Organized Session 1

**CIGR-TS II (Structures and Environment)**

Developing Digital Twins for Agricultural Buildings

Norton, T 1\*, Brown-Brandl T 2, Bartzanas T3

1 Department of Biosystems, KU Leuven, Leuven, 3001, Belgium

2 Biological Systems Engineering, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Nebraska, USA.

3Department of Natural Resources and Agricultural Engineering, Agricultural University of Athens, Greece

\* Corresponding organizer. Email: tomas.norton@kuleuven.be

**Concept of Organized Session**

Agricultural buildings such as greenhouses, livestock buildings and storage facilities need to be accurately designed and controlled to guarantee the quality of agricultural products and the well-being of the animals within the structure. For many years, the agricultural engineering community have carried out research to better design these buildings using tools such as CFD, FEA and controller simulations, wherein domain knowledge and technical expertise are used to specify inputs, constraints and interpret results. While this is a powerful approach, the comparison with the real system is only made at validation stage. The new era of Digital Twinning seeks to change this by combining these powerful simulation tools with the capabilities of IoT so that the real-life data can be assimilated while the simulations are running. This way forecasts on how these buildings will perform in the face of e.g., changing climate, energy or other input availability can be made in a very accurate manner. In this Organised Session of Technical Section II, we will explore the application of digital twins to agricultural buildings (greenhouses, livestock buildings and crop stores) through a serious of invited talks by senior international researchers followed by a panel discussion.

**Keywords:** greenhouses, livestock buildings, fruit storage, simulation, forecasting