Monday morning half past 8 in Wageningen. Flows of cycling students that are in a hurry to get in time for the first lecture. The result: a bicycle traffic jam. Probably the term ‘Complex Adaptive System’ (CAS) is not immediately popping up in your mind, while this is exactly what it is. Complex adaptive systems consist of multiple levels, structures and entities that are interrelated and interact. In the previous example it might seem that students are the only actors in the system, but what about the university that let all classes start at the same time, or the municipality that makes decisions on the road structure? Understanding CAS requires tools that can simplify but still represent the complex and dynamic systems at different levels. One of these tools is agent-based modelling (ABM). This is a methodological approach in which computational models are used to analyse the system dynamics. ABM uses a bottom-up approach, the behaviour of individuals is programmed (cycling students) to study emerging behaviour at system level (traffic jam). Although it would have been interesting, in this session we are not going to simulate cycling students, but we use the CAS-approach and ABM to analyse agricultural systems and increase insight in sustainable food production.

Three PhD studies will be presented in this session. The first study is conducted at the Plant Sciences Group and integrates epidemiological models of potato late blight, agronomic data and stakeholder behaviour. The aim of this study is to use ABM to develop effective strategies to support the social-institutional systems that determine the design of disease-resistant landscapes for potato cultivation. The interaction between stakeholder behaviour (i.e. farmers, private companies, markets), farmers’ pesticide management and disease resistant landscapes is central in this project. The second study, conducted at the Social Sciences Group, aims at understanding the dynamics of sustainable innovation processes in the Dutch pork production. The project will focus on the economic and social behaviour of farmers with respect to the adoption of novel and sustainable housing systems, combining the knowledge of rural sociology, social-psychology, agricultural economics, and technological state-of-the-art. The third study is conducted at the Animal Sciences Group and aims at understanding pig behaviour and the related sustainability performance in novel farm designs. This study investigates the dynamics in pig behaviour and interactions with conspecifics, farmer and environment, including aspects of ethology, social sciences, and technological developments.

This panel session aims to bring together different perspectives on model development and to learn from one another’s experience and knowledge. The use of theories and techniques for modelling human and animal behaviour in individual projects will be discussed and, in the final discussion, insights in modelling assumptions will be compared. Existing insights from different disciplines could open up new areas for modelling of both humans and animals. With this panel session, we hope to share and expand our knowledge of modelling human and animal behaviour in order to better understand system dynamics and to work towards a more sustainable food production in the future.