**5.2.1 Buildings**

**Functional Requirements**

1. The system should support creating and managing various building types, including Residential, Commercial, Industrial, and Landmarks.
2. Each building type should have specific attributes (e.g., capacity, resource consumption) and behaviors (e.g., providing housing, generating employment).
3. Residential buildings should accommodate citizens and affect their satisfaction levels.
4. Commercial buildings should offer business services and contribute to economic growth.
5. Industrial buildings should create job opportunities, support production, and consume specific resources.
6. Landmark buildings should provide cultural or recreational functions, enhancing citizen satisfaction.
7. Buildings should interact with resources and utilities to fulfill operational requirements.

**Functions**

* createBuilding(buildingType): Create a specific type of building (Residential, Commercial, Industrial, Landmark).
* calculateResourceConsumption(building): Calculate the resources required for a building.
* updateCitizenSatisfaction(building): Update citizen satisfaction levels affected by the building.
* generateEconomicImpact(building): Calculate the building's impact on the economy (for Commercial and Industrial buildings).
* connectToUtilities(building, utilities): Connect a building to the relevant utilities.
* maintainBuilding(building): Maintain the building's operational status and check resource and utility needs.

**5.2.2 Utilities**

**Functional Requirements**

1. The system should provide utilities to sustain city operations, including Power Plants, Water Supply, Waste Management, and Sewage Systems.
2. Utilities should generate and distribute resources (e.g., electricity, water) to support city operations.
3. Utilities should manage waste and sewage to maintain the city's cleanliness and environmental health.
4. Utilities should interact with buildings and citizens, influencing their functionality and satisfaction.
5. The system should track resource consumption for each utility and ensure adequate supply for city development.

**Functions**

* generateResource(utilityType): Generate a specific type of resource (e.g., electricity, water).
* distributeResource(building, resource): Distribute resources to specified buildings.
* manageWaste(wasteAmount): Process waste and ensure proper disposal or recycling.
* treatSewage(sewageAmount): Treat sewage to prevent pollution.
* monitorResourceUsage(): Monitor resource usage to ensure adequate supply.
* connectBuildingToUtility(building, utility): Connect a building to the relevant utility.

**5.2.3 Transportation**

**Functional Requirements**

1. The system should support multiple modes of transportation, including Roads, Public Transit, Trains, and Airports.
2. Transportation systems should affect citizen mobility, optimizing traffic flow and commute times.
3. Public Transit should include multiple options (e.g., buses, taxis, trains) to meet citizens' travel needs.
4. Airports should support air travel and facilitate cargo and passenger movement between cities.
5. The system should adjust the frequency of different transportation modes based on demand.

**Functions**

* planRoute(start, destination, transportMode): Plan a transportation route and select the appropriate mode.
* updateTrafficFlow(): Update traffic flow information to optimize the use of roads and transport modes.
* scheduleTransport(publicTransport): Schedule public transport and adjust service frequency.
* calculateCommuteTime(citizen, destination): Calculate commute time for a citizen to reach a destination.
* manageAirportTraffic(): Manage cargo and passenger traffic at the airport.

**5.2.4 Citizens**

**Functional Requirements**

1. The system should manage population growth, including factors like birth rates, migration, and relocation.
2. Citizens should make decisions based on job availability, housing demand, and access to public services.
3. Citizen satisfaction should be influenced by factors such as taxes, amenities, and quality of life.
4. Citizens should respond to government policies, economic changes, and infrastructure developments.

**Functions**

* calculatePopulationGrowth(): Calculate city population growth.
* findEmployment(industryType): Help citizens find job opportunities.
* accessService(serviceType): Access specific public services (e.g., healthcare, education).
* updateSatisfaction(factor): Update citizen satisfaction based on various factors.
* moveCitizen(newLocation): Relocate citizens based on housing and employment needs.

**5.2.5 Government**

**Functional Requirements**

1. The government should be able to set and collect taxes and manage the city budget.
2. The government should allocate budgets to support various city services and projects.
3. The government should implement policies and regulations that impact city dynamics.
4. The government should manage public services such as healthcare, education, and law enforcement.

**Functions**

* setTaxRate(taxType, rate): Set tax rates for different categories (e.g., income, property).
* collectTaxes(): Collect taxes from citizens and businesses.
* allocateBudget(department, amount): Allocate budget for a specified department.
* implementPolicy(policyType): Implement specific policies that impact the city.
* managePublicServices(serviceType): Manage and oversee public services.

**5.2.6 Resources**

**Functional Requirements**

1. The system should manage resources needed for buildings and utilities, including materials, energy, and water.
2. The system should manage the city budget to support services and infrastructure.
3. Resources should be allocated according to demand to support city expansion and service provision.
4. The system should adjust supply based on resource consumption to avoid shortages.

**Functions**

* distributeMaterials(building, amount): Distribute materials to buildings.
* provideWater(utility): Provide water resources for utilities.
* supplyEnergy(building): Supply energy to buildings.
* manageBudget(): Monitor and manage the city budget.
* adjustResourceSupply(): Adjust resource supply according to demand.

**5.2.7 Taxes**

**Functional Requirements**

1. The system should support various tax rates, including income, property, and sales taxes.
2. The system should collect taxes and allocate them to different departments and projects.
3. The system should influence citizen satisfaction and economic activity based on tax policy changes.
4. The tax system should offer flexible rate settings and support different tax strategies.

**Functions**

* calculateTax(income, taxType): Calculate tax based on income and tax type.
* collectTax(citizen, taxAmount): Collect taxes from citizens and businesses.
* distributeTaxRevenue(department): Allocate tax revenue to city departments.
* adjustTaxPolicy(policyChange): Adjust tax policy to impact citizens and the economy.

**5.2.8 City Growth**

**Functional Requirements**

1. The system should dynamically manage city growth, including population growth, housing demand, and economic development.
2. The system should support infrastructure expansion to meet growth needs.
3. The system should adjust resource allocation to ensure sustainable city development.
4. City growth should drive economic development and enhance citizens' quality of life.

**Functions**

* expandResidentialArea(): Expand residential areas to accommodate population growth.
* boostEconomicDevelopment(sector): Stimulate economic development in specific sectors.
* developInfrastructure(): Expand infrastructure to support city growth.
* allocateResourcesForGrowth(): Allocate resources to support city expansion needs.
* monitorGrowthTrends(): Monitor city growth trends and make adjustments as needed.