



Noteworthy Insights on Project Management

Many managers experience the challenge of managing a substantially-sized project at some point in their careers. Systems Thinking and System Dynamics have helped the best managers anticipate common dynamics and avoid surprises.

By Kristina Wile

Typical project management tools are often overly optimistic and assume simply that a project begins with a large body of work to be done, which is then worked through based on a given productivity to a completed status. Consider *Work To Be Done* and *Work Completed* as stocks or bathtubs, the work being done is then represented as a flow between these two stocks, as shown in Figure 1.

To expand this system framework to more accurately reflect reality, it is necessary to introduce the idea of work quality or correctness, as shown in Figure 2. As all tasks are being completed, some fractions of the tasks are not done correctly. This creates a new flow of work, not into the stock of *Work Completed*, but into a stock of *Undiscovered Rework*.

After a delay, this *Undiscovered Rework* is discovered and will flow back into a fourth stock, *Work to be Redone*, which compounds the overall amount of work that needs to be completed. In the act of being completed, some of the *Rework Completion* flow will feed back to the *Rework Creation* flow due to the inevitable errors that occur.

The effect of acknowledging the critical concept of rework, which adds two stocks to the system, as well as new flows (shown in Fig. 2), can provide major insight and efficiency to a working structure.

Without acknowledging the rework to be done, the progress of the project is perceived as further along than is actually the case. Once the rework is identified, or acknowledged, it creates a previously unseen project delay that can trigger a number of workarounds, further exacerbating the delay.

In addition to the quality control or rework, another element that helps the system more closely reflect the real world is customer changes—rework that stems directly from the customer or client. This flow feeds directly into the *Work to be Redone* stock, but also increases the total amount of work to be done, which further slows down the project.



Figure 1. Simple understanding of project dynamics.
Source: Leverage Networks

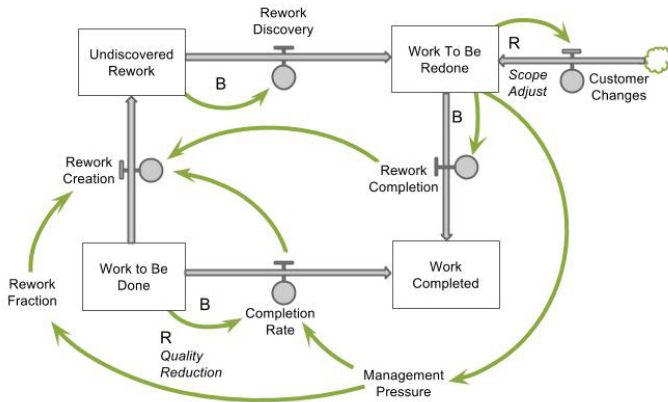


Figure 2. A more complete view of project management dynamics.
Source: Leverage Networks

As project progress slows unexpectedly for both of these reasons, management often reacts by exerting pressure to work harder. Tasks may be demanded simultaneously, which can cause conflicts with personnel and equipment, and result in a net of reduced productivity and further decreased workflow.

This decreased workflow requires extra time to manage and resolve the conflicts, while the additionally increased pressure leads to lower quality work. Reduced work quality again increases the *Undiscovered Rework* stock, creating a reinforcing process that even the most competent project manager may not be able to resolve. This *Quality Reduction* feedback loop, as seen in Figure 2, is a reinforcing loop where the behavior trends amplify themselves. The more rework there is to be done, the more management will exert pressure, and the more rework will be created.

This may seem like a worst case scenario situation, when in fact it is merely a representation of reality and the ways in which these actual factors interact. Articulating and understanding the practical and factual ways these elements work together allows for the development of effective fixes and solutions. Additionally, it is useful to understand the baseline of inefficiency —this system, and others, will never be perfect.

The intention of examining these systemic diagrams is to look at all of the pieces and their relationships to each other in order to work toward smoother operations.

Systemic Insights

Undiscovered rework happens.

Recognize it, call it out explicitly, and plan for it. Build time into the schedule to address it. Set customer expectations by identifying the need for rework.

Avoid high-pressure project finishes.

The unintended side effects of high-pressure management are escalating and negative, particularly when engaged for a longer time frame.

Customer changes can have a much bigger impact than planned.

The ripple effects should be thought through and can be made clear to customers. A lengthened project timeline should be negotiated. Expectations for these renegotiations should be specified in the contract for customer change requests.

Look at the entire system.

Bring together all of the pieces of the system and consider how they interact with each other. Are there any gaps? How do the pieces interact with each other?

Further Reading:

Sterman, John D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: Irwin/McGraw-Hill, 2000. Print.

Cooper, K. "Naval Ship Procurement: A Claim Settled and a Framework Built" (1980). *Interfaces*, 10(6) 20-36. Print.

Sterman, John D. "System Dynamics Modeling for Project Management" (1992). MIT Sloan School of Management. Web. <http://jsterman.scripts.mit.edu/docs/Sterman-1992-SystemDynamicsModeling.pdf>

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