# **COLD CHAIN EQUIPMENT**

A map-based, interactive visualization of public-health data

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### PROBLEM

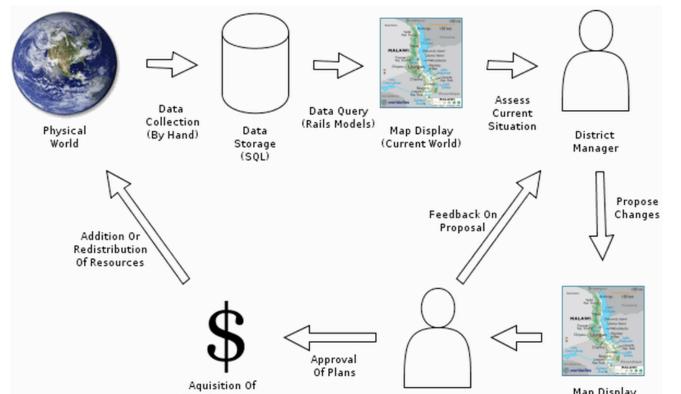
• Most vaccines need to be keep at a constant temperature of 2-8 °C until used

VISUALIZER

- An unbroken cold-chain of cold-rooms, refrigerators, and cold-boxes is needed to transport and store vaccines
- Current information about cold-chain infrastructure is stored in unwieldy databases
- Government health ministries and NGOs need to be able to easily model current and possible future configurations of their cold-chain resources for action and funding

#### How can public-health officials use a map-based

### ARCHITECTURE



### **Architecture details**

- The database is a digital representation of the current physical world
- Managers are able to locally make changes that can be presented as a plan to funding agencies or a superior
- Multiple local copies can be shared or compared, allowing multiple users to

visualization to easily model a current and potential *future vaccine cold-chain equipment configurations?* 

#### Map Display New Resources assess and address the situation Review By (With Changes) Coworkers/Bosse

## CCEM

	Cold Boxes and Vaccine Carrier View/Edit Catalog	s Regulators ues	Facility Type Lev	dministrative rels and Dat Country D	a Demographic ata	Info	rrent Vaccine Schedule hization Progr	Languag Setting am Languag	5			
		Health Facilities and Cold boxes and vacc				regulators	Generators	Transport	Comments	1		
_			and contracts   new pe		totage .	- Lancer	Generatory			1		
6	Equipment ID Catalog ID	R-050618 E003003		14	Model name		H8D-286					
7	Serial number	1589687			Manufacturer		Haier			_		
8	Year of first use	2008			CFC Free?		Yes					
9	Working status	Working well	•		Туре			ezer, AC elec	tricity	-		
10	-	t is not working well o			Internal stora	ge dimens					-	
-	Spare parts are no	t available for repair/m	intenance		+4 '(		ions (any	-2	0 °C			
		ilable for repair/mainter electricity or fuel is not		L	w	H	L [	w	H			
	Equipment needs t		available	19	Calculated in	ternal stor	age volume	(litre)				
11	Equipment utilizati	on In use			Gross	0.00		2	98.00			
12	Temperature moni	tor			Net	0			224			
-	No monitoring devi	ce										
Dial thermometer												
	Stem thermometer											
13	Stem thermometer	s, number of days: At	oove +8°C	Below +2	2°C							
13	Stem thermometer	s, number of days: At	oove +8°C	Below +2	2°c 📃	Add pa	urafrimerat	or/froozor		lata	1	
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	Stem thermometer FridgeTag			Below +2	2°C	Add ner	w refrigerat	or/freezer	De	lete	]	
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- The Cold Chain Equipment Manager (CCEM) is a Microsoft Access database tool developed by PATH
- CCEM allows users to access data related to a country's cold-chain infrastructure including capital resources, vaccine schedules, and clinic data
- CCEM is complex and not intuitive to use
- More information about CCEM is available at http://www.path.org/publications/ detail.php?i=1569

Mapping & Visualization

to map requests for help

Ushahidi – A disaster response tool used

Livehoods – A neighborhood mapping

tool using Foursquare check-ins

### FEATURES

#### Database

- Maintained by a centrally responsible agency
- Read-only. Should only be changed when a new region inventory has been completed

### Layers & Clinics

- Information shown is context sensitive
- Clinic appearance changes based upon capacity
- Heat maps allow users to quickly asses which areas would be best served with new or reallocated resources

### Map

- Separation of facilities into groups • based upon district or sub-district
- As little data is displayed at one time as possible to keep the interface clean

#### **Resource Allocation**

- Manual allocation should allow a user to have full control of system resources
- Automatic or assistive allocation would allow a user access to algorithms and metrics to best distribute resources to underserved areas

### **RELATED WORK**

### WEB APPLICATION

#### Cold-Chain

PATH Cold Chain Equipment Manager

Vaccine Modeling Initiative

**UNICEF Cold Chain Logistics taskforce** 



Hipmunk – A popular travel planning website

Num Lock 🛛 🖂 🗟

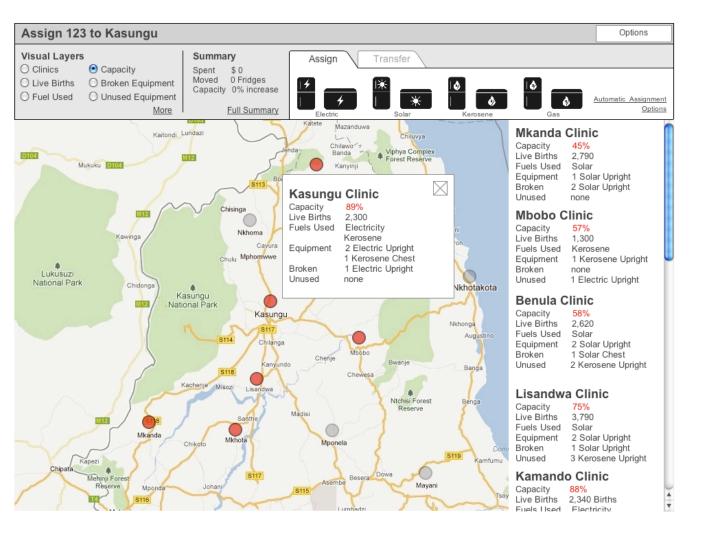
# PROTOTYPING

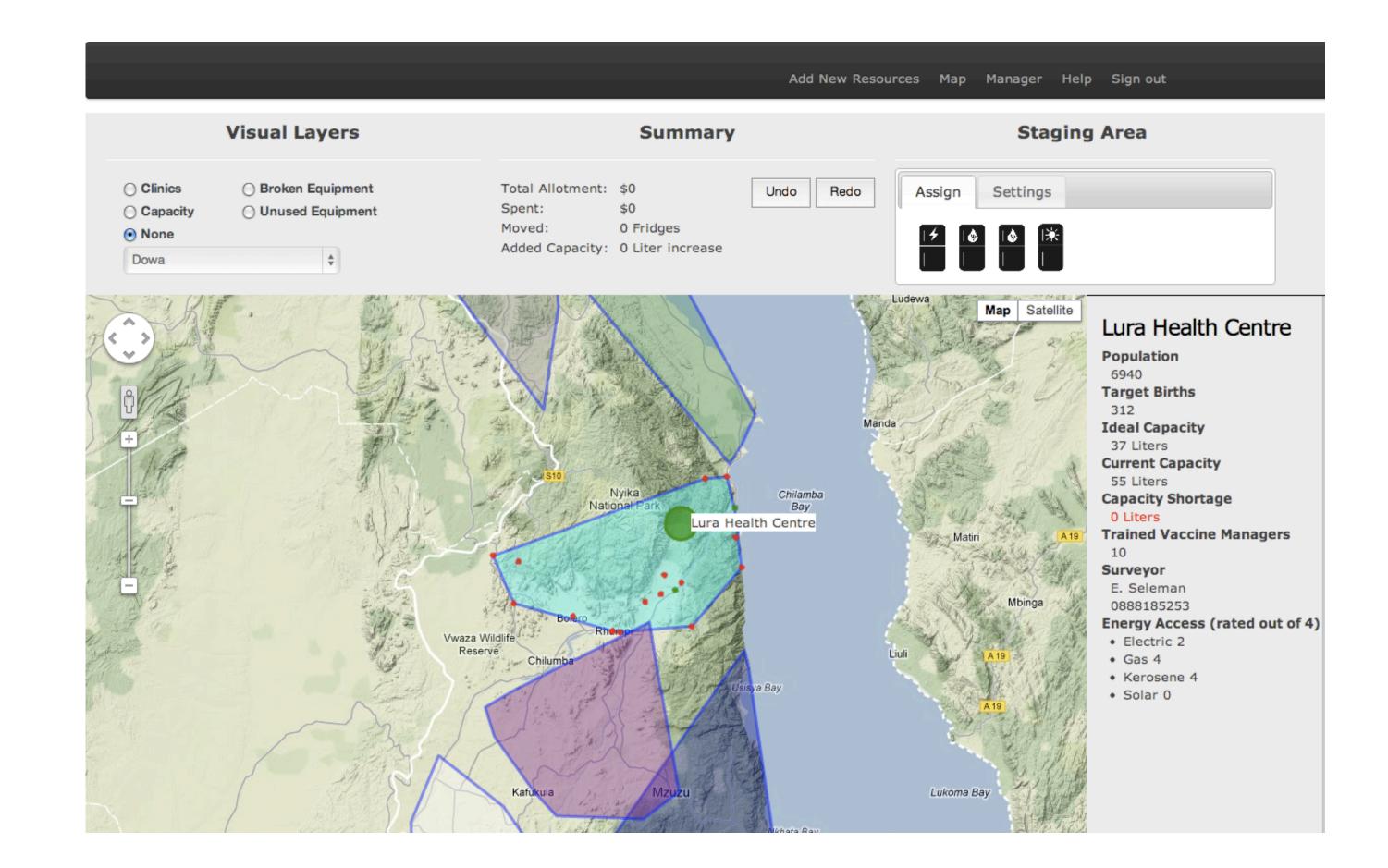
#### Evolution

- Early paper mockups
- Early hi-fi mockup (Visual Studio) as a desktop application
- Recent hi-fi mockup (Axure- see figure to right) as a web application

#### Iterative design based on stakeholder input

Regular status checks with PATH partners and instructors





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#### Round one: basic paper prototype •

Round two: interactive Axure prototype ۲



