

The Deep Dementia Phenotyping (DEMON) Network: A global platform for innovation using data science and artificial intelligence

Janice M Ranson¹ | Ahmad Al Khleifat² | Donald M Lyall³ | Danielle Newby⁴ |
Laura M Winchester⁴ | Petroula Proitsi² | Michele Veldsman⁴ | Timothy Rittman⁵ |
Sarah Marzi^{6,7} | Zhi Yao⁸ | Nathan Skene^{6,7} | Conceição Bettencourt⁹ |
Andrey Kormilitzin⁴ | Isabelle F Foote¹⁰ | Cecilia Golborne¹ | Ilianna Lourida¹ |
Magda Bucholc¹¹ | Eugene Tang¹² | Neil P Oxtoby⁹ | Peter Bagshaw¹³ |
Zuzana Walker⁹ | Richard Everson^{1,14} | Clive G Ballard¹ | Cornelia M van Duijn⁴ |
Kenneth M Langa¹⁵ | Malcolm MacLeod¹⁶ | Kenneth Rockwood¹⁷ |
David J Llewellyn^{1,14}

¹University of Exeter, Exeter, United Kingdom

²King's College London, London, United Kingdom

³University of Glasgow, Glasgow, United Kingdom

⁴University of Oxford, Oxford, United Kingdom

⁵University of Cambridge, Cambridge, United Kingdom

⁶UK Dementia Research Institute, London, United Kingdom

⁷Imperial College London, London, United Kingdom

⁸LifeArc, London, United Kingdom

⁹University College London, London, United Kingdom

¹⁰Queen Mary University of London, London, United Kingdom

¹¹Ulster University, Derry, United Kingdom

¹²Newcastle University, Newcastle, United Kingdom

¹³Somerset Clinical Commissioning Group, Yeovil, United Kingdom

¹⁴Alan Turing Institute, London, United Kingdom

Abstract

Background: The increasing availability of large high-dimensional data from experimental medicine, population-based and clinical cohorts, clinical trials, and electronic health records has the potential to transform dementia research. Our ability to make best use of this rich data will depend on utilisation of advanced machine learning and artificial intelligence (AI) techniques and collaboration across disciplinary and geographic boundaries.

Method: The Deep Dementia Phenotyping (DEMON) Network launched in 2019¹ to support the growing interest in machine learning and AI. Led by Director Prof David Llewellyn and Deputy Director Dr Janice Ranson, the leadership team additionally includes 5 Theme Leads and 14 Working Group Leads, supported by an international Steering Committee of world-leading academics. Core funding is provided by Alzheimer's Research UK, the Alan Turing Institute and the University of Exeter, with additional support from strategic partners including the UK Dementia Research Institute and the Alzheimer's Society. Grand Challenges were established at a National Strategy Workshop in June 2020. Multidisciplinary Working Groups were formed to coordinate practical activities in seven key areas: Genetics and omics, experimental medicine, drug discovery and trials optimisation, biomarkers, imaging, dementia prevention, and applied models and digital health. Additional Special Interest Groups coordinate topic specific collaborations.

¹⁵University of Michigan, Ann Arbor, MI, USA

¹⁶University of Edinburgh, Edinburgh, United Kingdom

¹⁷Dalhousie University, Halifax, NS, Canada

Correspondence

Janice M Ranson, University of Exeter, Exeter, United Kingdom.

Email: J.Ranson@exeter.ac.uk

Result: Membership on 4th February 2022 comprised 1,321 individuals from 61 countries across 6 continents (see Figure). Areas of expertise include dementia research (904; 68%), data science (692; 52%), clinical practice (244; 18%), industry (162; 12%), and regulation (26; 2%). Individual membership is free, and regular knowledge transfer events are provided including a monthly seminar series, talks and workshops, training, networking, and early career development. Each Working Group meets monthly, with multiple grants, reviews, and original research articles in progress. Eight state of the science position papers are in preparation, resulting from a Symposium held in April 2021. In January 2022, 110 early career researchers participated in the Network's flagship event 'NEUROHACK', a 4-day competitive global hackathon, with pilot grants awarded to those generating the most innovative solutions.

Conclusion: The DEMON Network is a rapidly growing global platform for innovation that is supporting the global dementia research community to collaborate. Find out more at demon dementia.com

