Our team was the Rubber Duckies, and in the production game we accrued costs of $5910. Today’s objective is to find out how that happened, whether it could have been avoided, and if so, how could it have been avoided.

As is logical, we will start at the beginning, with the retailer. For the first four weeks, customer demand was 4. But in the fifth week, it jumped up to 7, and that is when the chaos began.

This is a graph of the retailer incoming and outgoing mail, and as you can see, demand, which is the blue line on the bottom, stayed constant. But compared to that, the outgoing requests were erratic and followed no pattern.

One can imagine what this would have done to a wholesaler trying to gauge demand and to order accordingly. If you look at the graph of distributor incoming and outgoing mail, you’ll see first that there is a time delay, but second, that whatever order the wholesaler received, he added to it when ordering from the distributor. He did this, we can guess, because he wasn’t sure what the retailer would require of him in any given week, and wanted to hedge him supplies against the time when the retailer would require unreasonable amounts from him

The distributor reaction is slightly different. For the first 20 weeks, he basically met the demand of the wholesaler, only increasing orders by a little, if at all. However, in the 16th week he ordered much less than the wholesaler requested, and subsequently sent in an order of 40. A guess of why he did this was that he thought he had ordered enough to suffice for a while, and thinking himself close enough to the factory that he would be able to respond to future changes in demand quickly enough. However, seeing his orders continuing to increase and his backlog skyrocketing, he decided that he needed to remedy his situation in one stroke, and so ordered 40.

What we can see from these reactions is that the lack of knowledge on what will happen in the future causes players to act very conservatively: in the retailer, there was schizophrenic ordering; the wholesaler, conservative ordering—that is, excessive ordering; and the distributor was similarly erratic and excessive. All of these players, especially those farther away from the factory, saw that there was a significant time delay for any order to be fulfilled, and so stocked up on inventory to guard against future changes in demand. If we look at the graph of retailer outgoing mail compared to distributor outgoing mail, we can see that the initial order is distorted out of proportion by the time it has passed through two intermediaries.

And rightly so, because all of the conservative ordering caused the first three players to build up giant backlogs, sometimes pushing costs into the triple digits.

On the factory side of things, inventory became the problem. The factory was close enough to production to accommodate changes in demand with a slight time delay. This graph of factory backlog and outgoing mail shows that as soon as factory backlog seemed to get out of hand, the factory ordered more, and backlog fell back down in the subsequent two weeks. However, with this much ordering, the factory was less able to cut down on excess inventory when the first three players’ orders began to decrease at the end of the game. The player could react and decrease production, but the previous build-up compared to the rapid drop off of orders made the problem too big the deal with.

This problem permeated back to the other players, whose orders similarly went down as the game began to stabilize itself. Orders sent in the early rounds were coming back to their originators, but demand was not as large as they had anticipated, and so everyone started building up inventory. This added to the already astronomical costs.

And so, as can be seen, two problems that converged to raise costs in this game was the lack of ability to predict the future---partly caused by the rule against communication among players. Also, there was a significant time delay. Not knowing future demand and realizing that reacting to situations would be too slow, players acted proactively to secure themselves against worst-case scenarios, exceeded other players’ abilities to meet their demands, and caused backlog to rise. Meanwhile, the factory ability to fulfill demand quickly became a curse, because everyone got what they wanted only to find out it wasn’t what they *needed*. Inventory shot up as well, and the two parts of cost combined to give an unreasonable end cost.

Our solution to this is simple: cut out the middlemen. This would eliminate the communication problem, because the retailer would speak directly to the factory in terms of orders. The factory would be able to deliver products quickly, relieving the retailer of the onerous job of trying to predict weeks into the future. And thus, the business of rubber duckies could actually be profitable…….or at least not so costly.