

# Calibration of Disease Models for National Screening Programmes - Short Term Scientific Mission - Scientific Report

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<b>STSM Grantee</b>	Daria Semochkina
<b>STSM Title</b>	Calibration of Disease Models for National Screening Programmes
<b>Home Institution</b>	University of Limerick (UL), Limerick, Ireland
<b>Host Institution</b>	ScHARR, University of Sheffield, Sheffield, United Kingdom
<b>STSM Period</b>	5 <sup>th</sup> September 2016 to 25 <sup>th</sup> September 2016
<b>STSM Purpose</b>	The motivation for this scientific mission was to learn from the experience that ScHARR group has. That would provide additional knowledge of screening policies and the medical decision making process.

## Report

The motivation for this short term scientific mission was primarily to work closely with the ScHARR (School of Health and Related Research) group, which was involved in the calibration of the colorectal cancer study that has resulted in developing a screening program for England. The group has had subsequent interactions with the service and refined how it is delivered. Dr. Sophie Whyte was the main contact for this visit; however, I had discussed multiple techniques and approaches, related to my research with Alice Bessey<sup>1</sup>, Jeremy Oakley<sup>2</sup> and Mark Strong<sup>2</sup>.

Prof. Jeremy Oakley, alongside Dr. Mark Strong, was involved in Bayesian calibration for computer models using likelihood emulation. In situations, where a forward model is computationally expensive (as it is in our project), there might be ways of approximating the forward model. That

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reduces computational time significantly, when using MCMC methods with long chains, in combination with high dimensional space and a heavy forward model. One of the methods is Gaussian emulation: the forward model is being approximated by a Gaussian process. Dr. Oakley and Dr. Strong were involved in an uncertainty quantification project, which was very similar to our project. It was discussed if this technique can be used to speed up our computation time and how those methods were being implemented in their project. I plan to be able to incorporate those techniques into my work and a journal publication by the end of 2017.

My visit helped me to further develop the collaboration between our group and ScHARR which was initiated during a health technology assessment for the health information and quality authority (HIQA) about bowel screening. The latest developments in the field as well as the practices of UK biennial faecal occult blood testing (FOBT) screening program and similar were discussed.

Alice Bessey is currently working on a workload model for HPV screening in the UK. In particular, how people move through the system in the UK was discussed. The main concerns of the people involved in the process of delivering the screening were highlighted by Ms. Bessey. It was also emphasized by Ms. Bessey, that their model showed the ineffectiveness of additional vaccination, where the screening is present. Similar results were underlined in the literature previously. Those discussions gave me an insight on how mathematical modelling of disease can be improved in collaboration with those delivering the screening programme.

ScHARR group's recent report, the model, that they used for predictions, along with different calibration techniques were discussed in detail with Dr. Whyte and her colleagues during my visit. Learning from Dr. Whyte's experience in England's screening processes and modelling was extremely beneficial to my research and provided additional knowledge of different screening policies and the medical decision making process.

Dr. Whyte plans to visit in spring 2016 to present a seminar. We will continue to work together then. Skype calls have also been scheduled to further discuss the results. I plan to continue my visits to ScHARR as a part of my PhD project.

The funding for this STSM has greatly aided my research and my research plan for the remainder of my PhD. The allocation of €1980 has aided me in staying in Sheffield for a long period of time, to have a series of conversations with Dr. Whyte and her colleagues, who are working on similar projects in health systems. This added funding has also allowed me to budget more money for future visits which I plan to complete before November 2017.