INFO 5100: Final Project

**A National Vaccine Distribution System**

Objective of this project is to teach you how to use simple engineering techniques to build extremely complex systems quickly.

**The problem:** Vaccine distribution management and responsibility needs have grown in recent years. Vaccine management generally consists of a mess of siloed computer applications and paper-based systems that are managed by the CDC and state-level vaccination programs. The way vaccine is distributed, and inventoried are complicated and costly. Little information is known about the state of vaccine supply and demand. This leads to inefficiencies and safety problems at the provider level (hospitals and clinics).

Your task is to build a vaccine inventory management and distribution system that will operate at the national, state and local levels. The objective is to use application engineering technology to improve the efficiency, accountability, and the ability to respond to safety problems and public health crises.

Your first task is to research this problem in detail and come up with business architecture that will define the scope of your solution. You need to follow that with a software implementation of your solution in java. The solution must address vaccine financial management, vaccine distribution, provider ordering (hospital and clinics), inventory management, and the operation of the national vaccine stockpile.

**Players**

1. **Center for Disease Control (CDC):** Receive vaccine orders from individual state **Public Health Department** (PHD) for vaccine. Orders are approved by CDC according to state allocation and passed on to national distributor for shipping directly to hospitals, pharmacies, clinics, etc (referred to as sites). The CDC keeps track of available inventory on a daily basis and uses a formula to determine how to allocate vaccines supply to sites. The formula is based on the population size of each state. A site can only order from the allocated quantity for that state. If the limit is reached for that state then the order is delayed or rejected.
2. **Distributor:** A single national distributor responsible for shipping to registered clinics and hospitals. Satellite clinics receive their supply from their affiliated hospitals. The distributor interacts with vaccine manufactures and ship through their **distribution centers** which are located in different regions of the country. Distributor bills providers.
3. **Department of Public Health:** Receives orders from registered sites. It is responsible for reviewing and approving site requests for vaccine. Approved requests are forwarded to the CDC for approval and shipping. The state keeps track of registered sites. Only registered site can order vaccine.
4. **Provider:** Prepares and submits orders to the PHD for approval. The distributor will ship directly to the site. Maintains vaccine inventory for its satellite clinics. Provider billed by the distributor. Providers schedule their orders: monthly or biweekly depending on their anticipated demand forecast.
5. **Clinic:** Maintains vaccine inventory
6. Other Plays: Any additional players such as central pharmacies (such as regional CVS units responsible for pharmacies in their region).

**You must address the following aspects of the system:**

1. Configuration Management: Define users, geographies, players (enterprises) and including hospitals and their associated satellite clinics
2. Provider contract management where providers agree to certain delivery schedule
3. Inventory management and as it relates to pharma companies
4. Distribution centers: Manage the flow of vaccines from inventory centers to providers
5. Providers requesting vaccines for their hospital and clinic operations
6. Clinics that are suppliers by parent hospitals
7. Address how the flow of funds and payments go through the system
8. Vaccine adverse event management

**Key issues**

* Vaccine safety: The CDC is interested in learning as quickly as possible if a particular batch of vaccine is spoiled or making people sick. The problem could occur because of problems in manufacturing a particular set. The CDC wants to send a recall by tracing back the factory where that batch was made, date, etc. Your system must allow for the easy access to that kind of information. In other words, linkage between the factory and the inventory as the vaccine moves through the supply chain.
* Inventory that get wasted and the reasons for the waste.
* Etc.

The next few classes will be addressing many of the challenges you will face in this project.