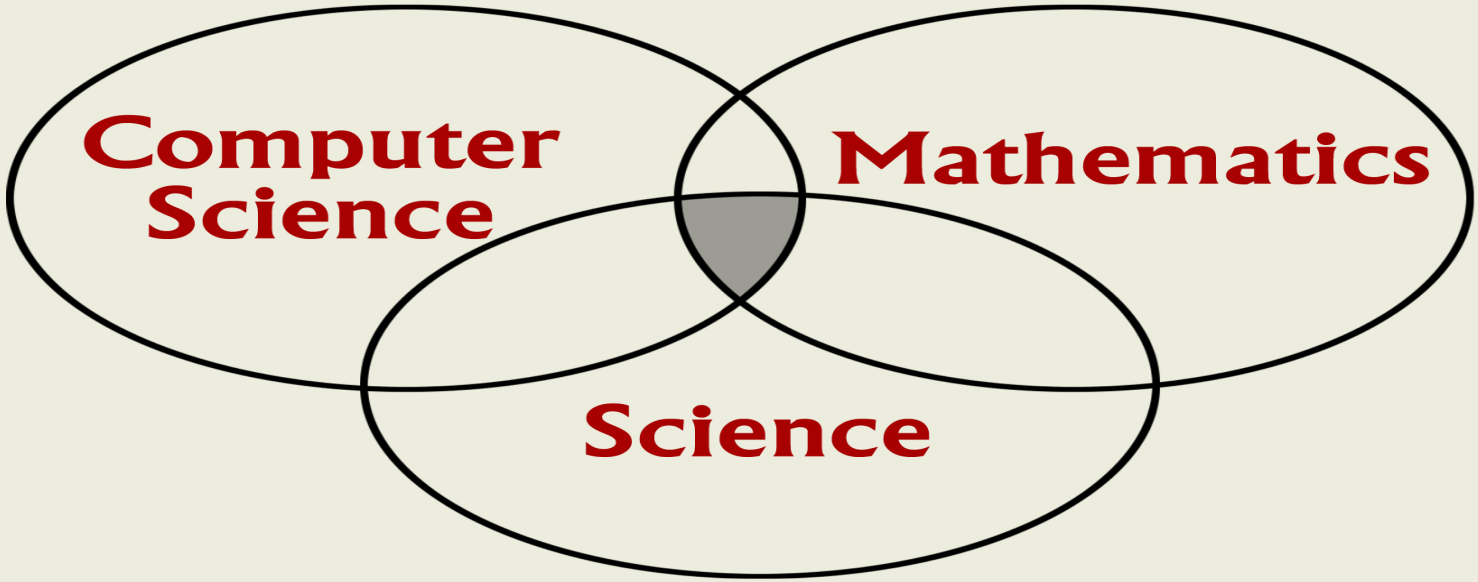
# A Model for Computational Science Investigations

## Supercomputing Challenge Kickoff 2005

# Computational Science?

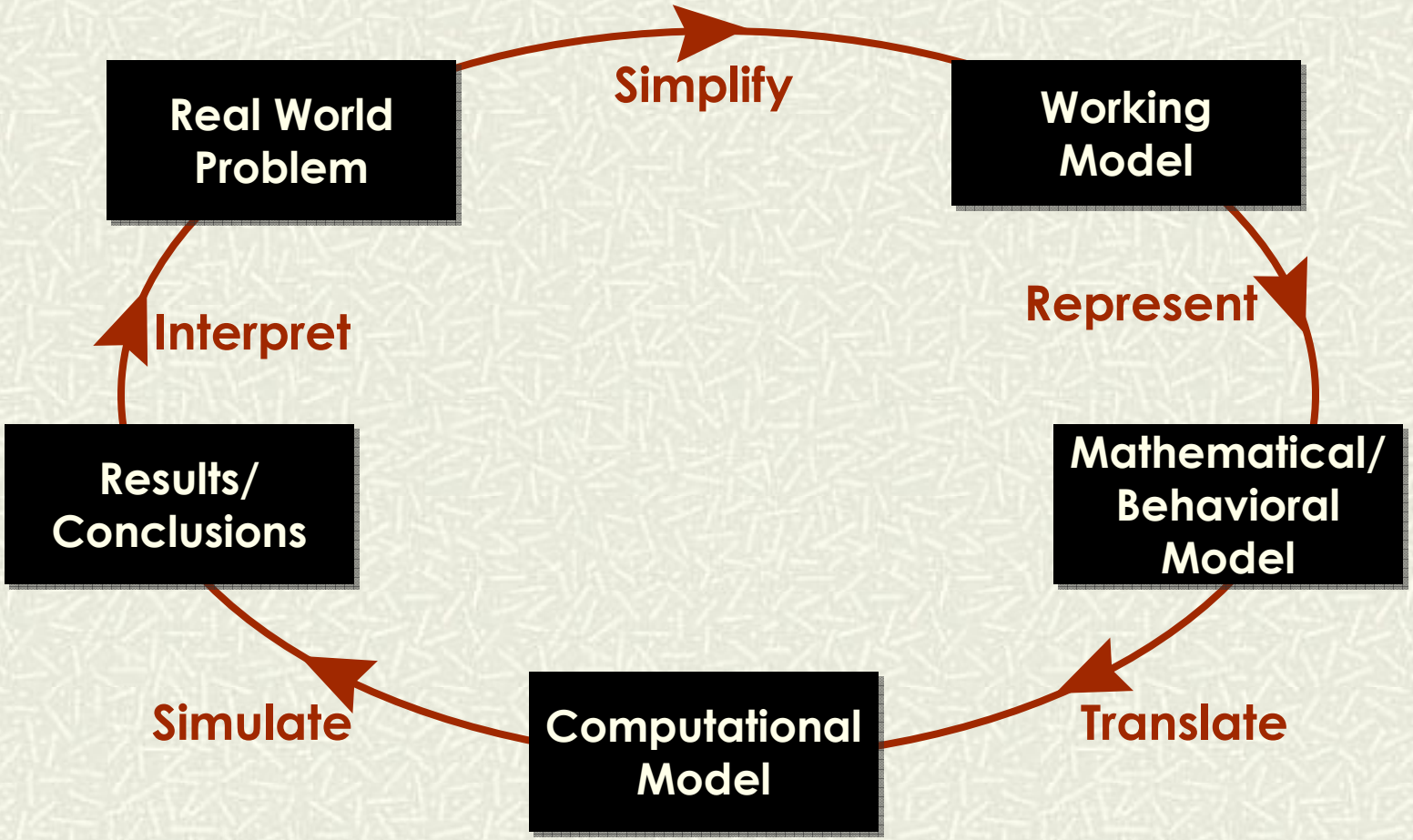
Computational Science is the use of mathematics and computers to model "real world" problems in science, and conduct simulation experiments.



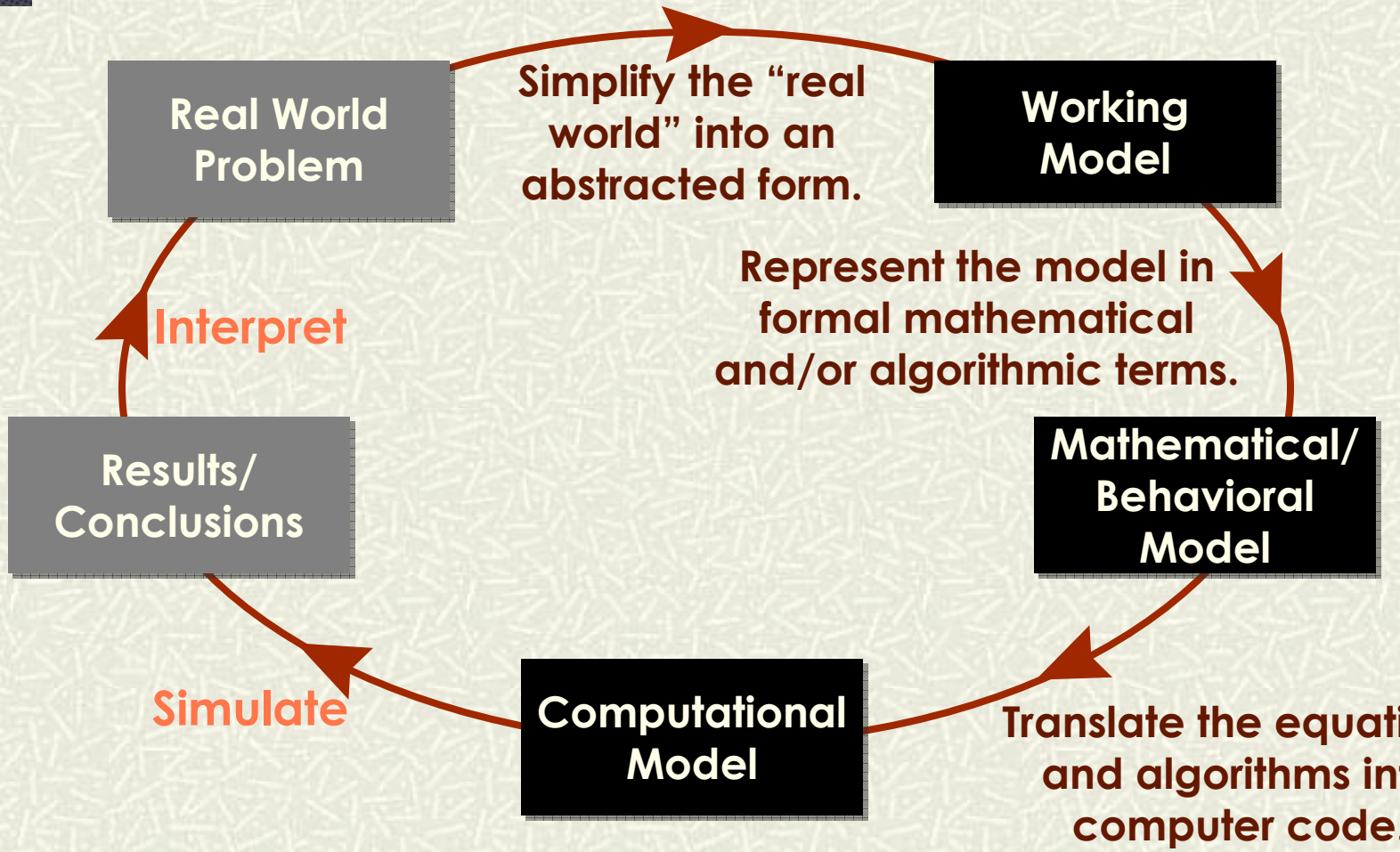
# Computational Science

- Computational Science (CS) complements, *but does not replace*, field experimentation in scientific research. Each approach is appropriate in certain situations.
- CS is ideally suited to exploration of problems which are too expensive, too dangerous, too difficult to control, too fast, too slow, too… etc. for extensive experimentation in the field.
- CS allows us to perform large numbers of experiments, using alternative scenarios with different inputs. This can be used for "what if" analyses, as well as output-driven solutions to complex problems.

# Computational Science Process

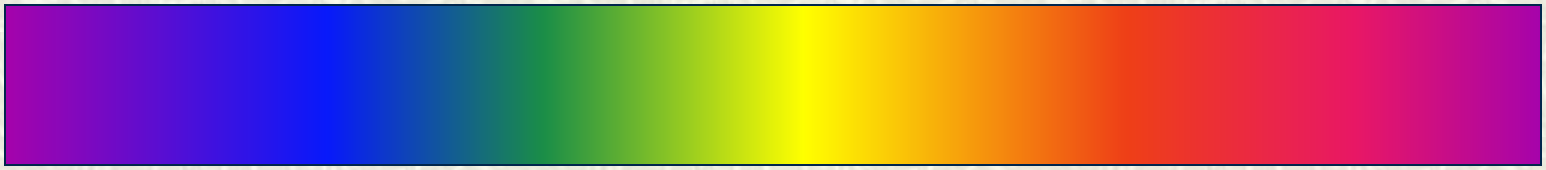


# The Role of Modeling



# Implementation Approach: Modeling Orientation

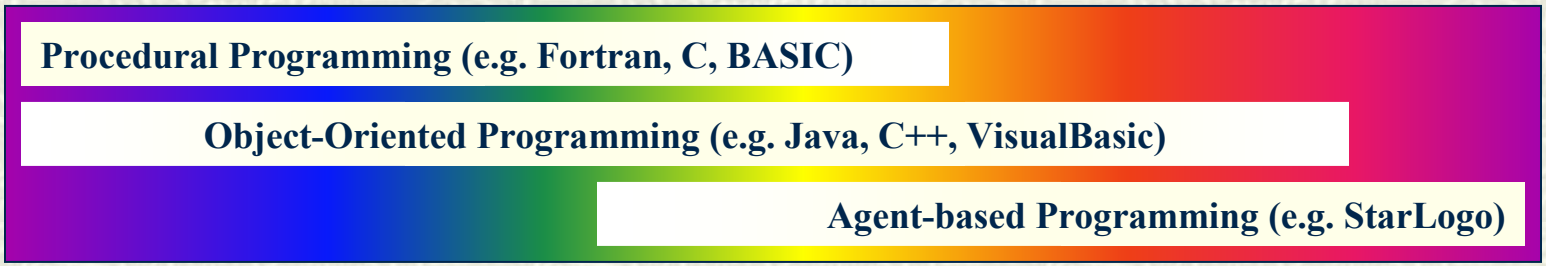
How we describe the "world" of our chosen problem …



Mathematical formulas and/or logical rules describing the global behavior of the "world" as a whole

Mathematical formulas and/or logical rules describing the local behavior of the different kinds of individual objects in the "world"

... influences our choice of programming language/approach.



# Implementation Approach: Technical Application