bhi biomedical and health informatics

UNIVERSITY OF WASHINGTON

Biomedical and Health Informatics Lecture Series

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12:00 - 12:50 p.m., Room E-216

Daniel L. Cook, MD, PhD

Research Professor, Departments of Physiology/Biophysics and
Biological Structure, School of Medicine, University of Washington

Reporting for the Semantics of Biological Processes (SBP) group on:

"Mapping biomedical data to anatomical entities: Lessons from the Virtual Physiological Human (VPH) project"

Mapping biomedical data to anatomical entities has been suggested as a way to organize and display biomedical data in a manner that is both physiologically intuitive and visually tractable. However, a simple annotation grammar ("entity-quality", or "EQ") that associates a quality (e.g., pressure, expression rate) to specific anatomical ontology entities (e.g., FMA:*portion of blood*, GO:*gene*) has proved to be insufficient for many use-cases. Here we present our collaborative work with the European Union's VPH project which generalizes the simple EQ annotation grammar to accommodate three important use-cases: 1) qualities of entities that are composed from *multiple structural classes* (e.g., the concentration of *calcium* in *cytoplasm* of a *myocyte*), 2) qualities that occur *during specific temporal intervals* (e.g., ventricular blood pressure *during diastole*), and 3) qualities that are attributes jointly of *more than a single entity* (e.g., resistance of *blood* flowing in *aortic lumen*). We propose a generalized annotation grammar whose sufficiency we will test against VPH annotation use-cases.

Dr. Cook has been developing tools for the representation and analysis of complex dynamic systems for 40 years. He earned a BSME in mechanical engineering from the University of Michigan and spent 4 years as a Boeing while earning his Masters degree in Mechanical Engineering from the UW. To follow-up his Master's thesis project on the simulation of glucose-induced insulin secretion, he entered the UW's Medical Scientist Training Program to earn his MD and a PhD in Physiology & Biophysics. After making seminal discoveries in the electrophysiology of insulin secretion, Dr. Cook returned to his interests in the computational representation and analysis of complex systems. He authored two graphics-based applications for diagramming and analyzing cell networks and based one program, Chalkboard, on a linguistic metaphor of entity interactions using noun/verb constructs. He then connected with Dr. Cornelius Rosse and the FMA project to learn state-of-the-art knowledge representation and query methods as part of the DARPA-sponsored Virtual Soldier Project. In subsequent collaborations with Drs. John Gennari, James Brinkley, and others, he is developing informatics methods for the declarative representation of physics-based biosimulation models as needed by, for example, the European Virtual Physiological Human and IUPS Physiome projects. The major contributions to this effort are an ontology of classical physics, the Ontology of Physics for Biology (OPB), and light-weight OWL representations (SemSim models) that map the biological and mathematical content of individual simulation models to the FMA and OPB.