20599 Agent-Based Modeling Assignment: WeDoScience

WeDoScience (WDS) is an independent publishing company focused on scientific papers about a niche, but promising, topic. They are thinking of a new product, a scientific journal, and trying to assess if the new product will be feasible, and profitable. WDS plans to have one issue per month with 10 articles each.

WDS want to build a solid model of their production process. Their workflow is that of many scientific publishing companies. It is presented here in a simplified setting.

Each month, some papers are submitted to the journal. This number is estimated to be normally distributed with $m = 110$ and $\sigma = 10$.

Each paper is initially reviewed by the Editor in Chief who for various reasons (off-topic paper, poor English, lack of novelty, insufficient data analysis, etc.) rejects the paper with probability of 90%. Rejection or acceptance by the Editor in Chief can be considered instantaneous.

Each accepted paper is sent to a reviewer who reads through the paper and sends the paper back to the authors with the request of making some revisions. The revised paper is sent back to the reviewer who makes a final decision which is positive with probability 90%. The number of months needed for the whole review process of an article is normally distributed with $m = 6$ and $\sigma = 1$. Each reviewer can work only on one paper at a time. The paper is then published online in the first available monthly issue.

Of course, the whole process might end up in a "normal" workflow, where most articles find their way into the printed issues and the queue that naturally originates from the process is kept under control. If the reviewers are not enough, a queue is formed of articles waiting for review and this is bad because the authors, who want their paper to be published as soon as possible, are getting a bad service. On the other side, increasing the number of reviewers over a certain threshold is unfeasible, because they work for free (actually, there's an implicit reward because they can boast of being a reviewer for a journal, which increases their scientific reputation). It is also possible to change the number of articles per issue but increasing it diminishes the journal reputation and is considered bad by WDS.

The assignment is to build a Netlogo/Python agent-based model to analyze the WDS case. You might be a consultant helping WDS in the startup phase. You also expect them to ask you the following questions:

1) How many reviewers are required, with the above data, to guarantee a "normal" workflow?
2) Does a variation of the number of articles per issue really make any noticeable difference?
3) Which of the above parameters are the keys to understand the dynamics of the process? All of them or only some of them? (Remember that even the probabilities of acceptance/rejections are subject to change, since they are in the hands of either the Editor in Chief or the reviewer. For example, they can decide to be less strict in rejecting papers which might results in more papers accepted. Which in turn might result in a decrease in the reputation of the journal and of its Editor in Chief and reviewer. Being more "tolerant" could be a reasonable price to pay for eliminating queues only if queues are really eliminated by doing so.)

Tue submission must include the code and a pdf with your answers to the three questions above and possibly other considerations and remarks you think might be relevant for WDS to improve their business model.