



# Emergency response: Police patrol

## Description

A police patrol (on foot, bike, car or horse!) can react to different types of calls.

## Fields

- Location
- Id
- Type
- Active call



## Features

- [1] A patrol can be on a call, triggered by:
  - Self-reported
  - Dispatch
  - Another patrol
- [2] A patrol can request help from ambulance, firefighters, other police patrols
- [3] A patrol of type X can respond to calls of type Y
  - traffic violation -> car
  - shoplifting -> on foot, bike, car
  - unrest in park -> foot, bike, horse
  - crowd control -> horse, car, ME
- Patrols need to let Finance Reporting know what calls they respond to
- [6] Patrols can be pre-planned in the case of events (crowd control, support, security)

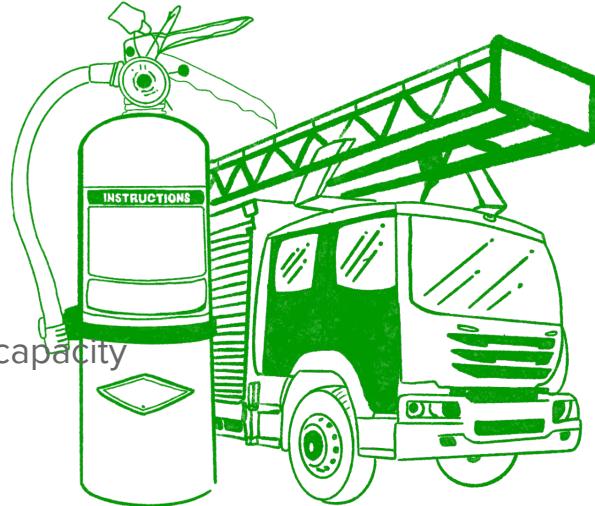
# Emergency response: Fire truck

## Description

A fire fighter truck comes with a team of firefighters, sometimes a ladder, the ability to pump water, and sometimes a water reservoir for locations where there's no easy access to a water supply. Fire fighters can respond to calls of different types. Some cars have divers, for when there's an incident in the water.

## Fields

- Id
- Location
- Type
- Active call
- Water pump capacity



## Features

- [1] A fire truck can be on call, triggered by:
  - Dispatch
  - another fire truck asking for assistance
  - a police patrol asking for assistance
- [2] A fire truck can request help from ambulance and police patrols
- [3] A fire truck of type X can respond to calls of type Y
  - car in water -> divers
  - fire in zone without available water -> truck with reservoir
  - fire -> any
  - [4] Fire trucks need to let Finance know what calls they respond to
- [2] Fire trucks need to know where water supply pipes are
- [6] Fire trucks need schedules maintenance and training

# Emergency response: Ambulance

## Description

An ambulance comes with a driver and EMT, and can respond to different types of calls.

## Fields

- Location
- Id
- Active call



## Features

- [1] An ambulance can be on call, triggered by:
  - Dispatch
  - another ambulance asking for assistance
  - a police patrol or firetruck asking for assistance
- [2] An ambulance can request help from police patrols and traffic control
- [3] An ambulance can respond to calls of type:
  - Accident
  - medical emergency
  - potential for injuries (events, etc)
- [4] An ambulance needs to let Finance know what calls they respond to
- [2] An ambulance needs to know where hospitals are
- [2] An ambulance needs to let a hospital know they are coming with a specific patient
- [6] An ambulance needs schedules inventory and training events

# Emergency response: Dispatch

## Description

Dispatch can be called to request an emergency service, such as a police patrol, ambulance or fire truck. Based on the specific needs, dispatch can send one or more of those to a location, either immediate or planned.

## Fields

- Location
- Id
- Active call



## Features

- [1] A client can request an emergency service (police, fire, ambulance)
- [2] A free service (police patrol, ambulance, fire truck) can be sent on a call by dispatch
- [3] A client can report an emergency by type:
  - Burglary
  - Assault
  - Fire
  - traffic accident
  - car in water
  - ...
- [2] An emergency service can request additional services with high priority
- [4] Dispatch needs to let Finance know what calls are received, and what response was sent



# Energy: Power plant

## Description

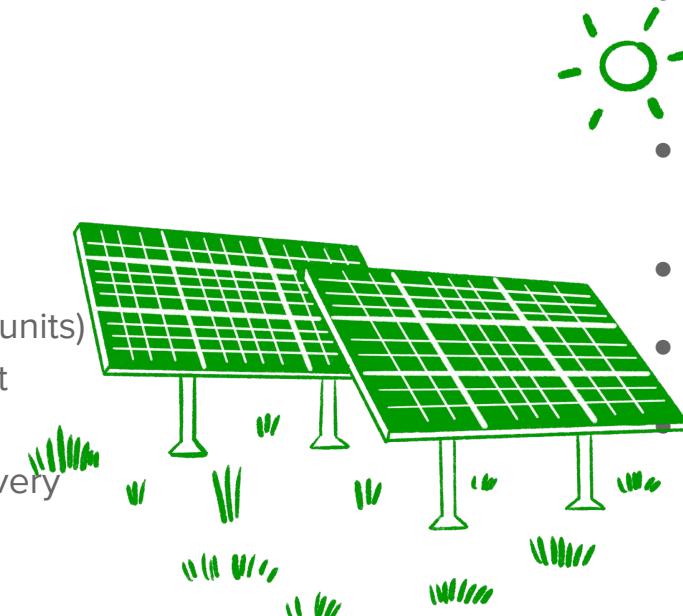
A power plant can deliver a certain amount of energy per minute, at a specific cost.

## Fields

- Id
- Capacity (in units)
- Cost per unit
- Location
- Current delivery

## Features

- A power plant can deliver energy to any meter connected to it through the powernet
- A power plant can only deliver energy up to the total capacity, when energy is requested when the capacity is exhausted, it will be denied
- A power plant will let finance reporting know how much energy was delivered in a timespan, and at what price
- A power plant can have different capacity depending on the time of day
- A power plant can have different pricing based on the time of day
- A power plant can have different pricing based on capacity available



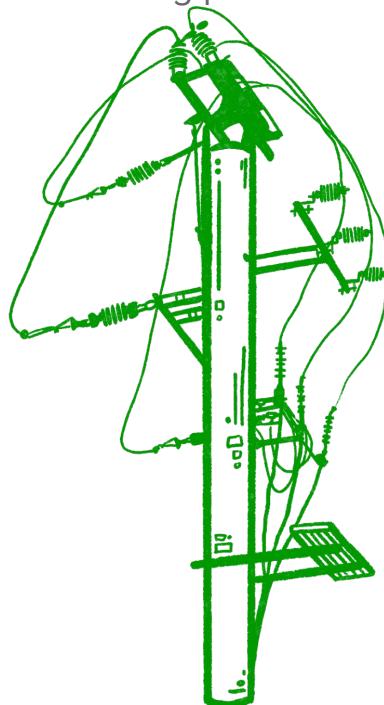
# Energy: Utility pole

## Description

A utility pole distributes energy by connecting power plants to energy users (meters)

## Fields

- Id
- Capacity (in units)
- Connected meters
- Connected Power Plants
- Location



## Features

- A utility pole needs to be connected to a power plant to be able to deliver energy
- A utility pole can deliver energy to any number of connected meters
- A utility pole can only deliver energy if the power plant has sufficient capacity
- A utility pole can deliver energy from multiple power plants
  - And select based on capacity
  - And select based on price
- A connected meter can deliver power back to the distributor as well, and act as a power plant
- Price of meter provided power is always 80% of the lowest price of any connected power plant
- If the total power from meters is above the distributor's capacity, the distributor goes off-line
- A utility pole reports the used capacity and number of connected meters every hour to Auditing

# Energy: Electricity meter

## Description

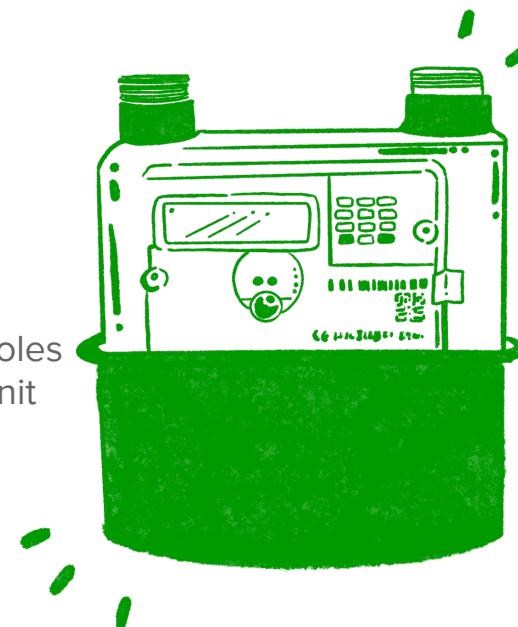
An electricity meter draws power from a powernet distributor, as requested by its users

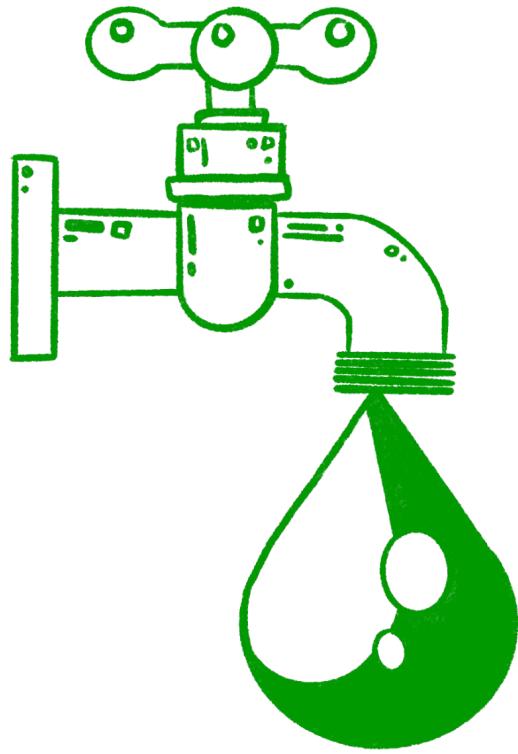
## Fields

- Id
- Current use
- Connected utility poles
- Current price per unit
- Capacity
- Location

## Features

- A meter can report current use and connected utility poles, as well as current price
- A meter can only draw power when connected to a utility pole
- A meter can only draw as much as its maximum capacity
- A meter needs to let Finance know how much power it's consuming per hour from which utility pole and at what price
- A meter can return power to the utility pole if it is generating more power than it's using (solar panels)





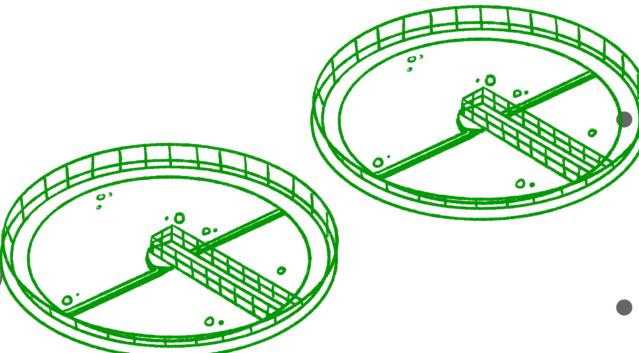
# Water: Water Treatment Plant

## Description

An electricity meter draws power from a powernet distributor, as requested by its users

## Fields

- Id
- Capacity (in units)
- Cost per unit
- Location
- Current delivery
- Current water pressure
- Target water pressure



## Features

- A water plant can deliver water to a certain capacity and pressure, and for a price
  - A treatment plant can deliver water to any water outlet (water meter) connected to it through the water supply pipes
- A water treatment plant can only deliver water up to its total capacity, when water is requested when the capacity is exhausted, water pressure will drop
- A treatment plant will let finance know how much water was delivered in a timespan, and at what price

# Water: Water supply pipes

## Description

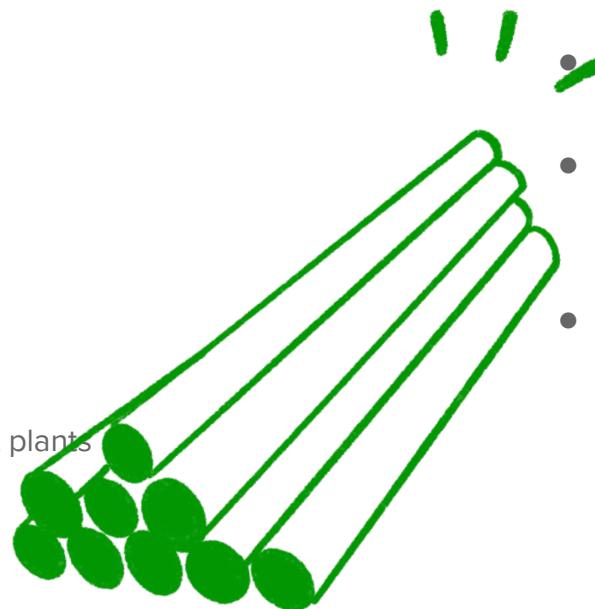
A water pipe transports water to users (water meters)

## Fields

- Id
- Capacity (in units)
- Pressure
- Allowed pressure
- Connected outlets
- Connected treatment plants
- Location

## Features

- A pipe has a location and capacity
- A water pipe needs to be connected to a treatment plant to be able to deliver water
- A water pipe can deliver water to any number of connected outlets
- A water pipe can only deliver water if the treatment plant has sufficient capacity and pressure
- A pipe reports the used capacity and number of connected meters every hour to Auditing



# Water: Water meter

## Description

An water meter measures how much water is used by a water outlet (home, fire hydrant, ...)

## Fields

- Id
- Current use
- Total use
- Connected pipe
- Current price per unit
- Current pressure
- Location

## Features

- A meter can return the current use, pressure and pricing for water
- A meter is always connected to a single pipe
- A meter can only draw as much as its maximum water pressure capacity
- A meter needs to let Finance know how much water it's consuming per hour from which pipe and at what price
- The closest outlet to a location needs to be available in all circumstances to ensure even low bandwidth environments allow fire trucks to find a water outlet





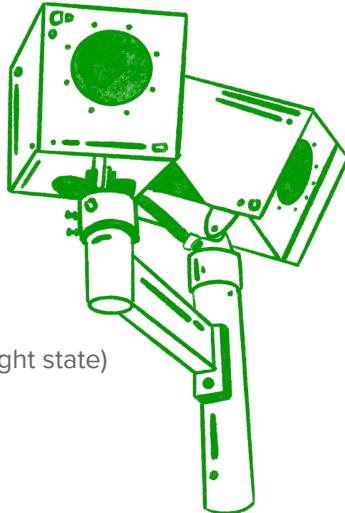
# Traffic: Traffic cameras

## Description

A traffic camera observes traffic, and when a car drives faster than the allowed speed at a location, or crosses a street while the traffic light is red, it signals the transgression to the appropriate parties (Fines in Administration)

## Fields

- Id
- Location
- Type [speed, light]
- Traffic observation:
  - Location
  - Location type (road, traffic light)
  - Location state (speed limit, traffic light state)
  - License plate
  - Time
  - Speed



## Features

- A traffic cam can observe speed and direction of a car, reporting an observed license plate.
- A traffic camera should be able to find out if traffic lights are red or green at a certain time
- A traffic camera can 'watch' traffic go by (Pub/Sub? direct calls also OK), and register its observations
- A traffic camera can decide an observation is a transgression if:
  - Speed is higher than allowed on a road
  - A car crosses when the light is red
  - Speed is negative (wrong direction)
- A traffic cam should report every transgression to the Fines service in Administration

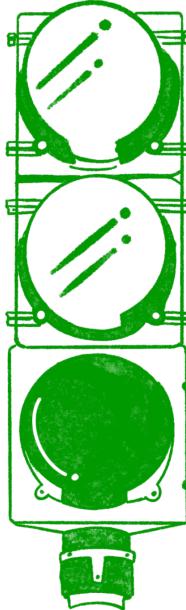
# Traffic: Traffic lights

## Description

A traffic light controls traffic at a specific road crossing. It can either allow traffic through (green) or stop it (red).

## Fields

- Id
- Location
  - Road crossed
  - Road
  - Direction
- Time
- State



## Features

- A traffic light can be either red or green at any point in time
- A traffic light can be switched from one state to the other on request
- A traffic light on a road crossing should have the inverse state of another traffic light that controls the road crossed
- A traffic light on a road crossing should have the same state as another light on the same crossing that is for a different direction
- A traffic light can be scheduled to switch from state at a regular schedule
- Any override of the programmed schedule should be reported to Administration Auditing service

# Traffic: Parking spot

## Description

A parking spot is a place a car can be parked. The spot can either be occupied or not, and has rates for parking which can vary depending on the day and time.

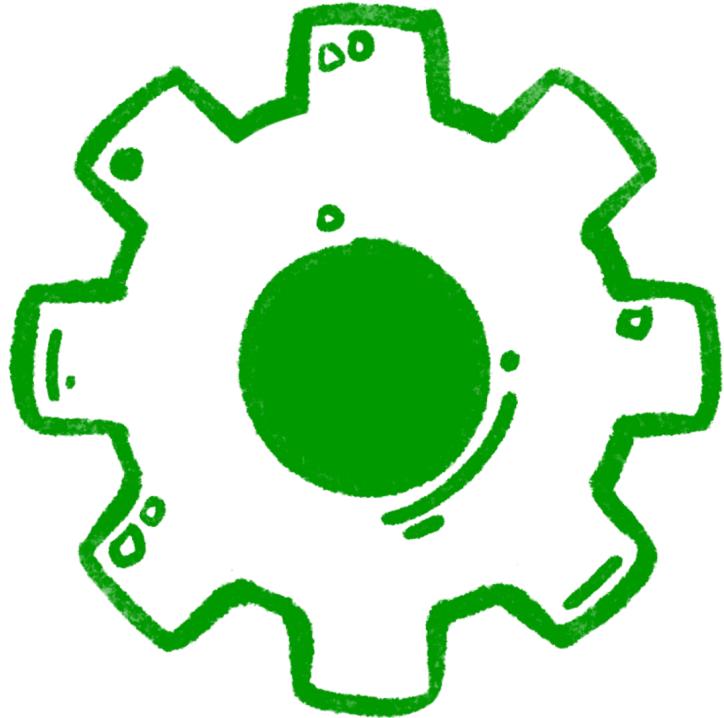
## Fields

- Id
- Location
  - Road
  - Parking location number
- Time
- Rates
- Current rate
- State
- License plate

## Features

- A parking spot has rates that can be requested by cars
- A parking spot can be occupied, or not
- A parking spot can be paid for, or not
- If a parking spot is occupied, that information, including the paid amounts, rates and car, should be reported to Finance.





# Administration: Permits

## Description

Permits can be requested for events. They can be approved or denied. Events are for a specific location and date(s).

## Fields

- Id
- Event Type
- Event date
- Event location
- Recipient
- State

## Features

- A permit can be requested and approved
- A permit can need additional power or water
- If a permit requires power or water, a distributor respectively pipe needs to be available at the location and have capacity to spare
- A permit can have a specific cost, and once paid this should be reported to Finance



# Administration: Passport/ID

## Description

Citizens can request a passport. They need this ID to be able to use public services, and identify themselves when they get a fine or are arrested. A passport is valid for 5 years. The passport costs €50,-

## Fields

- Id
- Person
- Location (address of the person)
- Valid to dates

## Features

- A passport can be created and requested
- If a passport is no longer valid, it should only return a notification that there is no valid passport
- A passport costs money, and once paid this should be reported to Finance
- Every day, any passport that expires should result in any open permits for the person identified by that passport to become invalid



# Administration: Fine

## Description

People can get fined for different reasons. The fine is always for a specific person, identified by their ID/Passport, and it needs to be paid in time.

## Fields

- Id
- Type
- Cost
- Person
- Date issued
- Date paid



## Features

- A fine can be issued against a person or a car
- A fine can be paid
- A fine needs to be paid within a fixed period after it is issued. This period is different for different types of fines.
- When a fine is paid, it should be reported to Finance
- Every day, for any fine that is not paid and has a payment term coming within 7 days should send a message to the person the fine was issued to
- If a fine is not paid in time, an extra administrative cost is added per week it is late, and every time the cost increases another notification is sent to the person. When it is a month late, a police patrol is sent to retrieve the money, or break a leg / arrest.



# Finance: Budget entry

## Description

The city council allocates budget for certain things to invest in police patrols, fire trucks, water treatment plants, energy plants, etc. The budget controls how much of these are available to the city. Each investment can have an expected value, in terms of energy sold, water used, fines paid or buildings and people saved.

## Fields

- Id
- Investment type
- Investment number
- Cost
- Expected value
- Investment period

## Features

- A budget entry can be created and changed over time
- A budget entry should create new instances of the investment type that is being invested in
- The city council needs to be able to get an overview of the total investments made per category and time period, as well as the expected value delivered
- If an investment period ends, the item invested in should no longer be available
- Finance reporting should always be notified of any investments made

# Finance: Financial report

## Description

Financial reports are for keeping track of both spending and incoming. The financial reports coming in are related to a Budget Entry, and are reported by other resource types, such as a police patrol or energy meter.

## Fields

- Id
- Report type
- Report amount
- Investment period
- Investment type
- Report date

## Features

- A financial report entry can be created by any other resource
- A financial report, calculating totals, can be requested for a period and by report types or investment types
- Financial reports should never be lost (pub-sub)
- At predefined schedules reports of all spending and income for a given period should be generated.



# Parks and Recreation: Park maintenance

## Description

Park maintenance is there to maintain parks and other public green. They do this by performing various activities, such as mowing the grass, pruning trees, chopping trees, placing benches, cleaning water, etc.

## Fields

- Id
- Location
- Activity
- Date Planned
- Date Performed

## Features

- An action of park maintenance can be created
- Any action of park maintenance is reported to auditing
- Park maintenance actions are often scheduled in advance, and be on a repeated schedule

Park maintenance action can also be requested by others, based on events (fallen tree, for instance) or simple requests (fear of fallen tree?)



# Parks and Recreation: Events

## Description

Festivals and events can be planned for a location and date. Different types of events can have different needs for support (electricity, water, police, health services, etc.)

## Fields

- Id
- Location
- Event type
- Date
- Support needed
- Permits needed



## Features

- An Event can be planned for a specific date and location
- The necessary support and permits can be specified for an event, creating requests for other services
- Specific types of events can only be given permit if specific support and permits are arranged
  - Police and ambulance presence for:
  - Concerts
  - Political rallies
  - Protests
  - Food and health licensing for street/food markets
  - Festivals
  - ...
- Once all permits and support are specified, the event can be scheduled
- All events should be reported to auditing and finance
- After the event, it should be removed



# Commerce: Commerce permits

## Description

Commerce Permits can be requested for commercial activities, ranging from shops, restaurants, bars, markets, to street performers and car sales lots. They can be approved or denied.

## Fields

- Id
- Commerce type
- Location
  - Shopping centre
- State
- Date
- Expiration date
- Cost



## Features

- A commerce permit can be requested and approved
- A commerce permit can need additional power or water or other types of (administrative) permits, depending on the commerce type:
  - Petrol station
  - Fire hazard inspection permit
  - Toxic materials permit
  - Club:
    - additional power meter and own distributor
    - Sound isolation inspection
    - ...
- A Commerce permit can have a specific cost per time period (tax), and this should be reported to Finance. Every month, a report on the amount of running commerce licenses per type, the amount that are issued, and which licenses will expire in the next month.

# Commerce: Shopping centre

## Description

Shopping centres are areas of the city where commercial activities are encouraged. They require a level of investment from the city in terms of energy, traffic, parking and support, so only a limited number can be supported.

## Fields

- Id
- Location
- Size (number of shops, restaurants, ...)

## Features

- A shopping centre can be created for a location and given a certain size
- A shopping centre can only support a certain number of commercial activities, measured in the number of commerce permits active for the shopping center
- A shopping center has a cost in terms of support and resources, depending on the size
  - 1 police patrols per day per 15 commercial activities
  - 100 units of water per day per 10 commercial activities
  - ...
- A report on the occupancy of the shopping center is generated every month



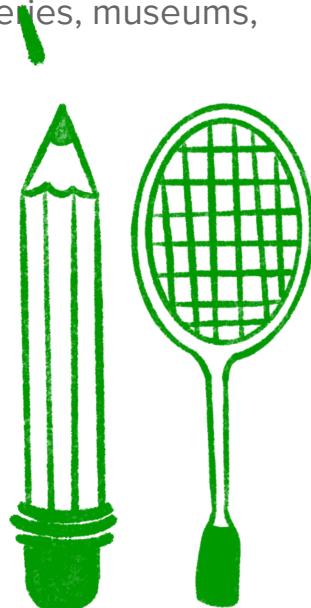
# Commerce: Facility

## Description

Facilities are there to support elements of human activity that are not necessarily commercial in nature, such as sports facilities and arts (galleries, museums, theatre, concert halls, ...)

## Fields

- Id
- Location
- Type (arts, sports, ...)
- Permits
- Resources needed



## Features

- A facility can be created at a location
- A facility can be of different types
- Different types of facilities need different resources:
  - a football field needs 10 units of water per day
  - a football field needs 150 parking spots
  - a theater needs its own power distributor
  - a museum needs additional police patrols
- Different types of facilities need specific permits:
  - a concert hall needs late night noise permits
  - a football field needs food preparation permits for hot dogs
- Any time a facility is created it should be reported through to the Administration Auditing service



# Health: Hospital

## Description

A hospital is a necessary service in any city. Enough beds for the population of the city are necessary. A hospital has a capacity in terms of the amount of patients it can handle, and separately how many in ER it can support. It should also know how many are currently occupied.

## Fields

- Id
- Location
- Special services
- Capacity ER
- Capacity beds
- Occupied ER
- Occupied beds



## Features

- A hospital can be created with a certain capacity
- A hospital should be able to tell an ambulance whether it has open capacity for a patient
  - Needing ER
  - Needing a bed
  - Needing a special service (skin transplant, heart transplant, ...)
- An hospital needs to let Finance and Auditing know what how many patients it has, and of which type (regular, ER, special)
- The closest outlet to a location needs to be available in all circumstances to ensure even low bandwidth environments allow fire trucks to find a water outlet

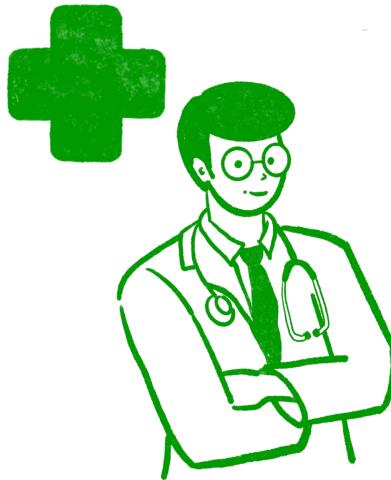
# Health: Pharmacy

## Description

A pharmacy has supplies of medicine and other medical supplies, and supplies hospitals and ambulances with those supplies.

## Fields

- Id
- Location
- Supplies



## Features

- A pharmacy can be created at a specific location
- A pharmacy can store supplies, which have a name, unit, price and available supply:
  - paracetamol, pills of 500mg, GBP 1, 5000
  - bandage, 10cmx10m, GBP 5, 200
- Supplies can be withdrawn from a Pharmacy (by an ambulance or hospital) and:
  - An ambulance can only receive 5 rolls of bandage per re-supply
  - A hospital can receive maximal 1000 pills of paracetamol per re-supply
  - ...
- An pharmacy needs to let Finance and Auditing know what both any new supplies, and and supplies done to any hospital or ambulance
- Every week, a pharmacy needs to provide a full report on the current supplies to ensure there's no irregularities with sensitive drugs