# Architecture of a Tangible Interface for Modeling Plant Cell Cycle

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Advances in high-performance computing and optical networking are making it feasible to handle complex analysis of the multiple phases of cell division. While it is now possible to build and explore simulation and modeling of the cell cycle [1], the complexity of their user interfaces can be intimidating and undesirable to researchers and teachers of such biological phenomena. While supercomputers have already been used for simulation of cell division [2], research in this area has been limited.

This motivated us to try to explore prospects for a tangible interface for modeling a plant cell cycle. This interface includes both visual+physical components for human manipulation; and tagged elements coupled to underlying computational models, which can specify and steer underlying software and high-performance computing resources. We sought to develop a physical interface that would be user-friendly from a biologist's point of view, while maintaining sophisticated back-end connectivity with cluster computers, and grid resources for simulation.

In this poster, we present the initial architecture of the tangible interface, and a basic workflow that could support smooth operation of the following steps: (1) actual physical design of a cell-cycle model on the tangible interface workspace; (2) saving of the physical model as a softcopy for future retrieval, using controls available on the workspace; (3) if necessary, editing the saved model in a GUI; (4) choosing a cell-cycle model as input to the parallel algorithm for simulation and verification of the model's correctness, (5) submitting the resulting compute job description to the grid; and (6) collecting the output from the compute resources for further analysis and archiving. To further support this chain of operation, we are continuing to develop a GUI (to handle/edit saved models and create new ones), and to develop an efficient parallel algorithm for the simulation of cell division. We believe this interdisciplinary effort would mark the beginning of designing grid-enabled tangible interfaces.

**References**

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