

# Application for sabbatical, 2017/18

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## Request

As indicated in last year's pre-proposal, I wish to take sabbatical for academic year 2017/18 (from 1st September as usual).

## Research to be carried out

I have some concrete plans and some less concrete ambitions.

## Concrete plans

To work on bidirectional transformations including language design, joint with Jeremy Gibbons at Oxford, and (funding permitting) to spend significant chunks of the year in Oxford doing so.

We plan to work on advancing the underlying theory needed to make bidirectional transformations dependable. Specifically:

- How should bidirectional transformations be structured? While the building blocks of bidirectional transformations expressed in the OMG standard language QVT-R, relations, seem satisfactory, QVT-R's means of connecting them by when- and where-clauses have proved very difficult to use. Work that Julian Bradfield and I did relating these clauses to minimal and maximal fixpoints in logic gives an intuitive explanation of why this is, and suggests alternative avenues to explore.
- How can the foundations of bidirectional transformations allow for the need to explain why a bidirectional transformation restored consistency in the particular way it did? This requires going below the high-level "models as points" perspective where I have mostly worked in the past, to understand how the structure of the bidirectional transformation relates to the structure of the models related, and coming up with a reasonable notion of "proof hint" that might be useful to human users.

We want to implement our ideas in prototype languages in two ways: as an internal DSL in Haskell and as an external DSL based on QVT-R. What can be achieved in the year depends partly on funding (see below).

## Less concrete ambitions

I want to use the chunk of time away from teaching and administrative responsibilities to plan my research agenda for the next 5-10 years. Broadly speaking I want to contribute to getting software engineering

out from under the dead hand of programming, so that it can thrive in the twenty-first century without making unrealistic assumptions about the availability of skilled programmers. Besides work on bidirectional transformations – which I still think is important, and will become increasingly so – what else needs to happen? How can I contribute to it, and what is the right kind of support to enlist?

## Timeliness and rationale

Please note that this full proposal follows a pre-application last year, which the committee supported in principle, and that it has previously agreed HoS support.

My main collaborator in Oxford, Jeremy Gibbons, will also be on sabbatical in 2017/18; I plan to spend much of the year in Oxford working with him (to the extent that funding permits). Obviously this can be expected to be more productive that year than any other as we will both be free of teaching.

I had a sabbatical in 2011/12, at which point I was severely overdue for a sabbatical; at that point, I had 22 semesters of eligible service. So I had 6 semesters “left over” after that, and by summer 2017 will have accrued another 10 semesters of eligible service, making the requisite 16. Moreover I have taught large non-honours courses in 9 years since 2006/7, and have had only one teaching year in which I taught less than 20pts (and that was only because that was the condition under which I agreed to step into a breach in the previous year!): I have more than pulled my weight.

An EPSRC grant proposal, joint with Prof. Gibbons, that would have funded 50% of my time plus travel and accommodation expenses for my sabbatical year unfortunately came just under the funding line at panel. A similar-but-different proposal that makes the same funding request is about to be submitted. If it is not funded I will not be able to afford to go away from Edinburgh so much, but will still attempt to carry out the same programme of work, still taking advantage of Prof. Gibbons’ and my coincident sabbaticals.

## Practical issues

In 2016/17 I taught a new 20pt course, Software Design and Modelling (SDM). This is open to students in UG3, UG4 and MSc, and is (in effect) compulsory for UG3 Software Engineering students. It is tool-intensive and relies on the lecturer being able to relate the techniques taught to their practical use. Whilst there are certainly staff who could teach it, it is not very close to anyone else’s area of expertise so this would be likely to be a very large amount of work, and those best able to do it are also in demand to teach other software engineering courses. Students in 2016/17 were warned that SDM was likely not to be delivered in 2017/18, and I suggest this is the most realistic plan. UG3 Software Engineering students will need appropriate concessions (for example, to take 10 instead of 20 points of SE courses, or perhaps to take SAPM which is normally a UG4 course in UG3 instead; they can, if they wish, take SDM in UG4).

I have a standard load of personal tutees, who would need to be reassigned.

My main administrative duty is as Director of Computing. It is high time for someone else to take over this role in any case, and I understand that this is under discussion.