

## EXPLOITATION

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

Janice M Ranson<sup>1</sup> | Ahmad Al Khleifat<sup>2</sup> | Donald M Lyall<sup>3</sup> | Danielle Newby<sup>4</sup> |  
 Laura M Winchester<sup>4</sup> | Petroula Proitsi<sup>2</sup> | Michele Veldsman<sup>4</sup> | Timothy Rittman<sup>5</sup> |  
 Sarah Marzi<sup>6,7</sup> | Zhi Yao<sup>8</sup> | Nathan Skene<sup>6,7</sup> | Conceição Bettencourt<sup>9</sup> |  
 Andrey Kormilitzin<sup>4</sup> | Isabelle F Foote<sup>10</sup> | Cecilia Golborne<sup>1</sup> | Ilianna Lourida<sup>1</sup> |  
 Magda Bucholc<sup>11</sup> | Eugene Tang<sup>12</sup> | Neil P Oxtoby<sup>9</sup> | Peter Bagshaw<sup>13</sup> |  
 Zuzana Walker<sup>9</sup> | Richard Everson<sup>1,14</sup> | Clive G Ballard<sup>1</sup> | Cornelia M van Duijn<sup>4</sup> |  
 Kenneth M Langa<sup>15</sup> | Malcolm MacLeod<sup>16</sup> | Kenneth Rockwood<sup>17</sup> |  
 David J Llewellyn<sup>1,14</sup>

<sup>1</sup>University of Exeter, Exeter, United Kingdom

<sup>2</sup>King's College London, London, United Kingdom

<sup>3</sup>University of Glasgow, Glasgow, United Kingdom

<sup>4</sup>University of Oxford, Oxford, United Kingdom

<sup>5</sup>University of Cambridge, Cambridge, United Kingdom

<sup>6</sup>UK Dementia Research Institute, London, United Kingdom

<sup>7</sup>Imperial College London, London, United Kingdom

<sup>8</sup>LifeArc, London, United Kingdom

<sup>9</sup>University College London, London, United Kingdom

<sup>10</sup>Queen Mary University of London, London, United Kingdom

<sup>11</sup>Ulster University, Derry, United Kingdom

<sup>12</sup>Newcastle University, Newcastle, United Kingdom

<sup>13</sup>Somerset Clinical Commissioning Group, Yeovil, 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 2019<sup>1</sup> 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

- <sup>14</sup>Alan Turing Institute, London, United Kingdom
- <sup>15</sup>University of Michigan, Ann Arbor, MI, USA
- <sup>16</sup>University of Edinburgh, Edinburgh, United Kingdom
- <sup>17</sup>Dalhousie University, Halifax, NS, Canada

**Correspondence**

Janice M Ranson, University of Exeter, Exeter, United Kingdom.  
Email: [J.Ranson@exeter.ac.uk](mailto:J.Ranson@exeter.ac.uk)

prevention, and applied models and digital health. Additional Special Interest Groups coordinate topic specific collaborations.

**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 [demonementia.com](http://demonementia.com)

