

The Ethos of Integrative Research: The case of systems biology

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Norwegian University of Science and Technology, Trondheim

Abstracts and Presenters

'Integrated research in cardiac modelling: pleasures and pains' by Annamaria Carusi, University of Copenhagen and NTNU

This paper describes my experience of integrated research in the context of cardiac modelling. I will describe my long history with this group from the perspective of teacher, sociologist, 'philosopher of science in practice' and collaborator and co-author, bringing to this experience reflection on personal situations, disciplinary cultures and institutional settings.

The "Reflexive Systems Biology" Project: act small, aim big by Dorothy J. Dankel, University of Bergen

Do you co-produce interdisciplinary knowledge? We do. The "Reflexive Systems Biology" project at University of Bergen (Norway) has a core team consisting of a biologist (Dorothy Dankel) and a social scientist (Ana Delgado). The over-arching objective and theme of the three year project is being "reflexive" in all aspects of conducting systems and synthetic biology. This is a impressive objective, but we took some simple approaches. To address this objective, Dorothy and Ana developed a philosophy of identifying labs with scientists who were genuinely curious about exploring their systems/synthetic biology "outside" the lab and asking if they would collaborate within our project. Our collaboration starts in their labs where we are allowed to interact with the scientists. After gaining respect and trust, we host dialogue sessions where we create a new, legitimate room for scientists to "open-up" and talk and imagine their scientific products (i.e. engineered vaccines at Arizona State University, talking bacteria at University of Valencia Biocampus) outside the lab. Besides the co-production in the form of co-authored published papers, our "organic" approach to the integrative ethos in research has initiated and produced dramatic short film, a competitive holistic (a synthetic biology project "Talking Life" by graduate students that combines wet lab work, human practices and mathematical modeling) in the 2012 iGEM competition in Amsterdam and, naturally, international friendships.

***BIO:** A native of Indiana, USA, Dorothy Dankel has masters and PhD degrees from the University of Bergen (Norway) in marine fisheries biology and management and an undergraduate degree from Hillsdale College (Michigan) in biology and French. During her PhD work in Norway, Dorothy explored quantitative integrated bio-socio-economic assessments as a way to reconcile stakeholder differences and promote sustainable management and governance of natural renewable resources. Today,*

Dorothy researches sociological and ethical considerations in synthetic and systems biology through reflexive thinking and dialogue with scientists and focus groups in the Reflexive Systems Biology project, financed by the Norwegian Research Council.

**How we Manage to Manage Knowledge
by Sophia Efstathiou, NTNU**

This paper is a real-time reflection about a knowledge-management effort in systems biology at NTNU. Knowledge, what it is and how we get it, intensely preoccupy philosophers and scholars of science. In the systems biology picture, "knowledge" is often understood as already available, deposited in publications, yet inaccessible: lying dormant in texts that few have the time to read, disguised under labels that few have the ability to decipher. The term "knowledge-management" is used to describe the choices made to select and organize the results of often parallel, multi-level and inter-disciplinary research in systematic ways and to do so transparently. Such large-scale science efforts call for both people and their creations to properly create and get organized behind some (at least partly) common vision or standard. But at what cost and to whose benefit?

I focus on the work of our systems biology team at NTNU. I examine both wet lab and dry lab ends of this process, talking to the humans in between, to investigate our team's attempts to manage knowledge. I argue that through practices of interdisciplinary work, understandings of "knowledge" articulated differently across disciplinary boundaries and via individual practices, come face to face and challenge us to answer, what is (real, acceptable, sufficient) "knowledge"? The paper relates epistemological issues of uncertainty and rigour to questions of familiarity and trust as these all complicate procedures of managing to manage knowledge.

***BIO:** Sophia Efstathiou is a Researcher in Philosophy at NTNU, working as a humanist with a systems biology group to explore "crossover" science and humanist research. Sophia's background is interdisciplinary. She has a Master of Physics in Mathematics and Physics, (Warwick 2000) an MA in Philosophy (UCSD 2006) and a PhD in Philosophy and Science Studies (UCSD 2009). Her PhD explores how everyday race concepts become scientific ones and was awarded NSF and White scholarships. She did a postdoc at Southampton University working on ageing and complexity science research (2009-2011) and taught at UCSD, LSE and Southampton University. Her work appears in Studies in History and Philosophy of Biological and Biomedical Sciences, International Studies in Philosophy of Science, and Philosophy of Science.*

**"Crossing the Styx." An attempt at doing a social critique of biology from within biology.
by Roger Strand, University of Bergen**

In our project "Reflexive Systems Biology" we make various attempts and different approaches to the challenge of integrated ELSA research. In this talk I will outline and reflect upon one such attempt in-the-making: To make a critique of biology and biology-in-society from perspective of complexity theory and theoretical biology.

***BIO:** Roger Strand works as Professor at the Centre for the Study of the Sciences and the Humanities, University of Bergen. Originally trained as a biochemist, his field of research is uncertainty and complexity in the interface between science and society.*

The empirical ethicist

By Lars Ursin, NTNU

In connection with two interdisciplinary projects on biobank ethics I was involved in focus group studies. I will briefly reflect on my experience of being the empirical ethicist - or normative social scientist - in such a setting.

***BIO:** Lars Øystein Ursin is a Senior Researcher in the Department of Philosophy, and the Department of public health and general practice, Norwegian University of Technology and Science, Norway. PhD in Philosophy, current projects include: "The ethical basis for parental decisions regarding medical treatment of extremely premature babies", and "Eco-values as product quality attributes in manufacturing agricultural food ingredients".*