**From:** **Fred Hickernell** hickernell@iit.edu
**Subject:** Re: [Ext] Joint proposal to NSF CDS&E-MSS
**Date:** August 31, 2020 at 11:28 AM
**To:** Art Owen owen@stanford.edu

Hi Art,

I took the NSF specific template and added in the specific information. This is it, just this one paragraph.

If the proposal submitted by Dr. Fred J. Hickernell entitled Collaborative Research: Quasi-Monte Carlo Community Software is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.

For reference, look at https://nsf.gov/pubs/policydocs/pappg20_1/index.jsp and go to II.C.2.j.

Thanks,
Fred

Fred J. Hickernell
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Working remotely. Please contact me by email or phone.

> On Aug 31, 2020, at 11:14 AM, Art Owen <owen@stanford.edu> wrote:
>
> Hi Fred,
>
> I'm happy that you got Simon on board, and I am also happy to send in such a letter. Last I heard NSF had some very specific rules for those letters, almost to the point of specifying the exact wording. Maybe you can point me to an NSF doc about what I need to say. Then in the proposal body you might be able to amplify it.
>
> -Art
>
> On 8/31/20 9:04 AM, Fred Hickernell wrote:
>> Dear Art,
>>
>> An update on my proposal. Simon Mak will join as a PI in a collaborative effort.
>>
>> NSF allows letters of collaboration and specifies the following format:
>>
>> If the proposal submitted by Dr. Fred J. Hickernell entitled Collaborative Research: Quasi-Monte Carlo Community Software is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.
>>
>> If you would be willing to collaborate in this informal way, I would be happy to state in our Project Description and/or Facilities, etc. section the type that you are willing to offer. Suggested wording (please revise):
>>
>> Art B. Owen, Department of Statistics, Stanford University, will advise on how QMCPy can better fits the needs of the QMC and statistics communities. He will also engage in collaboration on research problems of mutual interest.

Would you be willing to write and send me a pdf of a letter of collaboration? I am still working on the project description (about 1/3 done), but can show it to you if you would like. Duke's an Illinois Tech's research offices would like to have the administrative documents at least a week ahead of time.

Thanks,
Fred

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> On Aug 21, 2020, at 3:15 PM, Art Owen <owen@stanford.edu> wrote:
>
> Thanks Fred. I'm sorry to disappoint you. I do feel like I could add value discussing some of these topics.
>
> -Art
>
> On 8/21/20 12:56 PM, Fred Hickernell wrote:
> > Dear Art,
> >
> > Thank you for sharing your suggestions. I appreciate your reasons for declining to participate in a formal way and will continue to appreciate your moral support.
> >
> > Best,
> > Fred
> >
> > Fred J. Hickernell
> > Vice Provost for Research, research.iit.edu
> > Professor, Department of Applied Mathematics
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> > Working remotely. Please contact me by email or phone.
> >
> > > On Aug 21, 2020, at 2:43 PM, Art Owen <owen@stanford.edu> wrote:
> > >
> > > On 8/20/20 9:40 AM, Fred Hickernell wrote:
> > > > Dear Art,
> > > >
> > > > I am planning to submit a proposal to the program
> > > >
> > > > https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504687
> > > >
> > > > for the further development of QMCPy. Would you be interested to join?
> > > >
> > > > Collaboration strengthens the proposal. You have a good sense of how to expand the project. You write well. You are fast. It would be fun to work together.

Hi Fred,

What you say is very kind and I love the project but I don't want to write a proposal about it. The problem is that neither I nor a student here would have the time to work on what is primarily software. I would be happy to discuss the problems with you, for no money, but co-authorship whenever what I contribute is worthwhile enough.

Maybe Michael Mascagni would be good to work with. He has software dev credibility and I think he might also know how to bring GPU expertise to the team.

Also, **Simon Mak!** I think you really want him in your corner. He would move faster than me. Also, NSF might notice that I already have a bigdata grant. Simon is on a conference grant (new researchers) and I think that is all.

In case it helps with the proposal writing, here are topics that I think you could include:
- Sobol' indices ... there are clever ways to combine them with Sobol' sequences as a d+1 dimensional problem not 2d. What I would do is use the first and best Sobol' variable as the new/changed point in each change-one integrand.
- completely uniformly distributed sequences and weakly CUD sequences (recent work by Shin Harase)
- wafom
- higher order nets and their randomizations; strategies that are mixed order, e.g., higher order in the important inputs but single order in the others. I've not seen higher order nets live up to their asymptotics, but maybe we are just not starting from the right nets.
- Bayesian numerics
- active subspaces ... and RQMC for estimating them [I'd be happy to discuss that]
- test functions: e.g., all of Genz's, many of Bingham's, Sobol's, maybe one Cornell box thing from graphics if Alex can get you one in python, published MCMC examples, active subspace examples, Pierre's stochastic activity network

Simon could add some cool stuff the the list.

Paul Constantine is doing interesting work but seems to have dropped off the radar. I tried hard to get him to contribute to MCQMC 2020 with Clementine and I. In the end Clementine took vacation. Paul had been dealing with a personal crisis and didn't always respond. I hope things turn around for him. I expect he would have trouble collaborating on a proposal.

Less important: Kinjal Basu and I worked on sampling triangles, balls, spheres, simplices, spherical triangles, and Cartesian products of things like that. We had hopes that computer graphics people would pick it up but they do not seem to have done so.

-Art

> What do you think?
>
> Best,
> Fred

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