

SSI Fellowship programme application form

Describe your research

My principal research interest is Empirical Modelling (EM). EM proposes a new conceptual framework for computing based on principles and tools for making 'construals'. A construal is an interactive artefact that is developed as an integral aspect of learning about a domain. EM builds on established concepts and tools, such as declarative programming and spreadsheets, but adopts a fundamentally different perspective from the classical theory of computation. Whereas programs prescribe automatic behaviour optimised for specific uses and goals, EM construals embody counterparts of patterns of observation, dependency and agency that are experienced in the application domain. Identifying and engineering such patterns, which are more primitive than the comprehensive behaviours to be preconceived in conventional programming, is the basis for an alternative mode of software development. EM construals are as open to live interaction and interpretation as the real-world artefacts we encounter moment-by-moment in our experience. At the discretion of the modeller, they can be configured to realise a specific behaviour and used like a traditional computer program, but in such a way that this behaviour can always be suspended and subverted through reinterpretation. Such flexibility potentially has significant implications for promoting sustainability.

Do you have experience of blogging or other technical writing?

I am the principal author of over a hundred EM research publications (see <http://www2.warwick.ac.uk/fac/sci/dcs/research/em/publications/>). Application areas include concurrent systems simulation, interactive graphics and design, decision-support systems, technology enhanced learning, humanities computing, systems development and the philosophy of computing. I particularly enjoy writing carried out in association with the development of EM construals. Example construals include: an environment, developed on-the-fly in a teaching context, that seamlessly integrates pure relational algebra with several SQL-like translators and interpreters to expose the logical flaws in SQL; a construal of the harmonic devices that underlie Schubert's dramatic setting of Goethe's poem Erlkoenig that can be displayed as a visual accompaniment to a performance of the song; a series of mini-workshops for schoolchildren that introduces EM thinking with reference to the construal of human solving of Sudoku puzzles. I have no experience of blogging, but do practise more informal writing in connection with EM teaching and research. (See for instance the lecture notes for my annual introductory module on EM at <http://www2.warwick.ac.uk/fac/sci/dcs/research/em/teaching/cs405-1011/concsys-2010/> - password 'radicalempiricism'.)

List your three best publications, and explain why they are your best.

Where publications relevant to this application are concerned, my three 'best' publications are:

1. Meurig Beynon, Realising Software Development as a Lived Experience. An essay in Onward! '12 : Proceedings of the ACM International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software, October 21-25, Tucson, Arizona, USA, 2012 (to appear)
2. Meurig Beynon. Modelling with Experience: Construal and Construction for Software. Chapter 9 in Ways of Thinking, Ways of Seeing (ed. Chris Bissell and Chris Dillon), Automation, Collaboration, & E-Services Series 1, Springer-Verlag, January 2012, ISBN 978-3-642-25208-2, 197-228
3. W.M.Beynon, R.C.Boyatt and S.B.Russ. Rethinking Programming. In Proceedings IEEE Third International Conference on Information Technology: New Generations (ITNG 2006), April 10-12, 2006, Las Vegas, Nevada, USA 2006, 149-154.

These publications all illustrate writing broadly relating to software development, but with different styles and audiences in mind. The first explains the genesis and trajectory of EM research from my personal perspective. The second discusses EM in relation to the rich literature on modelling in science, engineering and computing. The third motivates EM by relating the traditional perspective on programming to contemporary challenges in software development.

What do you think of the SSI and its goals?

The goals of the SSI are centrally important for the future of computer science. Software has a vital and prominent role in the modern world. Failure to make software sustainable discredits the idea that computing has a science. The SSI is doing invaluable work in educating non-specialists in good software practice, raising awareness of sound principles of software development, providing resources and advice, and identifying the sociological and contextual factors that can render software unsustainable.

My concern is that current computing science is only effective in contexts where software development can be clearly separated from exploratory investigation of the application domain. It applies to software that performs computations derived from scientific theory, for instance. By way of contrast, the semantic models of traditional computer science are not well-suited to accounting (e.g.) for agile approaches to development, software whose interpretation is mediated experientially, or tools for the analysis of blogs. The implications for software sustainability are most apparent in the emerging culture of new software applications. Where classical applications of software exploit pre-developed theories, separating developer and user roles, modern applications establish an intimate connection between software construction and learning on the part of the user-developer.

What will you bring to the SSI as a Fellow?

I will represent an informal network of researchers in academia and industry who see understanding software development as a fundamental challenge for computer science. This includes leading software specialists such as David West - 'object thinking' and hermeneutic computing, Bernd Mahr - logic of models, Carsten Sorensen - digital infrastructure innovation, Willard McCarty - humanities computing, and others who attended the international interdisciplinary workshop "Thinking Through Computing (TTC)" hosted by the EM group at Warwick in 2007 (see <http://www2.warwick.ac.uk/fac/sci/dcs/research/em/thinkcomp07/>). It also includes Steve Russ, co-founder of the EM project, and more than a dozen graduates from the EM research programme in industry and academia who retain an active interest in EM. Our primary objective is to organise a workshop at which these researchers and SSI representatives discuss the relationship between software sustainability and conceptual frameworks for computing that support a constructivist outlook. Following the precedent of the TTC workshop, we shall present EM as one proposal specifically concerned with linking sustainable software development to a particular mode of construction, and invite other participants to present their personal perspectives and critique. The workshop will highlight the impact of paradigms for software development on sustainability.