

Early Project Ideas

Early Project Ideas

After musing over the project document for a bit, I had a few ideas on expanding certain concepts and introducing a few new ones. I'm not 100% clear on which pieces of the project will require class agreement and coordination to introduce, so I'm going to start a new post to track and discuss and see what comes of it. If nothing else, I'm curious to hear what other neat ideas everyone has and how they're considering implementing them!

Currently Suggested Part 2 Concepts

- Renewable resources (game tick or "turn")
- Recycling (transforms)
- Composite Transfers (multi-transfer)
- Variable Resource Weighting (non-constant across countries)
- War modeling

New Concepts

- Decaying resources
- Research trees
- Resource tiering
- Reputation as a resource

Decaying Resources

What would it look like to introduce a sense of entropy into the game? Manufactured goods don't typically last forever, and there is often a balance of maintaining existing vs creating new. For a concrete example, consider the quality of a house just built vs one built 50 years ago. If no resources have been put into maintaining the older house, it may be so far gone as to be uninhabitable.

The simplest approach here might be to do the opposite of renewables and have a decay rate applied to certain resource stacks every game tick or "turn." However, it would be nice to find an elegant way of allowing for some sort of *maintain* or even *upgrade* transformation that would have a cost, but likely less than the cost for *new*.

Research Trees & Tiering

The project description had me drawing several loose parallels to other games. Settlers of Catan comes to mind, as does Age of Empires and Civilization. Several other popular strategy games would easily be a good fit as well.

In several of these types of games, the concept of a research tree is present. Spend some resource(s) and/or currency now, and unlock the ability to build or create something better in the future. The overall concept is fun to consider from

the perspective of an AI, because in many ways just like humans, depending on the search strategy (perspective) the better long-term utility of such a choice might not be considered.

There are a few ways to model this just using the resource and transformation templates and no other mechanic changes. A new resource of research credits is created. Transforming combinations of raw and even other manufactured resources could produce research credits. At certain thresholds of credit amounts, new transformation templates become available that require the credits as input and also return the credits as output, thus not changing the current research “level.” For more complex research trees, intermediary “blueprint” resources could be introduced that require research credits as input to generate. They would then be inputs into subsequent specialized transformations that would similarly return the blueprint as an output so as not to take away “knowledge.”

Resource Tiering

While often paired with research, resource tiering can be done with or without that concept. In the real world, we don’t typically produce one type of something. Manufactured goods have varying quality levels, or tiers.

Housing is one area where this could be complex and interesting. While the game of Monopoly provides a simple example of transitioning, houses to hotels, what could be represented in our country models? Could a House I, II, and III represent increased population satisfaction at a cost of increased square footage (available land)? Could the introduction of High-Density Residentials be used to offset this? (SimCity anyone?)

Tiering could be done by simply having a tiered transformation require the preceding tier as an input, e.g. House II transformation requires House I. For more complex modeling, it could be tied to the above research concepts, requiring research as an input instead of a prior tier. It could also be associated with the aforementioned decay, where higher tiers decay at a slower rate than lower tiers.

Reputation Resource

This particular idea feels like a natural extension of the game’s premise centering around countries trading amongst each other. Soft power exists on the world stage. It’s less concrete than hard power (resources), but it has subtle implications for how countries interact.

A reputation resource would probably need to be done as a signed number, representing both negative and positive influence. It could be tracked as a single number per country, representing more of a binary outlook on the countries of the world as either good or evil, e.g. UKRAINE has REP 5, RUSSIA has rep -1. It would probably make more sense to track it as a separate resource for each country, e.g. USA has REP_UKR of 2, while RUSSIA has REP_UKR of -2.

The reputation resource would then have an impact on probabilities. A country might be slightly more inclined to accept a sub-par (utility) deal. A country might be more likely to declare war. There could also be new transfers or transformations to represent various aid (financial, military, medical, etc), and these would only provide the initiating country with reputation in return.

[programming_project](#) [programming_project/part_1_discussions](#) [programming_project/part_2_discussions](#)

~ An instructor (Will Hedgecock) endorsed this note ~

Resolved ☐ Unresolved @22_f1 

Peter Callahan 1 year ago

I love the ideas above and would like to further explore the idea of specialized transformations introduced above by John. This seems like a powerful idea of limited implementation complexity, keeping it within reach for all skill levels.

Since countries do not have similar capabilities in the real world, being able to measure the **impact of an additional capability** would be a realistic application of this kind of model. Consider this example; run the trade simulation from the perspective of a country whose capabilities completely match those of its neighbors. In a subsequent run, add an additional transformation to the source country (or one of the non-self countries) and see how this asymmetry changes the model output. Are countries better off with high-tech neighbors or only if they possess the technology themselves?

Alternatively, two countries could have similar transformations with one country having a slight **efficiency advantage in terms of resource consumption**. How would this comparative advantage change the outcome of the simulation?

I think these kinds of questions would be very interesting to explore so wanted to share out.

~ An instructor (Will Hedgecock) thinks this is a good comment ~

undo helpful | 2

Reply to this followup discussion

Start a new followup discussion