Institution: University of Chester

Unit of Assessment: 10: Mathematical Sciences

Title of case study: Expert Advice to EC/REA: FP7

1. Summary of the impact (indicative maximum 100 words)

This impact case study concerns the impact of FORD as an expert providing advice to the European Commission and the Research Executive Agency (REA) under the Framework 7 *People* programme contributing both as an expert and vice-chair in making funding decisions for Marie-Curie Fellowships (IxF (2007-2013) and CIG(2012-13)).

Marie-Curie Individual Fellowships (IxF) add to research excellence in both the public and private sectors in Member States and associated countries, due to the sharing and application of new knowledge transferred and developed by highly qualified researchers embedded in the European research effort while Career Integration Grants (CIG), which have a particular emphasis on countering the European brain drain, allow the transfer of knowledge that the researchers have already acquired as well as to the development of lasting co-operation with the scientific and/or industrial environment of the country from which they have moved.

2. Underpinning research (indicative maximum 500 words)

Appointment as an Expert under FP7 is based upon the Experts' database held on the European CORDIS system. Here, potential experts must provide details of recent research outputs and previous relevant experience. On the basis of the CORDIS record, potential experts are identified by REA staff and placed on a reserve list in anticipation of the closure of a particular call for proposals. When the call is closed, a careful matching of expertise against specific applications received leads to the confirmation of those experts who have the appropriate research expertise to serve as experts for that evaluation. The evaluations are undertaken using the expert's detailed judgements drawing specifically upon their research results and experience to provide advice to the REA and to assist in the final prioritisation of proposals. The specific work undertaken for the REA is under a non-disclosure confidentiality agreement.

In the current case, specific areas of research expertise relevant to the appointment are the mathematical modelling and simulation of problems from the life sciences (see references 1 and 3), engineering (references 4 and 5), earth sciences (reference 6), immunology (reference 3) and ecology (reference 1), numerical and analytical approaches to solution and stability of differential and integral equations, and the analysis of discrete systems (references 2, 4, and 5). These represent significant areas of activity for FORD and the wider research group at Chester and the evaluation reports draw directly on the Unit's research. FORD undertook the underlying research between 1993 and 2013. FORD has met the conditions of REF Category A at this institution from January 1986 to the present.

The evaluator's own research experience lies at the heart of the evaluation process and forms the basis of all judgements made and advice provided. The evaluation requires a detailed judgement of the scientific and technological merit of each proposal, the appropriateness of the research objectives, the relationship of the project to the current state of the art and the quality and relevance of the research methodology. The researcher's profile is evaluated in detail, including the quality and impact of previous research results and the likelihood that working on this particular fellowship will lead to new and useful results. The detailed project work plan is assessed, as well as the dissemination and impact strategy alongside arrangements for outreach activities to stimulate wide public interest and engagement with current scientific research. Specific attention is given to the potential impact on European Science and European Competitiveness should the proposal be funded, since the desire for impact on the economy, competitiveness and the supply of well-qualified and excellent scientists is central to the funding objectives and hence to the evaluations. Specific research results of the evaluator may reinforce or undermine the scientific merit of the

proposal; experience in undertaking similar projects underpins the assessment of methodology, feasibility and risk; knowledge gained from collaborative research links with relevant academic and user communities provides the foundation for assessment of the quality of the researcher, the benefit of knowledge transfer, and the impact of the research on European excellence and competitiveness.

3. References to the research (indicative maximum of six references)

Three key references to indicate the required standard are indicated by *

1
Ford, Neville J., Lumb, Patricia M., Ekaka-a, Enu, Mathematical modelling of plant species interactions in a harsh climate, JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS, 234, 2732-2744. 10.1016/j.cam.2010.01.025, 2010

2*
Diethelm, Kai, Ford, Neville J. VOLTERRA INTEGRAL EQUATIONS AND FRACTIONAL CALCULUS: DO NEIGHBORING SOLUTIONS INTERSECT? JOURNAL OF INTEGRAL EQUATIONS AND APPLICATIONS, 24, 25-37. 10.1216/JIE-2012-24-1-25, 2012

3
Ludewig, B, Krebs, P, Junt, T, Metters, H, Ford, NJ, Anderson, RM, Bocharov, G, Determining control parameters for dendritic cell-cytotoxic T lymphocyte interaction, EUROPEAN JOURNAL OF IMMUNOLOGY, 34, 2407-2418. 10.1002/eji.200425085, 2004

4*
Diethelm, K, Ford, NJ, Freed, AD, Luchko, Y, Algorithms for the fractional calculus: A selection of numerical methods, COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING, 194, 743-773. 10.1016/j.cma.2004.06.006, 2005

5
Ford, Neville J., Manuela Rodrigues, M., Xiao, Jingyu, Yan, Yubin, Numerical analysis of a two-parameter fractional telegraph equation, JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS, 249, 95-106. 10.1016/j.cam.2013.02.009, 2013

6*
Ford, JM, Ford, NJ, Wheeler, J, Simulation of grain-boundary diffusion creep: analysis of some new numerical techniques, PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON SERIES A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES, 460, 2395-2413. 10.1098/rspa.2004.1287, 2004

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

Marie-Curie Individual Fellowships (IxF) are designed to add to research excellence in both the public and private sectors in member states and associated countries, through sharing and application of new knowledge which is transferred and developed by highly qualified researchers. Career Integration Grants (CIG) facilitate the transfer of knowledge that researchers have already acquired and the development of lasting co-operation with the scientific and/or industrial environment between the country from which they have moved and their new location. This action has a particular emphasis on countering the European 'brain drain' to other third countries (based on the FP7 2013 *People* Work Programme).

Funding allocations that follow from the relevant Marie-Curie actions amount (in 2013, for example) to €134,000,000 (IEF), €44,500,000 (IOF), €44,500,000 (IIF), and €44,000,000 (CIG). The programmes were the subject of independent evaluation by the European Commission in 2010, and that evaluation focused on the impact of the activities and of the funding deployed following the advice provided by the expert evaluations of the applications.

The impact of the funding decisions made is best summarised in the following extracts from the European Commission's own publications. This extract is taken from the Interim Evaluation of the Framework 7 Programme (European Commission, November 2010, p30):

"*Training and mobility of professionals in science and technology is crucial for the development of the European Research Area, and the Marie Curie actions, now under the specific programme People, have been important instruments to make Europe attractive to the best researchers and to implement the Community's career development policy. People has been implemented through a coherent set of actions that aim at increasing the quality of human resources for research in Europe, enhancing industry-academia cooperation, supporting research careers for the young, for female researchers and for households with young families, and spreading good practices in the recruitment and employment of researchers. It is noteworthy that the Marie Curie actions, through a bottom-up approach with no pre-defined themes, have promoted excellence and contributed to internationalisation efforts in Europe. In strategic terms, the Marie Curie actions are the most international initiatives in FP7*."

(and at p61):
"*... the selection criteria for funding are demanding and include a focus on impacts, and ... FP7 attracts the best and most appropriate researchers and research organisations. It is also instructive to note that the stakeholder consultation highlights the diversity of ways in which impact occurs and should, thus, be appraised. It arises, inter alia, from networking and collaboration, through leverage effects and as a result of raising the bar for research generally. Findings from a study done for the UK government show that it is important in assessing scientific outcomes to look beyond the direct scientific outputs of projects. The study finds that 'the FP has had a big impact on the nature and extent of UK researchers' international relationships and networks, as well as on their knowledge base and scientific capabilities', and it is reasonable to infer that similar outcomes will have occurred elsewhere. ... The interface between research outputs and innovation is crucial. According to the Technopolis report for the UK government, 'the FP has yielded important commercial benefits. UK business participants had made or gained access to new or significantly improved tools or methodologies and other forms of intellectual property. Participation had contributed to the development of new products and processes and increased income and market share.' "*

It is important to note that the impact of the work extends well beyond higher education: for example 43% of UK participation in FP7 activities has been from outside HEIs. The case studies published by the European Commission (see sources below) include evidence of the significance and scope of the impacts from the Marie Curie actions.

5. Sources to corroborate the impact (indicative maximum of 10 references)

Section 4, paragraphs 1 and 2
FP7 2013 People Work Programme
http://ec.europa.eu/research/participants/portal/ShowDoc/Extensions+Repository/General+Documentation/All+work+programmes/2013/People/m-wp-201301_en.pdf

Section 4, paragraphs 3, 4 and 5
November 2010, Interim Evaluation of the Seventh Framework Programme, European Commission
http://ec.europa.eu/research/evaluations/pdf/archive/other_reports_studies_and_documents/fp7_interim_evaluation_expert_group_report.pdf

Section 4, paragraph 5
May 2010, The impact of the EU RTD Framework Programme on the UK, Technopolis Group:
http://ec.europa.eu/research/evaluations/pdf/archive/fp7-evidence-base/national_impact_studies/impact_of_the_eu_rtd_framework_programme_on_the_uk.pdf

Section 4, paragraph 6
Case studies published by the European Commission
http://ec.europa.eu/research/mariecurieactions/media-library/success-stories/index_en.htm

An email held on file by the University of Chester from the Rector of a Belgian university, with wide experience as an FP7 Expert and Vice Chair, confirms that the impact activity described here meets the definition in paragraph 161d of the REF Guidance on Submissions.