Where to draw one's theoretical boundary: One system, one data set, two published models, two opposing conclusions

Where to draw the theoretical boundary when modeling complex systems is an important problem. The modeler would like to capture all aspects of the system necessary for describing the phenomena of interest. The general goal is to create the simplest model that retains all relevant information, thus reducing parameter space, maybe allowing for analytical solutions, but generally making it easier for the modeler to gain insight about the real system. The talk will discuss the published work of two groups within the field of yeast cell polarity[1][2]. Both groups present a model describing the establishment and maintenance of the 'polarity patch', an isolated patch of protein on the cell membrane marking the presumptive bud site. While both models are designed to represent the same system and set their parameters using the same data, they differ in their level of abstraction and draw opposing conclusions. The comparison between these two models provides an interesting illustration of the importance of setting the theoretical boundary.

[1] Slaughter, B D, et al. (2009). *Dual modes of cdc42 recycling fine-tune polarized morphogenesis*. Developmental cell.

[2] Savage N S, et al. (2012). *Mechanistic mathematical model of polarity in yeast.* Molecular Biology of the Cell.