

WP7: Social Aspects

An off-the-cuff Summary

The Social Machine of Mathematics

For centuries, the highest level of mathematics has been seen as an isolated creative activity, to produce a proof for review and acceptance by research peers. Mathematics is now at a remarkable inflexion point, with new technology radically extending the power and limits of individuals. "Crowdsourcing" pulls together diverse experts to solve problems; symbolic computation tackles huge routine calculations; and computers, using programs designed to verify hardware, check proofs that are just too long and complicated for any human to comprehend. Yet these techniques are currently used in stand-alone fashion, lacking integration with each other or with human creativity or fallibility.

"Social machines" are new paradigm, identified by Berners-Lee, for viewing a combination of people and computers as a single problem-solving entity. This project works towards a new vision, changing the way people do mathematics, and transforming the reach, pace, and impact of mathematics research, through creating a mathematics social machine --- a combination of people, computers, and archives to create and apply mathematics.

Phase 1, studying collaborating mathematicians

This phase of the project comprises a number of ethnographic studies of collaborating mathematicians, both on-line and face-to-face, working with collaborators Lorenzo Lane (Edinburgh), Donald Mackenzie (Edinburgh), Natasa Milic-Frayling (Microsoft Research) and Alison Pease (Dundee).

Background paper

Mathematical Practice, Crowdsourcing, and Social Machines, Ursula Martin and Alison Pease, *in* Jacques Carette, David Aspinall, Christoph Lange, Petr Sojka and Wolfgang Windsteiger, editors, Intelligent Computer Mathematics – MKM, Calculemus, DML, and Systems and Projects 2013, Held as Part of CICM 2013, Bath, UK, July 8–12, 2013. Proceedings. Vol. 7961 of Lecture Notes in Computer Science. Pages 98–119. 2013. <http://arxiv.org/abs/1305.0900>

Partners

[Microsoft Research](#)

[Monoidics](#)

[Lemma One](#)

[D-Risq](#)

Objectives

- Make sure that the tools we build within the projects are informed by ongoing research into how mathematicians work together to produce mathematics
- Extend that research to look at free software development and produce guidance for how to organise ecosystems of linked projects

Early Tasks and Deliverables

- Month 3: initial report on current knowledge to inform design work elsewhere in ODK
- Study of software development work begins in month 6
- Study of impact on publication process etc. begins in month 12, led by Sheffield
- Later, evaluation of some VREs with Southampton