Institution: Middlesex University
Unit of Assessment: 11

This was an award-winning article in *Physiological Measurement* with significant contribution by the research group at Middlesex comprising accurate forward models of adult male and female thorax, but more specifically of an infant's thorax. These significant developments of EIT led to four significant grants that ultimately allowed this work to be applied in a clinical setting. The first from EPSRC in 2008, resulted in the contribution to the Electrical Impedance and Diffuse Optical Reconstruction Software project (EIDORS). This is a freely available website that provides software algorithms for forward and inverse modelling for EIT and Diffusion based Optical Tomography in medical and industrial settings. This site is also used worldwide to share data and promote collaboration between groups working in this area (over 2000 downloads and cited on over 100 published papers).

Clinical translation and hardware development ***(2016 onwards)***

The research described above allowed the team to develop algorithms and hardware for image reconstruction, parameter measurement and boundary form generation [6]. This culminated in the first large scale study monitoring the lung function of 200 neonates (preterm, high risk) for 72 hours each. As a result of this work the team at Middlesex University led a successful EU funding application (Horizon 2020) for €5M in 2016 for a project entitled "Continuous Regional Analysis Device for Neonate Lung (CRADL)" leading to a clinical system for use in neonatal intensive care units. Dr Bardill joined the project in 2016 to progress hardware development, create a new wearable device and continues to be part of the team with Prof Bayford and Dr Tizzard going forward. The work continues with follow-

[6] Sven Nordebo, Mariana Dalarsson, Davood Khodadad, Beat M uller, Andreas Waldman, Tobias Becher, Inez Frerichs, Louiza Sophocleous, Daniel Sjoberg ,Nima Seifnaraghi , Richard Bayford. (2018) A parametric model for the changes in the complex valued conductivity of a lung during tidal breathing in Journal of Physics D Applied PhysicsDOI: 10.1088/1361-6463/aabc04.

4. Details of the impact (indicative maximum 750 words)

Software and data impact:

(4.1) The GREIT algorithm with new forward models is being adopted by a manufacturer of EIT systems (Swisstom/SenTec)[1,] which will represent a significant improvement for commercial medical EIT systems in product development for EIT-based monitoring of neonate patient respiration and regional air content within patient's lungs at the bedside. (2018) (5.1) It has also been adopted by Emergex to extend EIT for other applTc 0 Tw 11.10Tw 11.10Tw 11.10Tw 1-[10Tss.9 ( )1

been involved with it use. This includes Cyprus who had not previously been