

EPSRC Frontier Progression Award 2019



Modelling Complex and Partially Identified Engineering Problems – Application to the Individualised Multiscale Simulation of the Musculoskeletal System

MultiSim2 Sandpit
Monday, 5th and Thursday, 8th July 2021, 09:30-13:30
September (TBA)

Online

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MultiSim aims to create a new generation of productive models capable of handling complex multi-scale and Multiphysics problems, characterised by uncertain and incomplete information. As the latest event in that quest we're delighted to be sharing details of a research sandpit which will be taking place online during early July with a follow-up activity in September. Collaboratively with Becky Steliaros from Research in Focus Ltd (www.researchinfocus.com) we've developed a multi part virtual programme that we hope will generate some really exciting and transformative proposals whilst making the process of working together as effective and efficient as possible. Our overall aim for the sandpit is to generate high quality, programme/large grant applications across a range of topics to be submitted by the end of 2021. We also hope a range of smaller projects, new collaborations, or other fruitful links will emerge from interactions. Please note to be eligible to participate in this event you must be capable of holding/being named as a co-author on UKRI research grants.

We'll provide detailed, step by step instructions to participants nearer the time but before you decide whether to apply to take part it's important to know both what you can expect to get out of the event but also what you'll be expected to contribute. Overall our process will be:

- During the week prior to the event, at times to suit you:
 - Mon/Tues spend a few minutes individually brainstorming the top challenges in 1 or more of the initial research themes (details about these below) and submit short sentences summarising key challenges via an online portal.
 - Thurs/Fri – view the key challenges submitted by all participants, contemplate these and group theme into clusters of similar ideas to be discussed during the live event. You are welcome to contribute ideas to just one or several research themes, as best matches your interests and expertise.
- Monday 5th July 2021, please reserve the entire morning until 13.00, exact timings will be confirmed once we know group numbers, etc. Within theme groups we will consider the identified research challenges before generating ideas as to how these might be addressed, then adding, augmenting and really stretching these ideas using our combined inputs.
- Between the two live events “homework” will include reflecting on the discussions to further strengthen ideas, and double checking what related work is taking place nationally and internationally, what's already been funded, etc.
- Thursday 8th July, again please reserve the entire morning until 13.00 (exact timings TBC). We will refine Monday's ideas, agree priorities and develop an agreed action plan towards a joint grant submission of a programme of high quality, exciting, transformative research.
- Between July and Sept theme teams will be expected to self-organise to further refine plans and develop a draft proposal/s.
- Early September 2021: Dragon's Den style event where individual theme teams will pitch their refined proposals and receive feedback to help strengthen the case ready for submission. The draft date/timing/format of this event will be finalised once outputs from the July discussions are known.

Participants will be able to engage skills, interests and experience towards a programme of hopefully very exciting research not possible without combining the knowledge and expertise of

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others and in return can expect to immerse themselves openly, fully and without expectation in some quite intensive, creative discussions with accomplished and like-minded peers; this is NOT a conference, we have no room for passengers and you should expect to engage fully and be open to whatever ideas emerge! Except in case of genuine emergency your full participation will be expected at all times e.g. no popping out of live events to teach! We have kept the structure of the event as focused as possible so as to not be a barrier to participation.

The sandpit will be led by Prof Claudia Mazzà, the Principal Investigator for MultiSim2 and individual discussion sessions will be led by MultiSim2's co-investigators: Prof Damien Lacroix, Dr Pinaki Bhattacharya, Dr Enrico Dall'Ara, Prof Viskan Kadirkamanathan and Dr Shannon Li.

Rather than start with a completely blank sheet we've built on discussions to date within MultiSim and the wider topic and decided to offer the following starter themes:

- Multiscale modelling and co-morbidities
- Ageing, sarcopenia and fracture risk
- Bone Metastasis
- Multiscale models and Artificial Intelligence
- Developmental Biomechanics

As part of the sign up process you will be asked to identify 1st and 2nd priorities for which group to commence discussions in on Monday 5th July. Once the sign up process has closed we will examine all applications and decide whether the themes need to be modified. For example, we might split very popular themes into multiple, more focused groups or if a theme has very few sign ups then it may not run. If we receive too many signups for the event to be workable then we will apply a set of selection criteria to all applications in order to draw up short and reserve lists of participants.

Please complete the registration form: <https://forms.gle/hzUeAmvrccTF8XKx6> no later than **9am Monday 14th June.**

We're really looking forward to working with many of you and seeing what emerges from this research sandpit. If you have any queries please forward them to Dr Norman J Powell: n.j.powell@sheffield.ac.uk, MultiSim's Project Manager

Regards,

Prof. Claudia Mazzà and the MultiSim2 team