Virtual Human Global Summit Program

Making Connections to Advance Human Digital Twins in Medicine
(All sessions will be held in the SUNY Global Center Global Classroom)

Day 1 – Foundations for Virtual Human Models and Medical Digital Twins

7:30 am – 8:00 am – Continental Breakfast
On-site at SUNY Global Center

8:00 am – 8:50 am   Virtual Human Global Summit Welcome and Opening Remarks
- Peter Coveney, University College London
- Kerstin Kleese Van Dam, Brookhaven National Laboratory
- Eric A. Stahlberg, Frederick National Laboratory for Cancer Research

9:00 am – 11:45 am Session A – Virtual Human Models and Biomedical Digital Twins in Research

Session Moderator: Kerstin Kleese van Dam, Brookhaven National Laboratory
Each talk will be 10 minutes, plus 5 minutes for questions and answers.

This session will cover topics that are research efforts and preclinical applications in human digital twins covering molecular, cellular, and multiscale models, AI and mechanistic models, physiological models, disease-specific models and other predictive approaches to human biology and physiology.

9:00 am – 10:00 am – Talk session A-1
- Peter Coveney (University College London)
    Digital Twins: The Virtual Future of Medicine

- Heber Lima da Rocha (Indiana University)
    Multiscale Modeling and Data Assimilation: A Path to Personalized Medicine

- Dwight V. Nissley (Frederick National Laboratory for Cancer Research)
    The NCI-DOE ADMIRRAL Consortium – Predictive Computational Biology for Modeling Cancer Mechanisms

- Ilya Shmulevich (Institute for Systems Biology)
    Acute Myeloid Leukemia Digital Twin

10:00 am – 10:15 am – Break

10:15 am – 11:15 am – Talk session A-2
- Mariano Vasquez (ELEM Biotech)
  Supercomputer-based Virtual Humans: The Future of Medicine NOW

- Jazmin Aguado-Sierra (Barcelona Supercomputing Center)
  In Silico Clinical Trials

- Daniel R. Isaacs (Digital Twin Consortium)
  Accelerating the Adoption of Digital Twins

- Matthew McCoy (Georgetown University)
  Parameterizing and Interpreting Biomedical Digital Twins

11:15 am – 11:30 am – Break

11:30 am – 12:15 pm – Moderated Panel Discussion A

Topic: "Challenges, Needs, and Opportunities for Research and Pre-clinical Biomedical Digital Twins"

Panelists:
- Ilya Shmulevich (Institute for Systems Biology)
- Jazmin Aguado-Sierra (Barcelona Supercomputing Center)
- Heber Lima da Rocha (Indiana University)
- Mariano Vasquez (ELEM Biotech)

12:15 pm – 1:30 pm – Day 1 Networking Lunch
Lunch will be onsite at SUNY Global Center. Participants are encouraged to network and meet with other attendees.

1:30 pm – 4:15 pm Session B – Infrastructure for Digital Twins in Biomedicine

This session will cover computing, data science and computational science related to digital twins, including cloud, exascale, data and model sharing, digital twin operations, privacy, data sources, future data streams, frameworks, and FAIR approaches.

Session Moderator: Eric Stahlberg, Frederick National Laboratory for Cancer Research
Each talk will be 10 minutes, plus 5 minutes for questions and answers.

1:30 pm – 2:15 pm – Talk session B-1
- Francis (Frank) Joseph Alexander (Argonne National Laboratory)
  On the Mathematical and Computational Challenges for Digital Twins of Complex Systems

- Daniel R. Isaacs (Digital Twin Consortium)
  Transforming Healthcare and Life Science with Digital Twins

- Vanessa Lopez-Marrero (Brookhaven National Laboratory)
    Predictive Digital Twin Framework Supported by Measure Transport Techniques

2:15 pm – 2:30 pm – Break

2:30 pm – 3:15 pm – Talk session B-2

- Line C. Pouchard (Brookhaven National Laboratory)
    Perspectives on Reproducibility of Data-driven Modeling Experiments Towards Responsible AI for Digital Twins
- Anuj J. Kapadia (Oak Ridge National Laboratory)
    From Individual Cells to Human Populations: A Multiscale Virtual Human approach to Radiation Dosimetry
- Florence Hudson (Columbia University)
    TIPPSS for Clinical IoT Privacy and Security

3:15 pm – 3:30 pm Break

3:30 pm – 4:15 pm – Moderated Panel Discussion B

Topic: "The Global Learning Ecosystem for Biomedical Digital Twins from Research to Patient"

Panelists:
- Warren A. Kibbe (Duke University)
- Stephen Litster (Amazon Web Services)
- Kerstin Kleese Van Dam (Brookhaven National Laboratory)
- Georgia (Gina) Tourassi (Oak Ridge National Laboratory)

4:15 pm – 4:30 pm – Day 1 Concluding Remarks

4:30 pm – 4:45 pm – Reception Sponsor Remarks

4:45 pm – 6:00 pm – Networking Reception

Location: SUNY Global Center, Terrace

Note to attendees: The Virtual Human Global Summit plans no evening events, allowing flexibility for attendees to network and connect with other attendees in accordance with their interests and preferences. Contact information for attendees will be provided to participants.

End of Day 1

<u>Day 2 – Virtual Human and Medical Digital Twins Transforming Medicine</u>

7:30 am – 8:00 am – Continental Breakfast
On-site at SUNY Global Center

8:00 am – 8:15 am – Day 2 Welcome
- Peter Coveney, University College London
- Kerstin Kleese Van Dam, Brookhaven National Laboratory
- Eric A. Stahlberg, Frederick National Laboratory for Cancer Research

8:15 am – 9:00 am   Opening Presentation
- Jerry Lee, Chief Science and Innovation Officer, Ellison Institute for Transformative Medicine
  Building Patient Journey Trajectories: Lessons Learned and Future Opportunities

9:00 am – 11:45 am Session C – Biomedical Digital Twins in Practice

This session covers experiences and anticipated clinical use of medical digital twins – pediatrics, cancer, infectious disease, ICU care, telemedicine, etc. The session topics may also explore the potential for new data sources and personal use of medical digital twins.

Session Moderator: Peter Coveney, University College London
Each talk will be 10 minutes, plus 5 minutes for questions and answers.

9:00 am – 9:45 am – Talk Session C-1
- Caroline Chung (The University of Texas MD Anderson Cancer Center)
  Practical Digital Twins for Personalized Oncology
- Gary An (University of Vermont)

  Critical Illness Digital Twins: Integrating Mechanistic Simulation Models with Artificial Intelligence for Personalized Precision Prediction and Control for Sepsis
- Marc Paradis (Northwell Health)

  Merlin's Mirror: A Vision for Digital Twins in Healthcare

9:45 am – 10:00 am – Break

10:00 – 10:45 am – Talk Session C-2
- Douglas W. Blayney (Stanford Medicine (emeritus), Stanford University School of Medicine)
  What Questions do Cancer Patients Have, and How Can Digital Twins Help?
- Olivier Elemento (Weil Cornell Medical Center)

  From Cancer Models to Digital Avatars - Building Virtual Models of Cancer

- Guruduth (Guru) Banavar (Viome Life Sciences)
  Human-microbiome Gene Expression Models for Biomedical Digital Twin Applications

10:45 am – 11:00 am – Break

11:00 am – 12:00 pm – Moderated Panel Discussion C

Topic: "Challenges and Opportunities for Biomedical Digital Twins in Practice"

Panelists:
- John P. McDaniel (Healthcare IT Leaders)
- Jeffrey (Jeff) Buchsbaum (National Cancer Institute)
- Jan F. Nygard (Norwegian Cancer Registry)
- Marc Paradis (Northwell Health)

12:00 pm – 1:00pm – Day 2 Networking Lunch
Lunch will be onsite at SUNY Global Center. Participants are encouraged to network and meet with other attendees.

1:00 pm - 1:30 pm Lightning Talks Session
This session will consist of brief talks (5 minutes).
Session Moderator: John Stubbs, Eviden

1:30 pm – 2:15 pm Session D – Supporting Biomedical Digital Twin Efforts

This session will bring insights to and discussion around past, present and potential future support for biomedical digital twin efforts, with an initial focus on governmental efforts in the US, EU and extending to other potential sources.

Session Moderator: Eric A. Stahlberg, Frederick National Laboratory for Cancer Research

1:30 pm – 2:15 pm – Moderated panel discussion D

Topic: "Government-supported Biomedical Digital Twin Efforts"

Panelists:
- Caroline Chung (The University of Texas MD Anderson Cancer Center)
- Peter Coveney (University College London)
- Emily Greenspan (National Cancer Institute)
- Grace Peng (National Institutes of Health)

2:15 pm – 2:30 pm – Break

2:30 pm – 4:30 pm – Session E – Community Adoption and Path Forward for Medical Digital Twins

This session covers topics related to fostering community adoption and identifying potential next steps to move ahead with medical digital twins including, education, workforce development, physical infrastructure, commercialization, regulatory, public-private partnerships, international efforts, and collaborations.

Session Co-Moderators: John Stubbs, Eviden; Eric A. Stahlberg, Frederick National Laboratory for Cancer Research
Each talk will be 10 minutes, plus 5 minutes for questions and answers.

2:30 pm – 3:15 pm – Talk Session E
- Tina Hernandez-Boussard (Stanford University)
    Building Trust and Momentum: The Future of Medical Digital Twins

- Andrea Townsend-Nicholson (University College London)
    Community Engagement: Shaping the future for Virtual Humans

- Michael N. Liebman (IPQ Analytics)
    Digital Twins: Fraternal or Identical?

3:15 pm – 3:30 pm – Break

3:30 pm – 4:30 pm – Moderated Panel Discussion E

Topic: "Laying the Course for the Future of Medical Digital Twins and Virtual Human Modeling"

Panelists:
- Tina Hernandez-Boussard (Stanford University)
- Andrea Townsend-Nicholson (University College London)
- Michael N. Liebman (IPQ Analytics)
- Robert Coughlin (JLL)

4:30 pm – 5:00 pm – Virtual Human Global Summit Closing Remarks
- Peter Coveney, University College London
- Kerstin Kleese Van Dam, Brookhaven National Laboratory
- Eric A. Stahlberg, Frederick National Laboratory for Cancer Research

5:00 pm   Summit Concludes