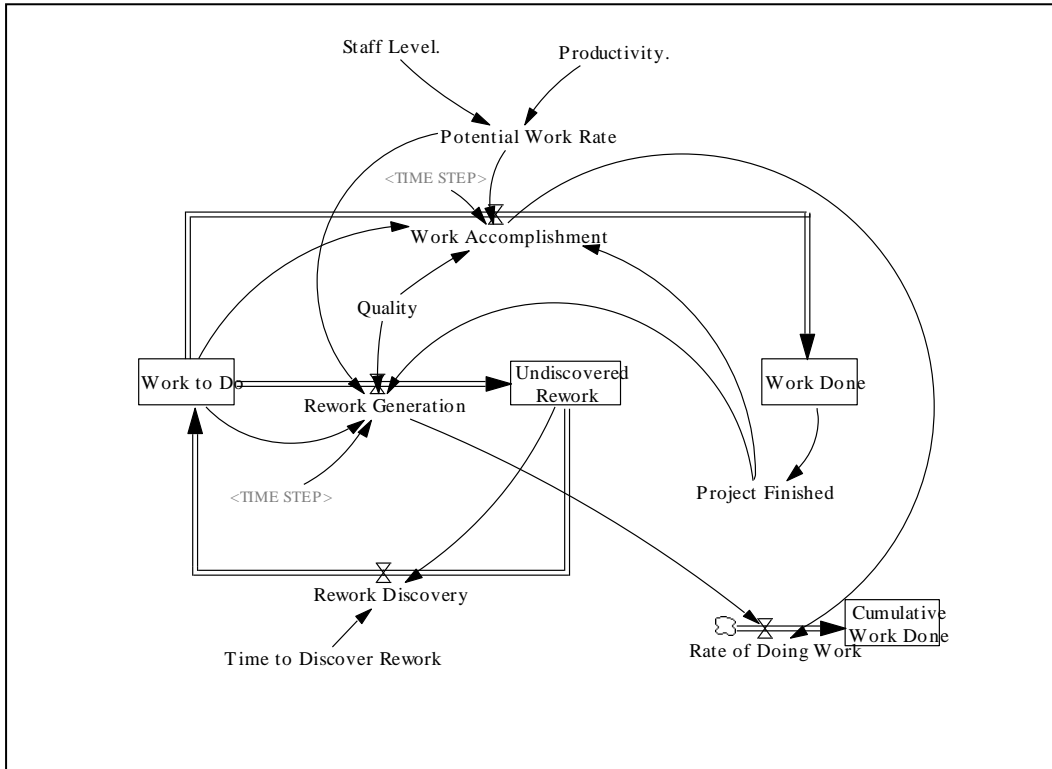




Complete the equations for the rework cycle model. Assume that staff, productivity, quality, and rework discovery time are constants. A VENSIM diagram of the model, plus some hints, follows. Assume that there are 100 tasks to be done; set the normal values for productivity, quality, and rework discovery time at 1 task/month/person, 1.0, and 4 months, respectively.



Model Analyses

1. With perfect quality, when does the project finish? What happens to work to do, work done, and undiscovered rework? [Attach graph with one or two sentence explanation.]
2. Now, set the normal value of quality to 0.75. When does the project finish? What happens to undiscovered rework? [Attach graph with several sentence explanation.]
3. Analyze the impact of productivity, work quality, and rework discovery time on project dynamics (specifically, completion date and total work done). Perform this analysis by simulating the model varying each parameter by plus-and-minus 33%. [Spreadsheet charts summarizing results of simulations.]
4. Summarize the lessons learned. [Several sentences.]

Hints (examples)

1. Rate

Work Accomplishment = Potential Work Rate* Quality * Project Finished

2. Auxiliaries

Potential Work Rate = Staff Level * Productivity

3. Constant

Quality = .75

4. Representing a delay

Rework Discovery = Undiscovered Rework / Time to Discover Rework

[This equation produces a delay between the time when rework is created and when it is discovered; in steady state, the delay time equals Time to Discover Rework]

5. Time Step

The value of “Time Step” should be less than one-half the smallest “first-order delay” in the model. Here, the smallest delay is the rework discovery delay.

6. Work Completion

Define the completion of work (Project Finished) when work done is say 99% of original work to do. Use Vensim’s IF THEN ELSE function. Stop further work at this point.

7. Preventing from Going Negative

Vensim does not prevent levels from going negative. Therefore, you need to limit the rates leaving Work to Do (Rework Generation and Work Accomplishment) to equal the minimum indicated by potential rate work, and Work to Do divided by the TIME STEP. Use Vensim’s MIN function. For example:
Work Accomplishment = MIN(Potential Work Rate*Quality, Quality*Work to Do/TIME STEP)*Project Finished

8. Unit Check

Please put in units for your variables and run the units check (under the model menu). This often helps you discover equation errors. Note that Vensim sometimes has trouble determining if units are balanced for equations with imbedded computations.