Systems Biology has almost as many definitions as it has proponents. However, most people would agree that minimally it consists of mathematical modelling of a biological system, based on a detailed knowledge of its components. The aim is to reach a deeper understanding of how the system works. How close are we to achieving this?

I review the information needed. For a simple system, such as a signalling pathway, we know the protein components, and modelling is both feasible and useful. However, many workers are more focussed on larger systems such as bacterial cells. Here we know many of the protein components, but few rate constants, few metabolite levels, and little about spatial and temporal localisation and the effects of cell crowding. We are therefore many years away from a detailed model of every interaction. But models can contain 'black box' elements; indeed, a certain level of abstraction is probably necessary to allow us to pick out the important features of the system. However, the model is only useful if it corresponds to reality, and if it allows us to model and predict perturbations. Although a working model is many years away, the attempt will be useful. The key requirements are robust experimental data, and good communication between biologists and modellers.