



# CAREER: Enabling “White-Box” Autonomy in Medical Cyber-Physical Systems

(CNS 1748762 2017-2022)

Jin-Oh Hahn (PI, University of Maryland), Ali Tivay (PhD Student, University of Maryland)

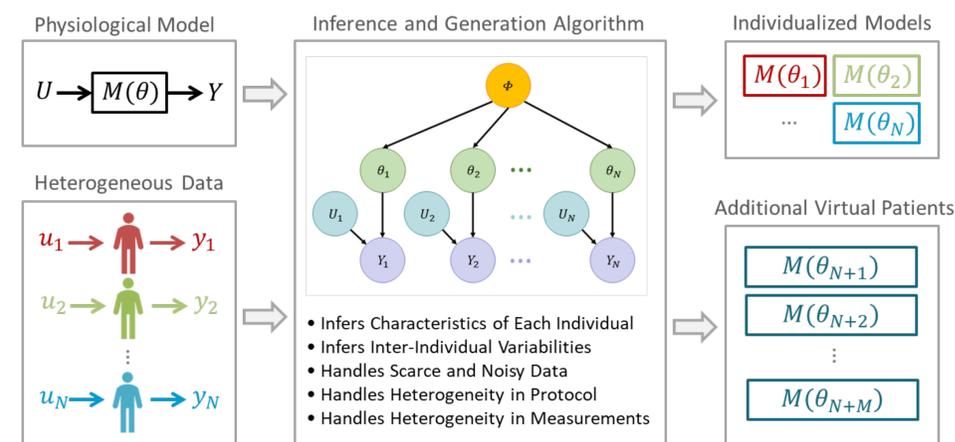
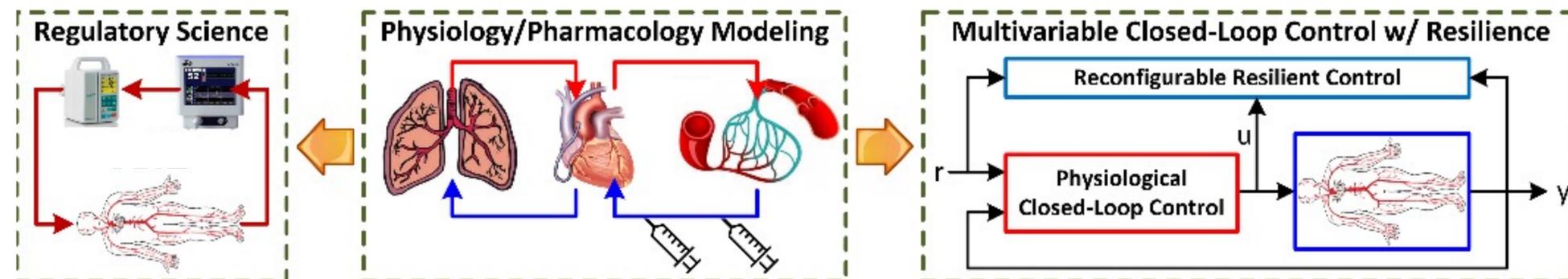
Christopher G. Scully (Co-I, U.S. Food and Drug Administration)

## Challenge:

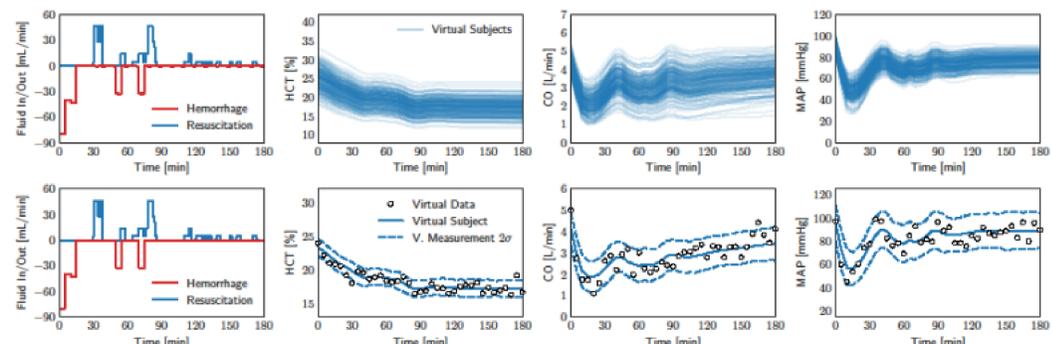
- Current closed-loop autonomy in healthcare is black-box in nature and not interpretable, limiting its clinical acceptance.
- Black-box autonomy in medicine is prone to safety concerns.

## Solution:

- Digital twin (physiological models)
- SYSID / virtual patient generation via machine learning inference
- Physiological monitoring & control design based on DT and inference-based algorithms



ML inference for SYSID/Virtual Patient Generation



Virtual patients applicable to M-CPS Design & Testing

## Scientific Impact:

- Digital twins and machine learning inference-based estimation & control algorithms may be broadly applicable to closed-loop autonomy challenges in M-CPS domain

## Broader Impact:

- Healthcare: new medical autonomy capabilities
- Regulatory sector: M-CPS testing methodologies/tools
- Education: Next-generation M-CPS workforce training

*The mention of commercial products, their sources, or their use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such products by the Department of Health and Human Services.*