering and Construction) and Pietro Beretta (Data Scientist), Protium

BEAM Connectivity

We have been working closely with Swansea University since 2022 on AutoCHERI, an Innovate UK funded cybersecurity project focussed on the Automotive sector. All engagements with the team from Swansea have been highly collaborative and I have been impressed with the level of insight and professionalism throughout. Our work together has been so beneficial that we are delighted to embark on a new PhD research project with the EPIC Centre for Doctoral Training in Q4 2024.

The project aims to enhance the cybersecurity of connected and autonomous vehicles by developing an AI-driven solution for analysing and securing Telematics Control Units (TCUs).

With the rise of connected devices in vehicles, TCUs face significant risks of attacks, leading to potential data breaches and privacy violations. This project intends to implement advanced machine learning techniques to enhance security monitoring, intrusion detection, and anomaly detection of TCU data in real-time. By using explainable AI and federated learning, the project will ensure that user privacy is protected while still allowing for effective threat analysis and response.

Rob Potter

Chief Technology Officer, Beam Connectivity

Collaborating with the Centre has been a rewarding experience. From the start, the onboarding process, including the sandpit and interview phases, was both enjoyable and insightful, providing us with a clear understanding of Centre process and research scoping. The Centre's team has fostered a welcoming environment that encourages creativity and open communication.

TASIKA

Our research collaboration aims to develop machine learning models to predict clinical events for patients with chronic conditions by integrating primary, secondary, and social care data. This integration seeks to identify early health indicators, reduce healthcare costs, and improve efficiency. A user-centred approach will be key to developing explainable AI interfaces tailored for patients and healthcare professionals, enhancing collaboration and decision-making. Our research will also explore collaborative opportunities with other health projects within the Centre that are integrated into Health Boards.

For an SME, leveraging the latest technology and data is crucial, but it must be applied to real-world commercial applications. Collaborating with the Centre provides tangible access to diverse expertise, funding, and the ability to tackle larger challenges aligned with desired outcomes. We eagerly anticipate continuing this partnership, confident that our combined efforts will lead to innovative solutions and impactful results that will advance our shared goals.

Reuben Mifsud (Managing Partner), Lee Melia

(Chief Operating Officer), Tasika

The Director's End Note - Into the 6th Year

We continue to see strong demand from partners in the public, private and third-sectors and I'm delighted that we are building a prototype, small 6th Cohort (that starts October 2024) and plans for a larger 7th Cohort in 2025. We are always open to starting new conversations and journeys with stakeholders large and small who want to be part of and shape our vision and mission – please get in touch (full details of how to do so are on our website).

2023-2024 saw a lot of hype about AI – much of it overselling the possibilities while overlooking the near and present dangers as well as transformative opportunities. Our Centre has always been convinced that the best way to proceed is to focus on the most important technology of all – people - people like you and me, unique, diverse and wonderful creations. With this focus, over the years, we have seen novel, useful and positively disruptive computational science flow from our work. But, as always, the best is yet to come!

Matt Jones

Matt Jones
Director
October 2024

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