

Technology to Improve Logistics Decisions

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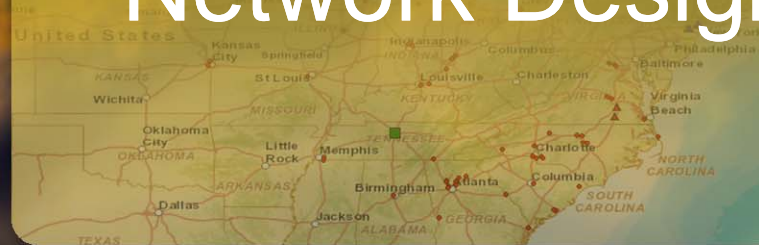


GEORGIA TECH
Health & Humanitarian Logistics Center
A Unit of the Supply Chain & Logistics Institute

Georgia Tech **ISyE**
H. Milton Stewart School of
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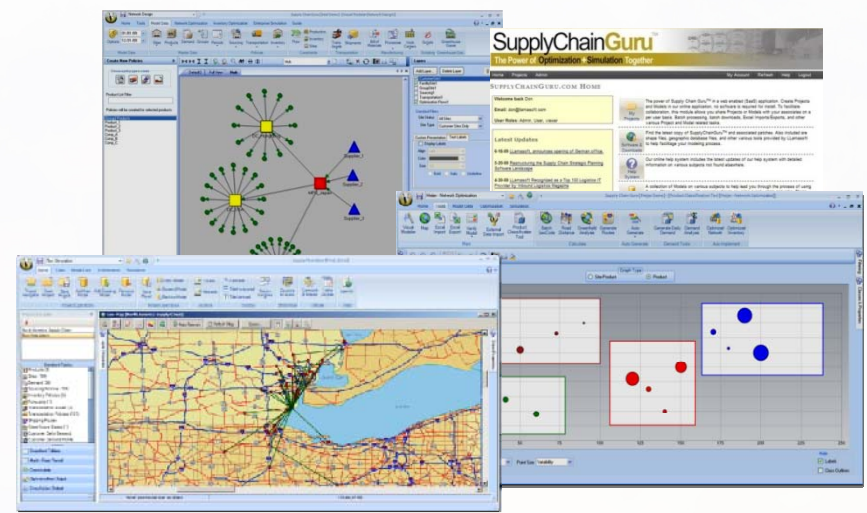
LLamasoft: Improving Public Health Supply Chains through Network Design



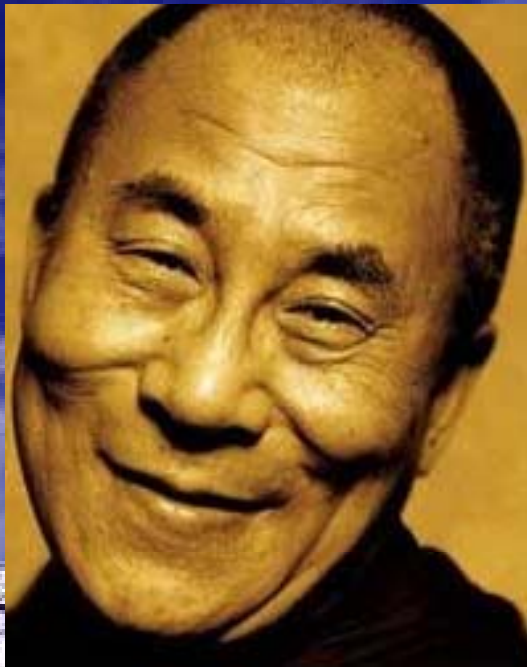
LLamasoft Overview



- Employee owned software company headquartered in Ann Arbor, Michigan USA
- Industry leader in supply chain design, modeling and optimization
- Provider of technology, training and services to help organizations design supply chains that will:
 - ❖ Reduce cost
 - ❖ Maximize profit
 - ❖ Improve service
 - ❖ Manage risk
 - ❖ Improve sustainability
 - ❖ Acquire a lasting competitive advantage



What is LLamasoft about?



Putting inaccessible wisdom and sophisticated modeling techniques to work solving real problems for you.

LLamasoft Public Health Solutions



- Mission: positively impact human health by leveraging Network Design technology to make better supply chain decisions
- Delivery Models
 - Short Term Assessments
 - Long Term Engagements
 - Technology Transfer / Capacity Building
 - Other: advisory services, technology development on demand
- Recent Projects: Lesotho, Ethiopia, Kenya, Côte d'Ivoire, Nigeria, El Salvador, Dominican Republic, Guatemala, and Panama.

Supply Chain Management and Network Design



- Supply Chain Management
 - Supply Chain Planning + Supply Chain Execution
 - Focus on running and managing the current network
- Supply Chain Network Design
 - Modeling and analysis to determine how to configure the entire supply chain
 - Structure AND policy
 - Cross-functional (procurement, warehousing, inv & transpo)
 - End to end scope
- Supply Chain Network Design helps system planners and policy makers transform their supply chains from Historical Accidents to Intentionally Engineered Systems

Project Examples



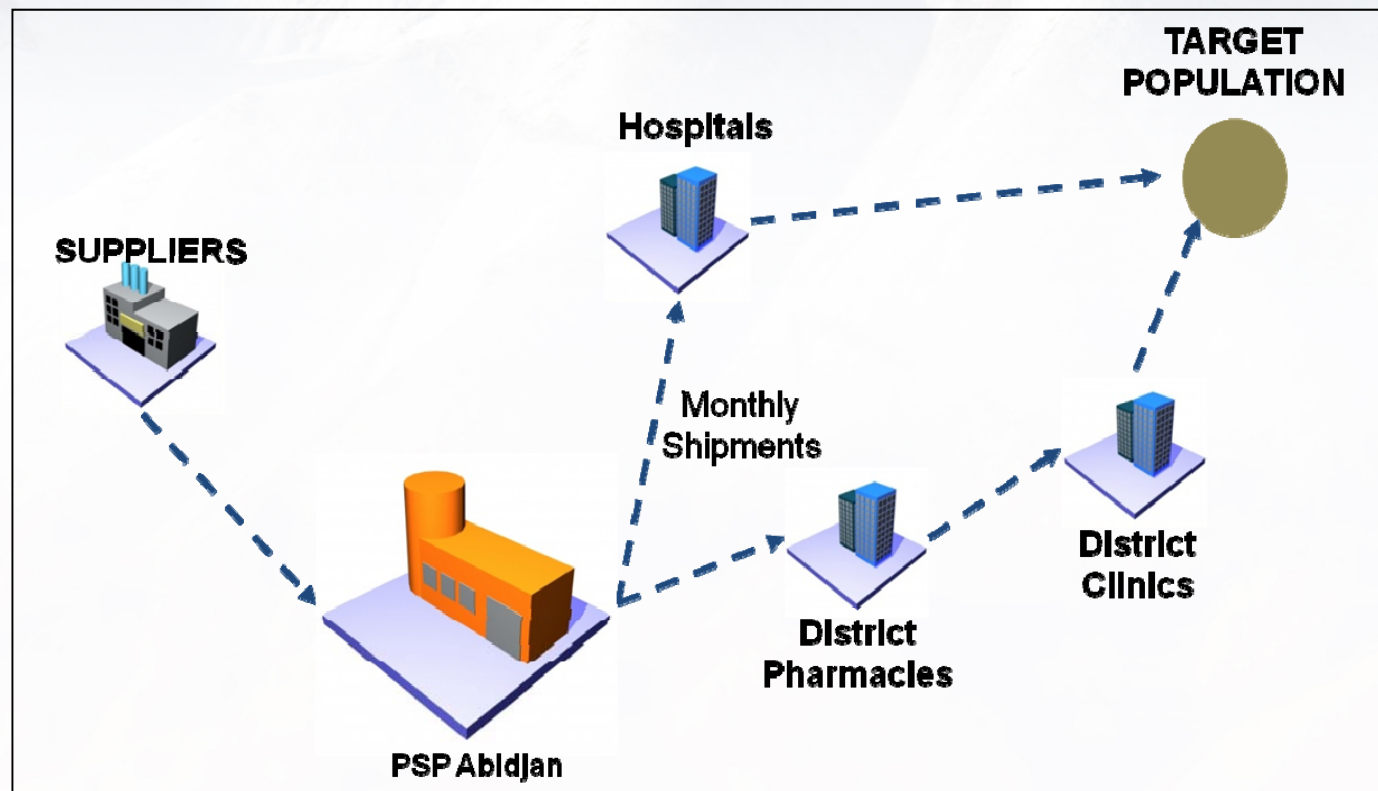
- Quantifying the effects of centralized versus decentralized systems and multiple DC echelons.
- Redesigning transportation networks to maximize service levels.
- Analyze the impact of large volume, low frequency shipments of supplies, improve procurement schedules.
- Predicting future supply chain needs and defining performance metrics to enable policy makers to strengthen the public health systems.
- Collaborating with the Inter-Agency Working Group to develop a Logistics Module for the Unified Health Model (UHM).
- More Short Term Assessments: take an overall look at the current state of the supply chain, what data is available to conduct an analysis.

Case Study: Côte d'Ivoire District Hub Assessment (SCMS)

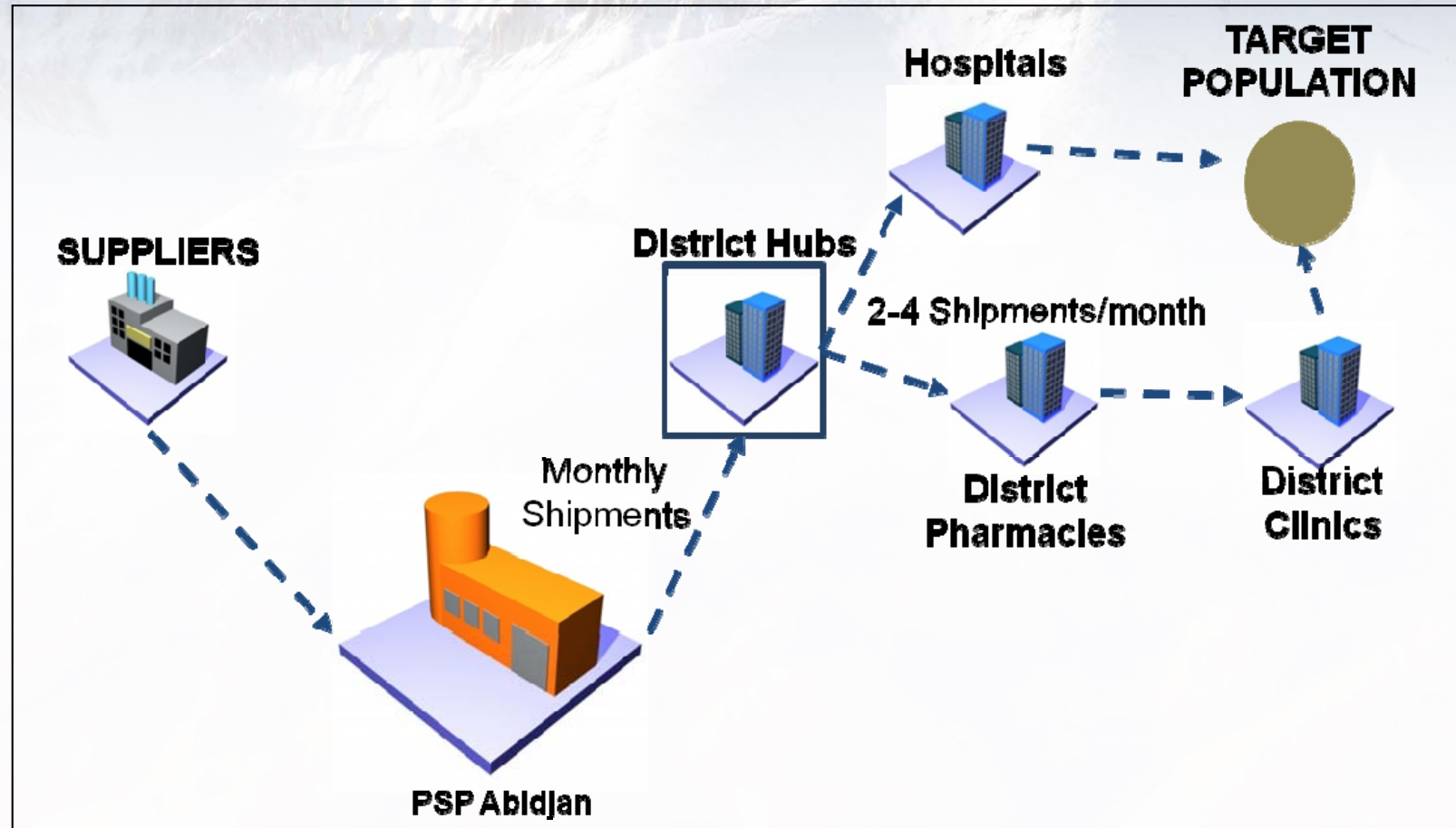


- The Issue
 - While the number of facilities serviced by the Pharmacie de la Santé Publique (PSP) has increased significantly in the last 60+ years, the organization's capability to serve its customers has changed very little.
- The Objectives
 - Will a decentralized network increase service levels?
 - In a decentralized network, can District Pharmacies be used as District Hubs? If yes, which ones are the most optimal?
 - In a decentralized network, which District Hubs would serve which customers?

Current Network



Future State Network



Identify District Hubs



- Greenfield Analysis to identify potential District Hubs

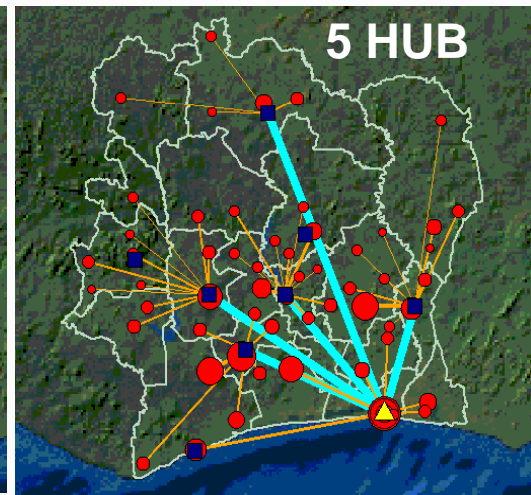
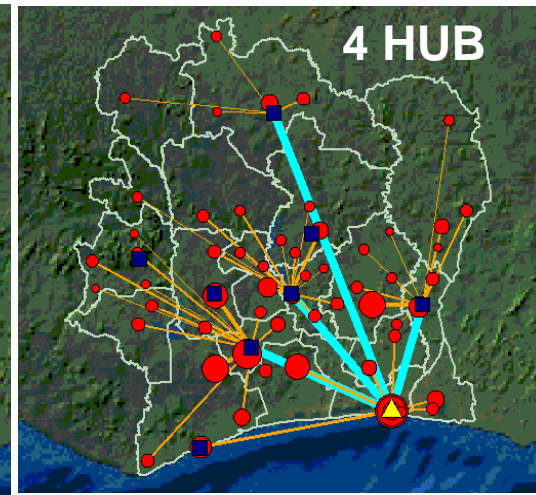
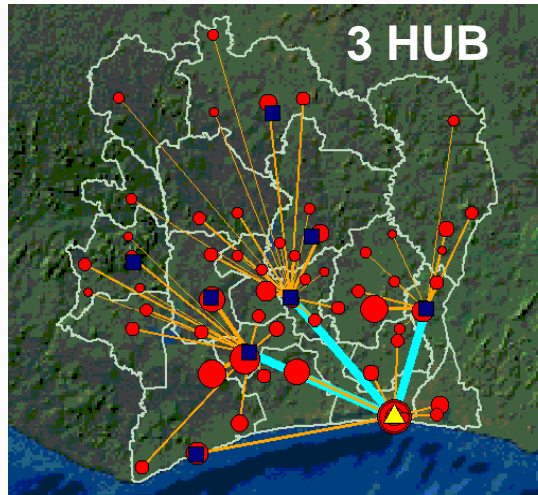
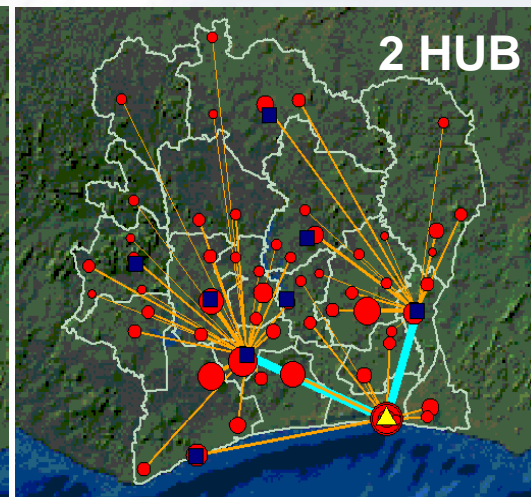
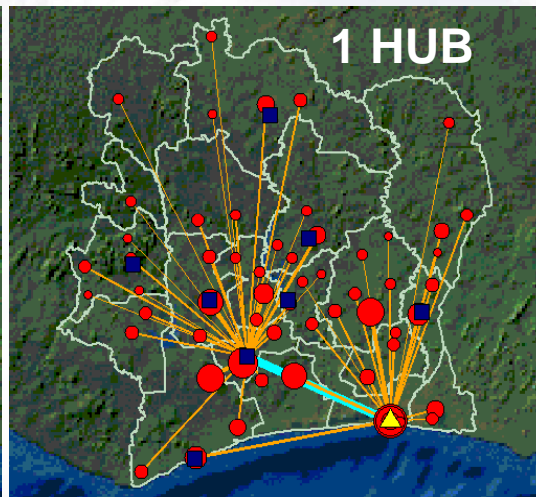
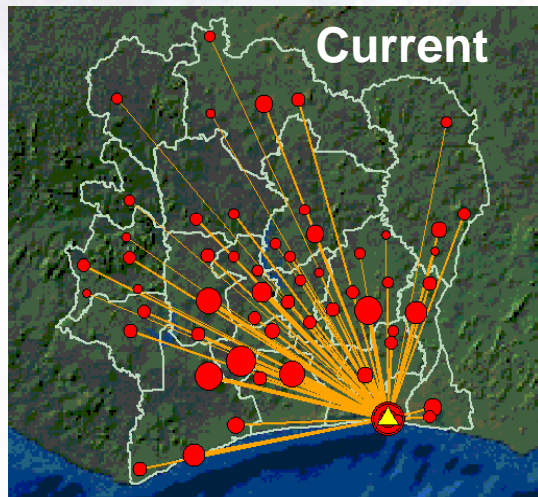
1. Abidjan (PSP)
2. Abengourou
3. Bouake
4. Daloa
5. Gagnoa
6. Korogo
7. Man
8. San Pedro
9. Yamoussoukro



Distance Optimized Scenario Results



- Hub 1: Gagnoa, Hub 2: Abengourou, Hub 3: Yamoussoukro, Hub 4: Korhogo, Hub 5: Daloa.

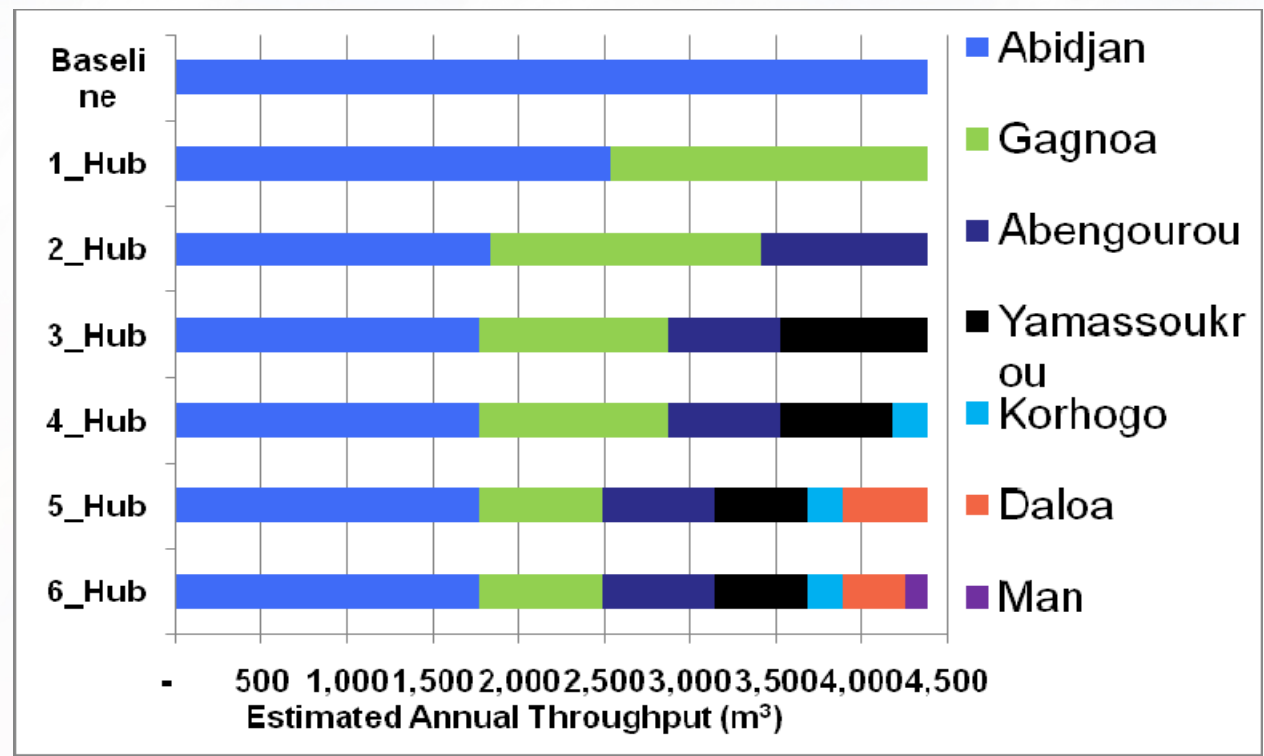


Throughput by Facility



- Adding more than three District Hubs would not further alleviate capacity issues at the PSP's main warehouse in Abidjan

Adding a District Hub in Gagnoa would have the largest impact, followed by Abengourou and then Yamoussoukro

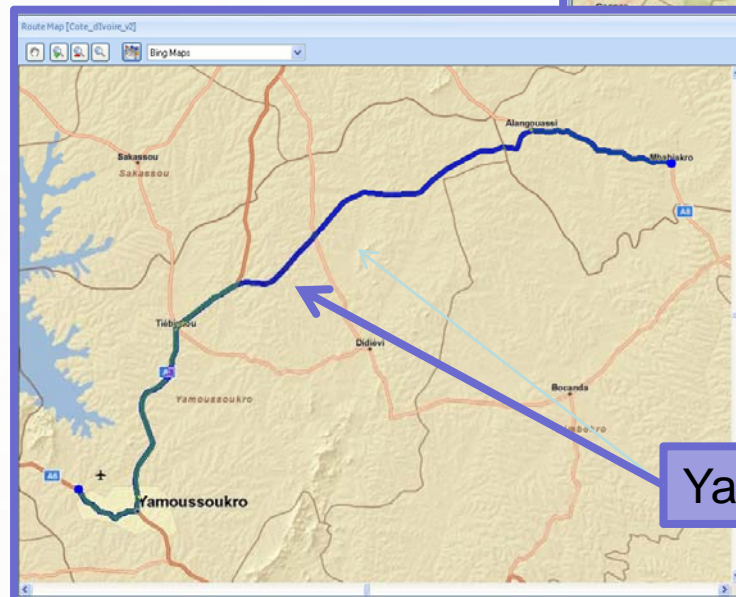


Transportation Road Distances

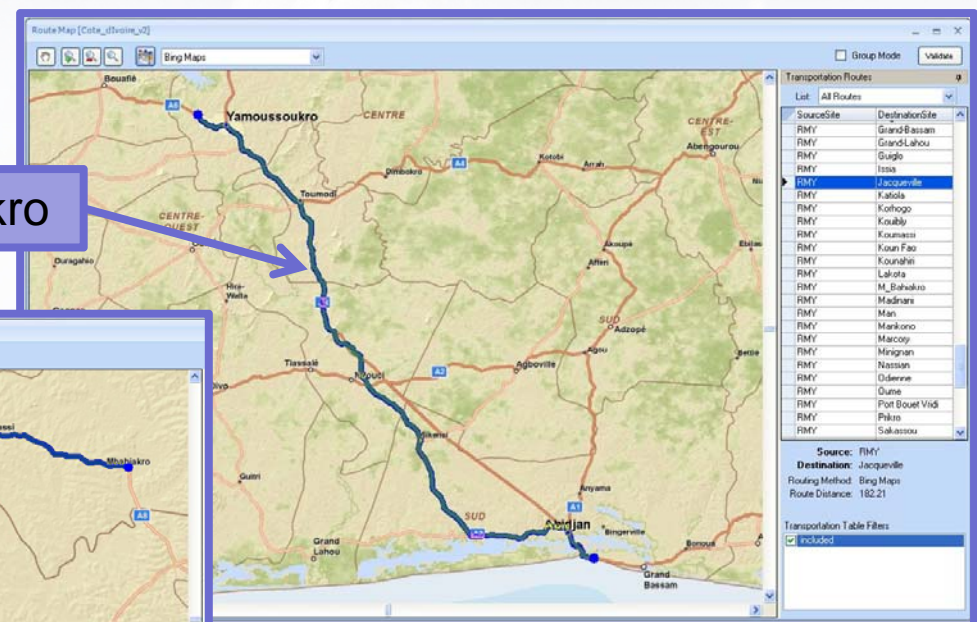


- City to city distances calculated in Supply Chain Guru

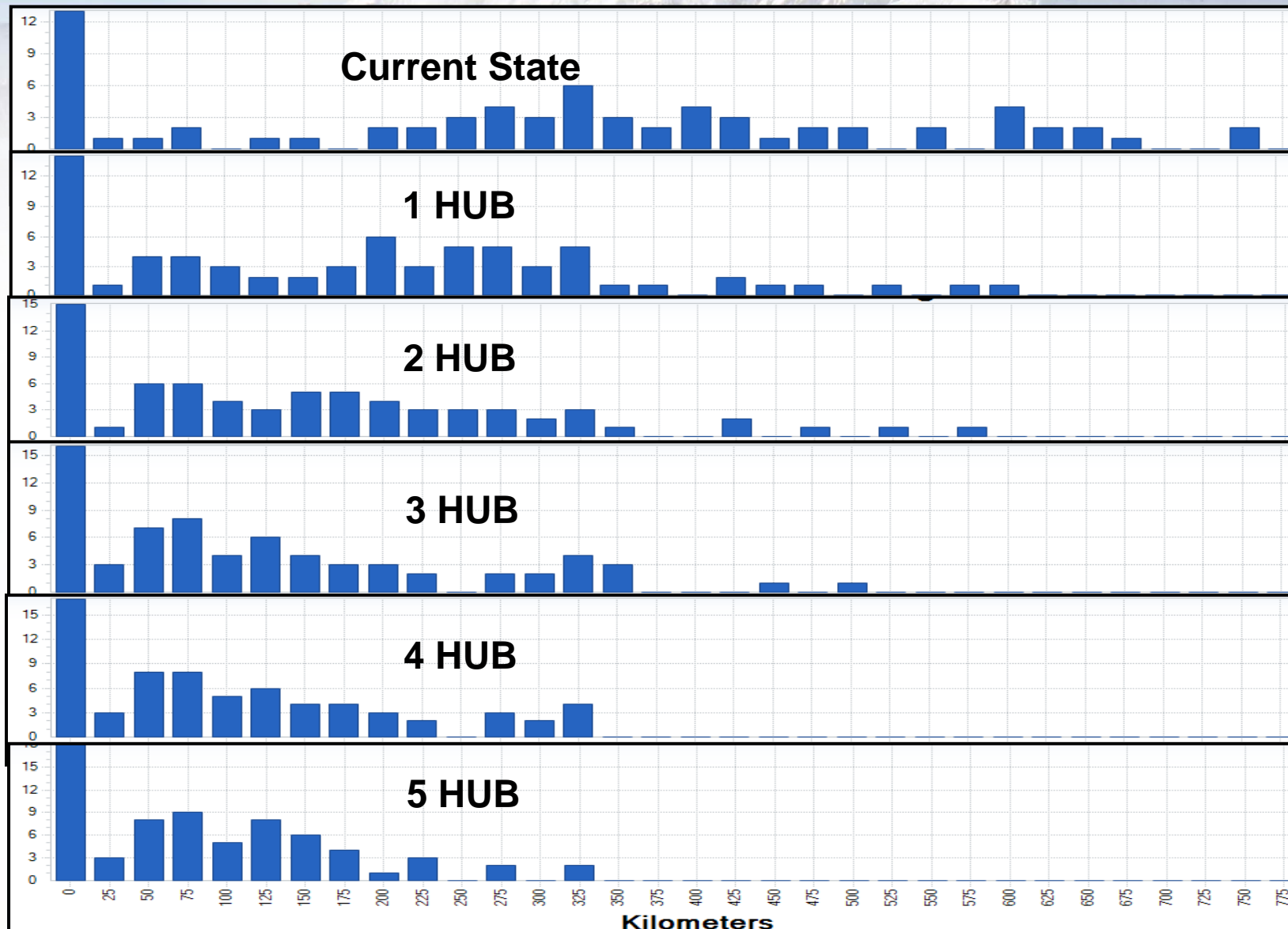
Abidjan to Yamoussoukro



Yamoussoukro to M'Bahiakro



Customer Service Distance Histogram



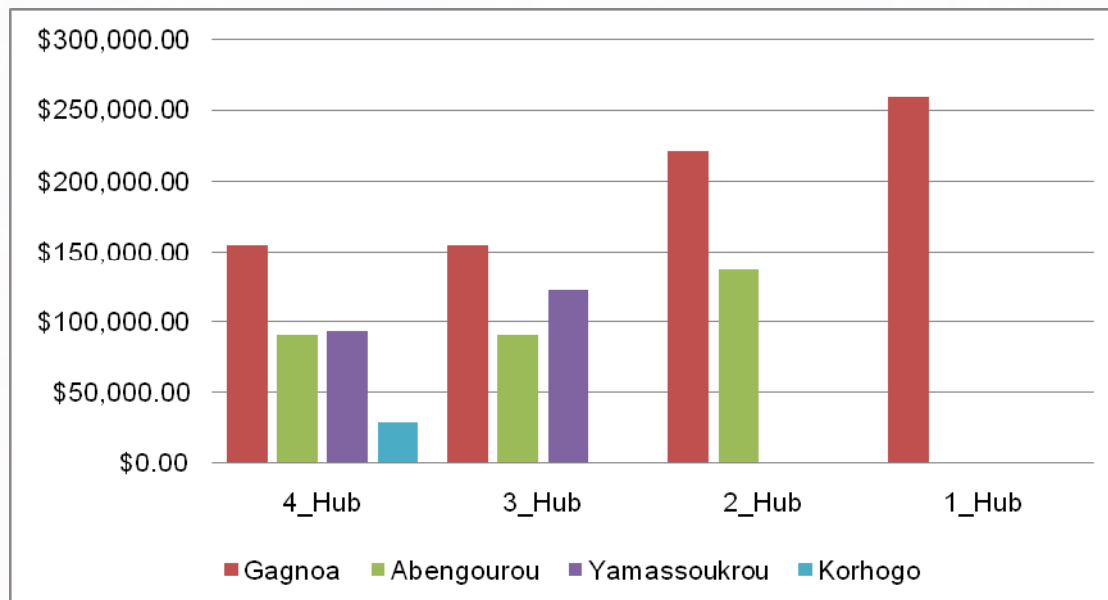
Implementation Cost Estimates



Transportation Cost (USD) vs. Total PSP Distance Driven (Km; CWH - DH)

	Baseline	1 Hub	2 Hubs	3 Hubs	4 Hubs	5 Hubs	6 Hubs	7 Hubs	8 Hubs
Total Distance (Km)	189,910	158,838	147,357	139,342	134,193	130,314	129,320	129,320	129,320
Total Cost (USD)	\$786,195	\$657,563	\$610,032	\$576,853	\$555,536	\$539,480	\$535,363	\$535,363	\$535,363

Variable Warehousing Cost



Total Cost (USD)

1 Hub: ~\$250K
 2 Hubs: ~\$365K
 3 Hubs: ~\$365K
 4 Hubs: ~\$360K

Conclusions



- Current supply issues must be addressed before decentralization is considered. Frequent stock-outs at the central level will result in continuously low service levels.
- If PSP chooses to decentralize its network, the optimal locations would include Gagnoa, Abengourou, and Yamoussoukro.
- The first optimal hub to open is Gagnoa. Gagnoa has several large centers of population around it and would have the largest impact on PSP's overall operations.
- Due to the sensitive nature of cold chain products, it was recommended that these products be shipped directly from the central warehouse in Abidjan; DPs should act as cross-docks.

Famous Public Health Network Design Myths



- We can't get enough data
- We can't change anything
- We already know what we need: more resources
- Network modeling is too complicated, we just want the "simple solution"
- Public health is "different" : you can't treat people like numbers
- We should make important, complicated, decisions based on gut-feel and intuition!



Contact Information



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