IGME-689 Building Types

Overview

I feel it is important for the game to define some key statistics/trackers, whether they are resources or scores. These will serve as motivators for adding specific buildings/structures to the town/city, regardless of the type of effect it will have on the ocean ecosystem, as well as keeping a sense of realism for the city. As the city grows, some necessary actions may not be great for the ocean ecosystem, which then in turn creates a need to build other structures to improve the wellness of the ocean ecosystem. This creates a solid engagement loop for our game, and an interaction that feels more like a game than just a simulation. Not all of these are in the scope of the product for this competition, but this is to serve as a list for our refinement, and can serve as a guide for expansion in potential future work. Here is a list of some potential resources or scores to be managed:

- Population
    - Higher population means more pollution and a need for more homes and more buildings to ensure happiness as well as to handle the increased amount of waste. This will also increase city agent interaction rate with the ocean ecosystem.
    - Increases the number of pedestrian agents in the city ABM
- Cleanliness
    - Buildings that create a lot of pollution will decrease this score and require waste management buildings to help increase this score. This score will also have a direct effect on the happiness score. Decreased cleanliness and a lack of waste management can also have a negative effect on the ocean ecosystem.
    - Affects the garbage count in the ocean ABM
- Happiness
    - This score/value will have an effect on the population of the city. A city with a lower happiness score will have a lower population as people leave for a “better city.” This can also decrease the efficiency of different buildings as less happy people will be less efficient at work. This also incentivizes the player to keep the happiness score up, as the efficiency of buildings that sustain the ocean ecosystems will also be affected.
- Money and Revenue
    - Money will be the main resource used for building different structures/buildings. This will be a limiting factor for player progression, allowing for the game to be well paced and forcing the player to compromise cleanliness and other scores/resources in order to create more revenue producing buildings to help expand their city faster

    - More revenue producing buildings can increase the human agent's likelihood to litter and increase their transportation (affecting cars and such) and disposable goods as more commercial goods become available.
- Food
    - Food is a necessity for keeping up the city's population and happiness. While food can be sourced from outside of the ocean, maintaining a healthy ocean ecosystem allows for the ocean to be used as a resource for food. This provides another incentive for working to keep the ocean healthy, helping keep the focus on the interactions between the ocean and city ABMs. This helps incorporate a lot of the agents from the ocean's model (fish, fisherman, food, etc) into the overall interaction between the two models, instead of the focus being solely on the city interaction and just the effect being seen in the ocean simulation. Using fish agents as food also allows for a good use of the endangerment attributes discussed for fish agents and an actual adjustment of the number of agents in the model at any given time.
- Power/Energy
    - Almost any building in the city will require energy in order to serve its purpose. However, in order to generate energy/power, you need some sort of power plant or natural resource mining which can cause a lot of pollution depending on the type of plant used.
    - See CO2 emissions and oil spills listed in the city ABM design document as well.
- Transportation Efficiency
    - Building an efficient transportation system decreases the amount of cars/trucks/vans agents in the city ABM. Building roads increases happiness by allowing residents to drive to work and around the city instead of walking everywhere. Having a large population without a great public transportation system, however, decreases the cleanliness due to pollution. This directly aligns with the vehicle emissions outlined in the city ABM

City Essentials (Generics)

Town/City Hall

Homes

Roads

Hospital/Fire Station/Police Station

Pier/Boardwalk

Shipping Port

Entertainment Structures (Maintain/Increase Happiness)

- **Public Parks**
- **Movie Theater**
- **Amusement Park**
- **Arcade**

Revenue Generating Structures

- **Shipping Port**
- **Shopping Mall**
- **Office Building**
- **Casino**
- **Hotel (Beachfront Resort)**
- **Stadium**

Waste Management Structures

- **Landfill**
- **Incineration Plant**
- **Recycling Center**
- **Composting Facility**
- **Waste-to-Energy Plant**

Food Production/Generation Structures

- **Plant Farms**
- **Animal Farms/Slaughterhouse**
- **Fishing Docks**
- **Processed Food Plant**

Energy Production Structures

- **Fossil Fuel Power Plant**
- **Wind Farm**
- **Solar Farm**
- **Nuclear Power Plant**
- **Hydroelectric Power Plant**

Transportation Structures

Bus Stations

Transit Center

Train/Rail System