

## **Report on SICSA Distinguished Visiting Fellowship**

**Alan M Frisch**

**Artificial Intelligence Group**

**Department of Computer Science**

**University of York**

I held a SICSA Distinguished Visiting Fellowship during Sept-Dec 2011.

This, combined with a study leave granted by the University of York, enabled me disseminate my research at four Scottish universities and to accelerate greatly joint research with St Andrews through intensive, in-person collaboration.

My Fellowship included four trips to Scotland:

5-7 September: University of St Andrews

11-14 October: Universities of Glasgow (1 day), Dundee (1 day),  
St Andrews (2 days)

7-11 November: University of St Andrews

12-15 December: Universities of Edinburgh (1 day), St Andrews (3 days)

I delivered three seminars and a master class:

The Design of Essence: A Language for Specifying Combinatorial Problems. Delivered at Universities of Glasgow and Dundee. The seminar at Glasgow was promoted jointly with Univ of Strathclyde.

Lecture slides: [www.cs.york.ac.uk/~frisch/Research/SICSAESSENCE.pdf](http://www.cs.york.ac.uk/~frisch/Research/SICSAESSENCE.pdf)

Abstraction and Automation in Constraint Modelling: A Decade of Progress. Delivered at University of St Andrews.

Lecture slides: [www.cs.york.ac.uk/~frisch/Research/decade.pdf](http://www.cs.york.ac.uk/~frisch/Research/decade.pdf)

Video recording: [blogs.cs.st-andrews.ac.uk/csblog/2012/02/03/1726/](http://blogs.cs.st-andrews.ac.uk/csblog/2012/02/03/1726/)

Modelling with Constraints: A Systematic Approach: A three-hour masterclass delivered at Univ of Edinburgh. Lecture slides available on my home page: [www.cs.york.ac.uk/~frisch](http://www.cs.york.ac.uk/~frisch)

Most of my time in Scotland was spent at St Andrews collaborating closely with Ian Miguel and Chris Jefferson on identifying constraints for breaking symmetries in matrices and proving their correctness. We made significant progress, obtaining results that unify and substantially generalise all previously known results. We plan to publish these results in a long journal paper, approximately two-thirds of which is currently drafted. Completing the paper requires further results, and we plan to work on those in the coming months.

To a much lesser extent, I spent time at St Andrews collaborating with Ian Miguel, Chris Jefferson and Ozgur Akgun on Conjure. We began extending an existing conference paper into a journal paper and have continued that work into 2012. We have a draft of the paper, but we have uncovered some problems that need to be resolved before submission.

I also brainstormed with constraint researchers at St Andrews on extensions to Conjure that would enable it to (1) identify symmetries in problems and remove them by generating symmetry-breaking constraints and (2) learn to favour the generation of better models over inferior ones. We plan to develop this into a joint York/St Andrews proposal to be submitted to EPSRC in 2012.