Supply Chain Design
WASH cluster

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Agenda

- Introduction
- Case WASH cluster
- Findings

Variables, aims and conditions for network design in humanitarian logistics: literature

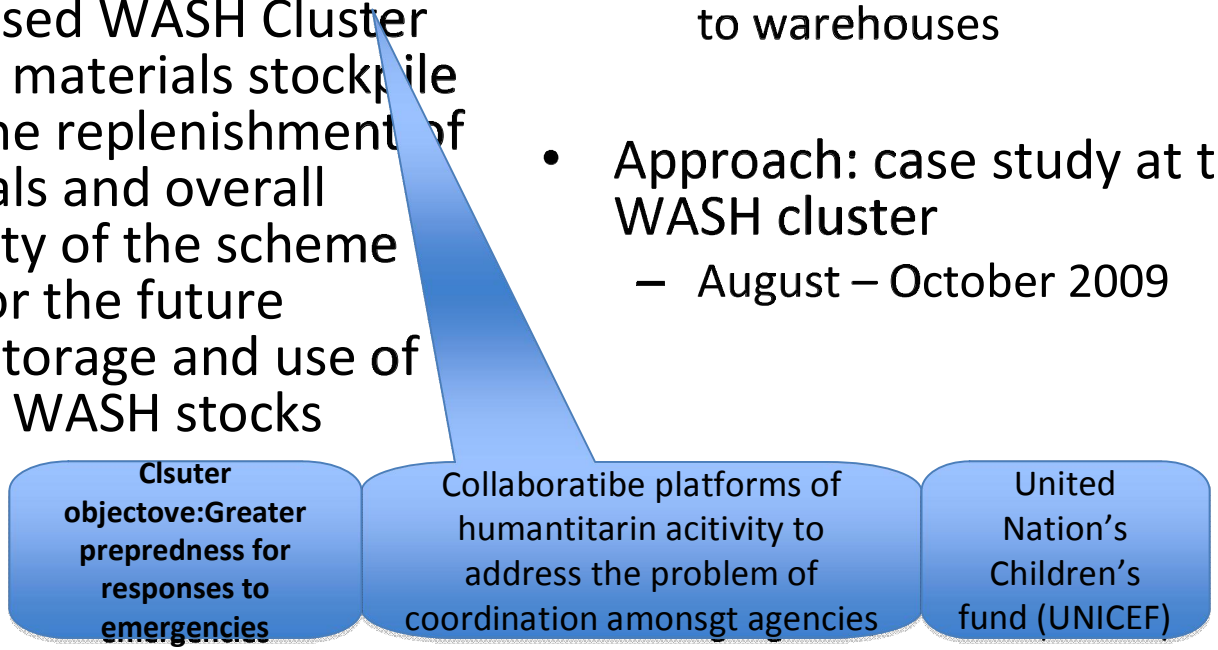
- Variables incorporated
  - Transport route use and capacities
  - Warehouse use and capacities
  - Inventory levels / availability
  - Accessibility
- Aims:
  - Minimise costs (warehouse, transport, inventory, procurement)
  - Minimise average response time or travel time
- Conditions
  - “Equal share in response”
  - Cost structure known and stable
  - Transport costs known and constant
  - 1 disaster at a time
  - Known demand function

Objective

- Project:
- To provide the design and advise on the implementation of the best feasible supply chain and operating concept for a proposed WASH Cluster emergency materials stockpile including the replenishment of the materials and overall sustainability of the scheme adopted for the future purchase, storage and use of emergency WASH stocks

- This presentation:
- Discuss factors that influence network design decisions:
  - Warehouse location
  - Inventory levels and allocation to warehouses

- Approach: case study at the WASH cluster
  - August – October 2009



Project Organization

WASH Steering Committee (Oversight)	WASH CAST (specifications and donor interaction)
Robert Fraser/IFRC Andy Bastable/Oxfam Jean McKluskie/UNICEF Rod Jackson/World Vision International	Jean McKluskie/UNICEF David Weatherill/External Consultant

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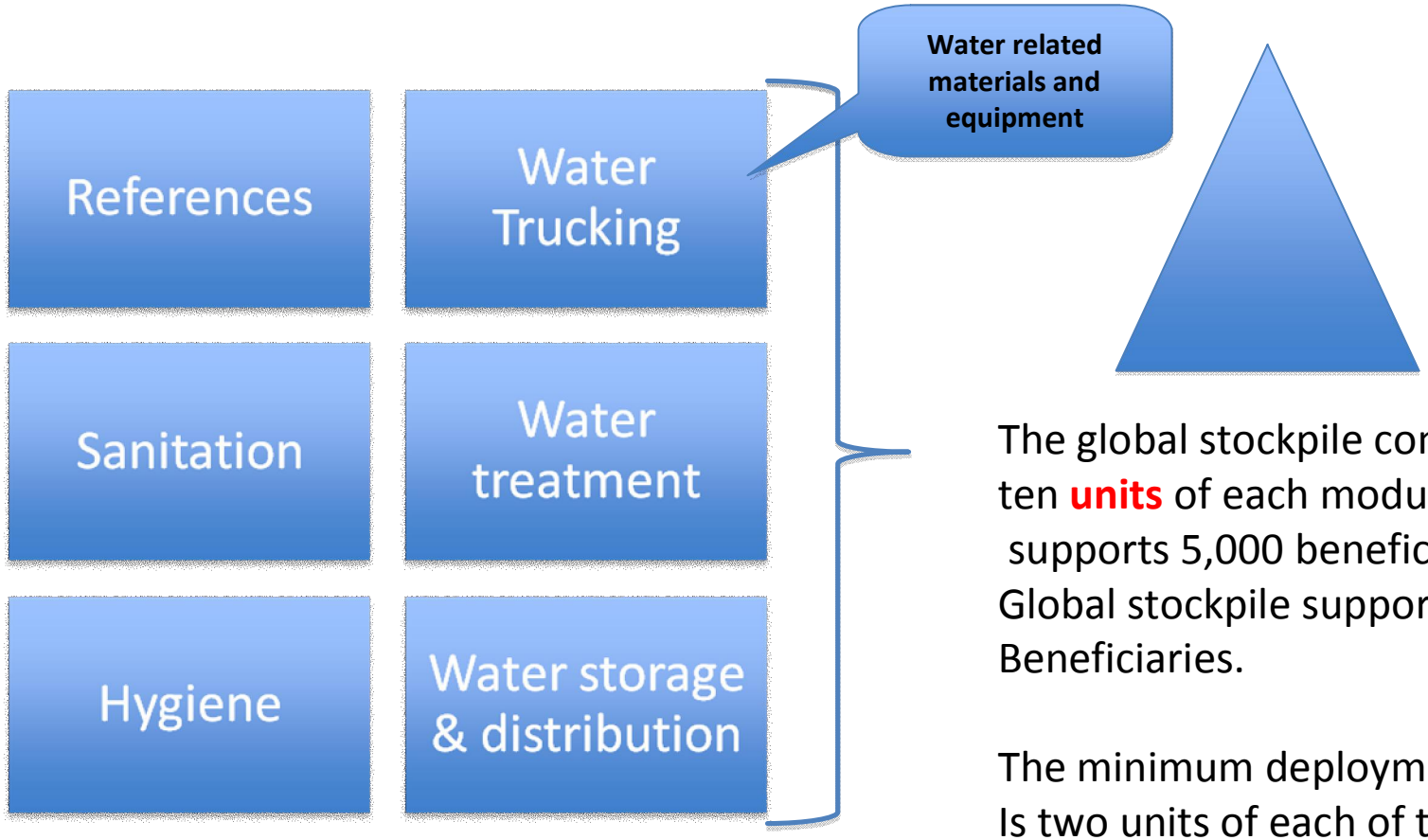
Terminology



There are six **modules**. Each module is composed of several items. The **entire kit** of six modules will be deployed.

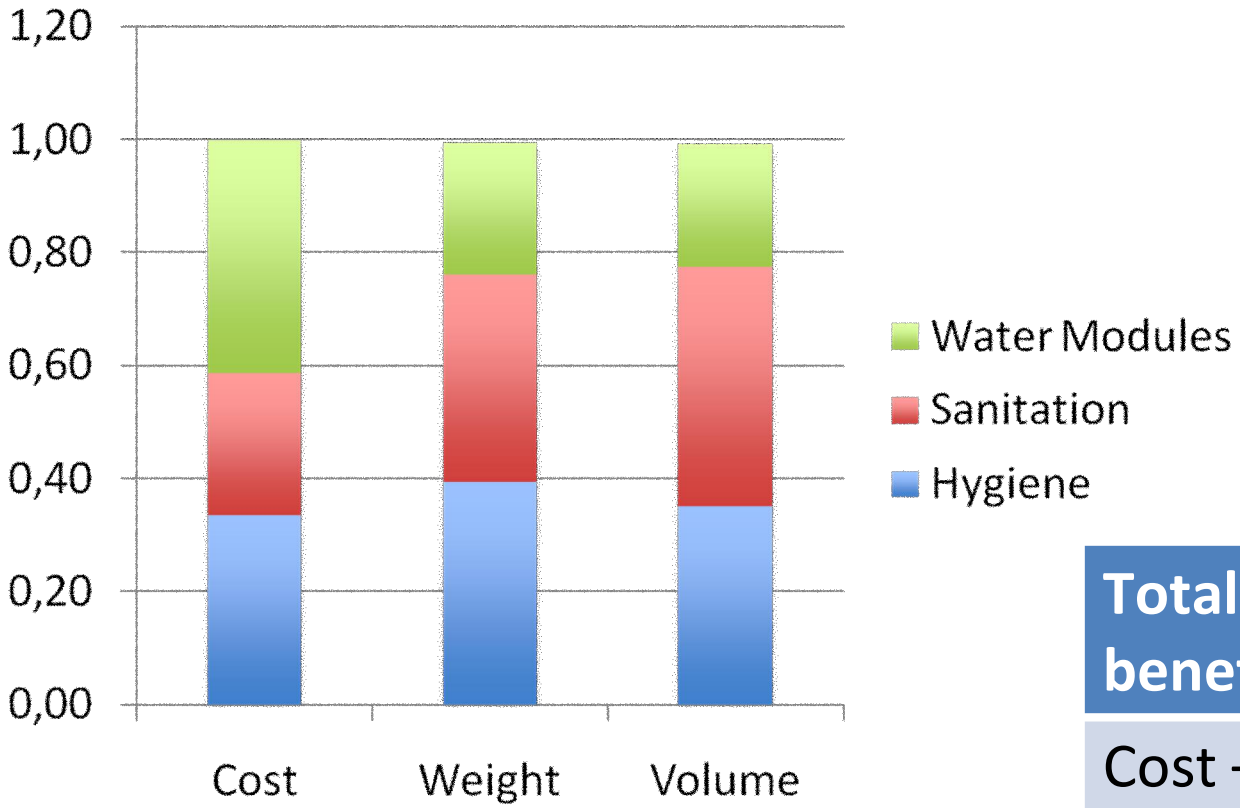
The global stockpile consists of ten **units** of each module. Each unit supports 5,000 beneficiaries. The Global stockpile supports 50,000 Beneficiaries.

The minimum deployment quantity Is two units of each of the six modules – enough to support 10,000 beneficiaries.

Modules must be deployed together

A WatSan kit (IFRC)

Breakdown of Cost, Weight and Volume by Module



Can fit commonly used IL76 rear loading charter aircraft or similar

Total for 10,000 beneficiaries
Cost – USD 200,000
Weight -27,900 kg
Volume – 151 cu mtr

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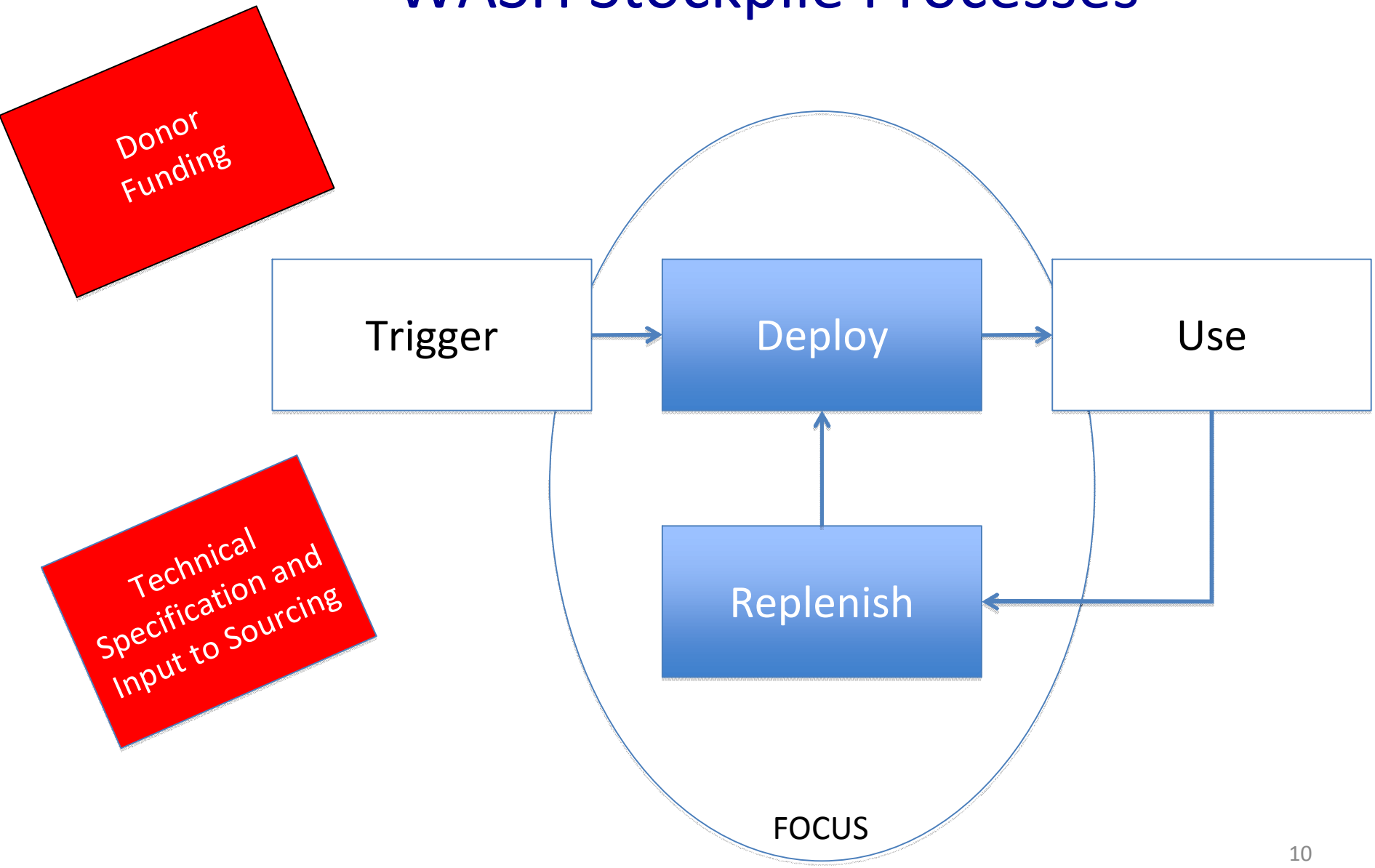
WASH Stockpile Processes



Output of initial analysis

Phase 1: avail of WASH related material and equipmment after emergency was insufficient

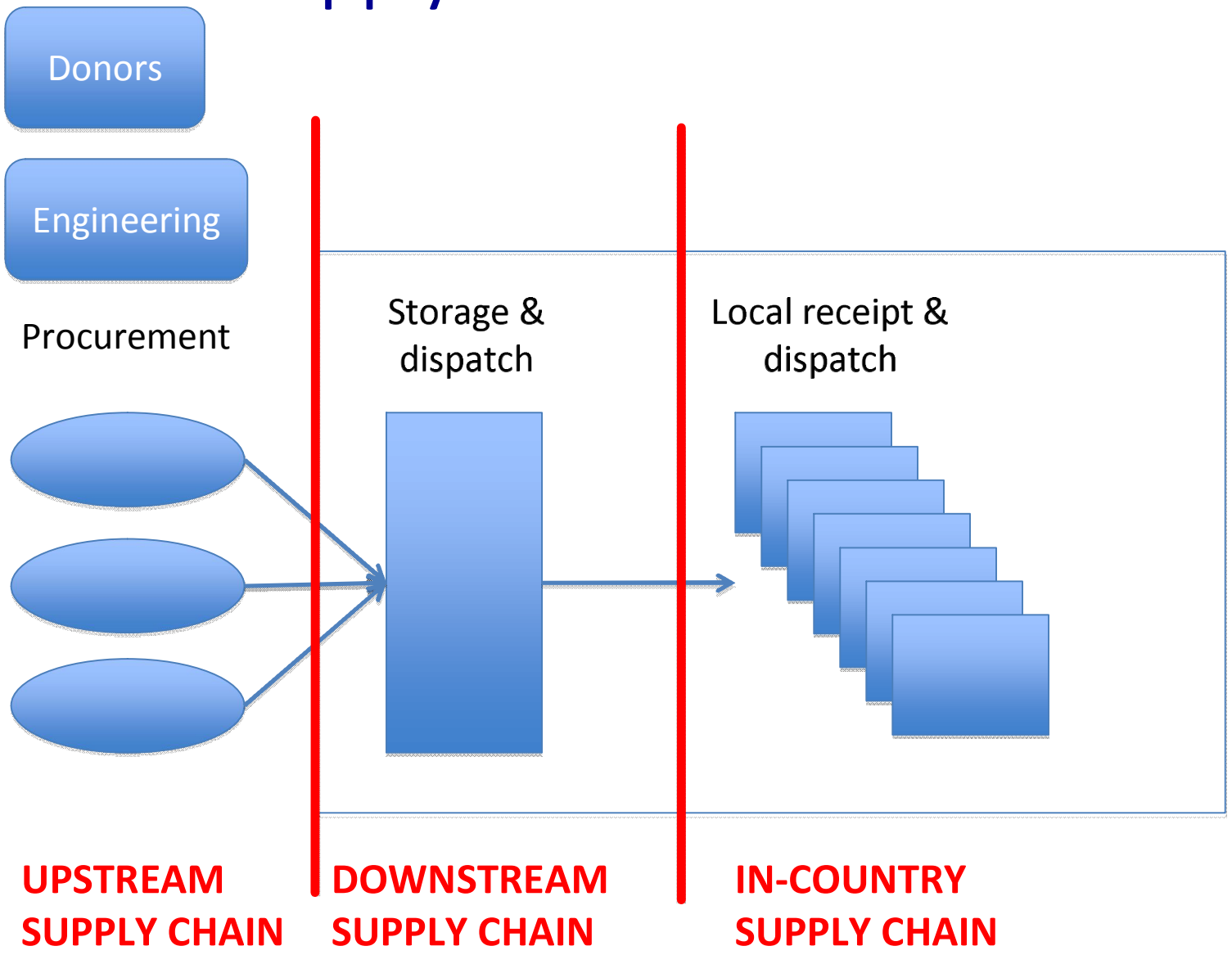
Phase 2: Design of SC and selection of partners, acknowledging the different sets of partners would offer different SC options with different potenial for performance

Emphasis on logistics departments of WASH cluster member agencies as potential partners

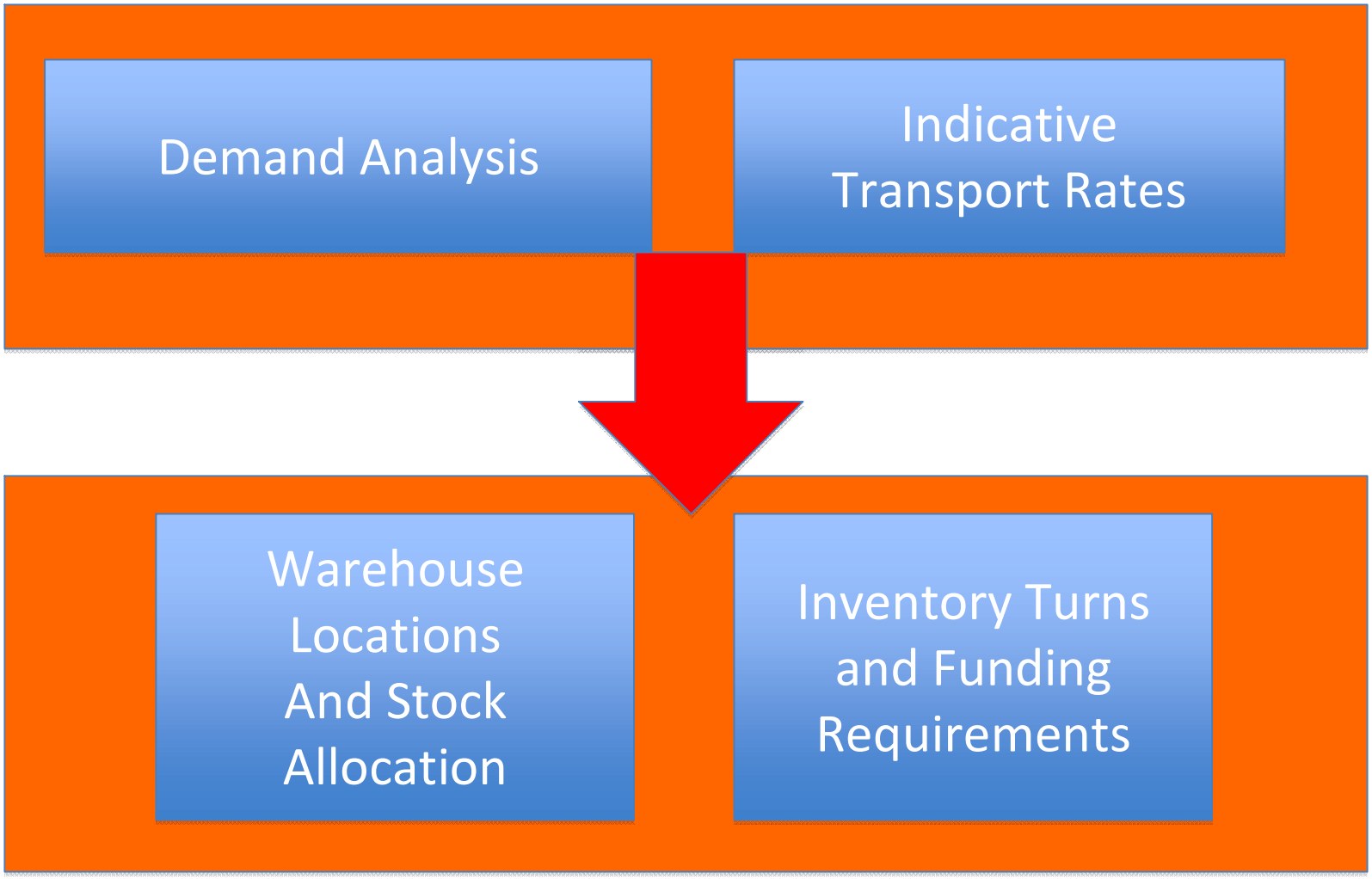
Eight agencies that expressed interest considered

Logistics service providers considered only to the extent that the agencies being considered were using them

Supply Chain Structure



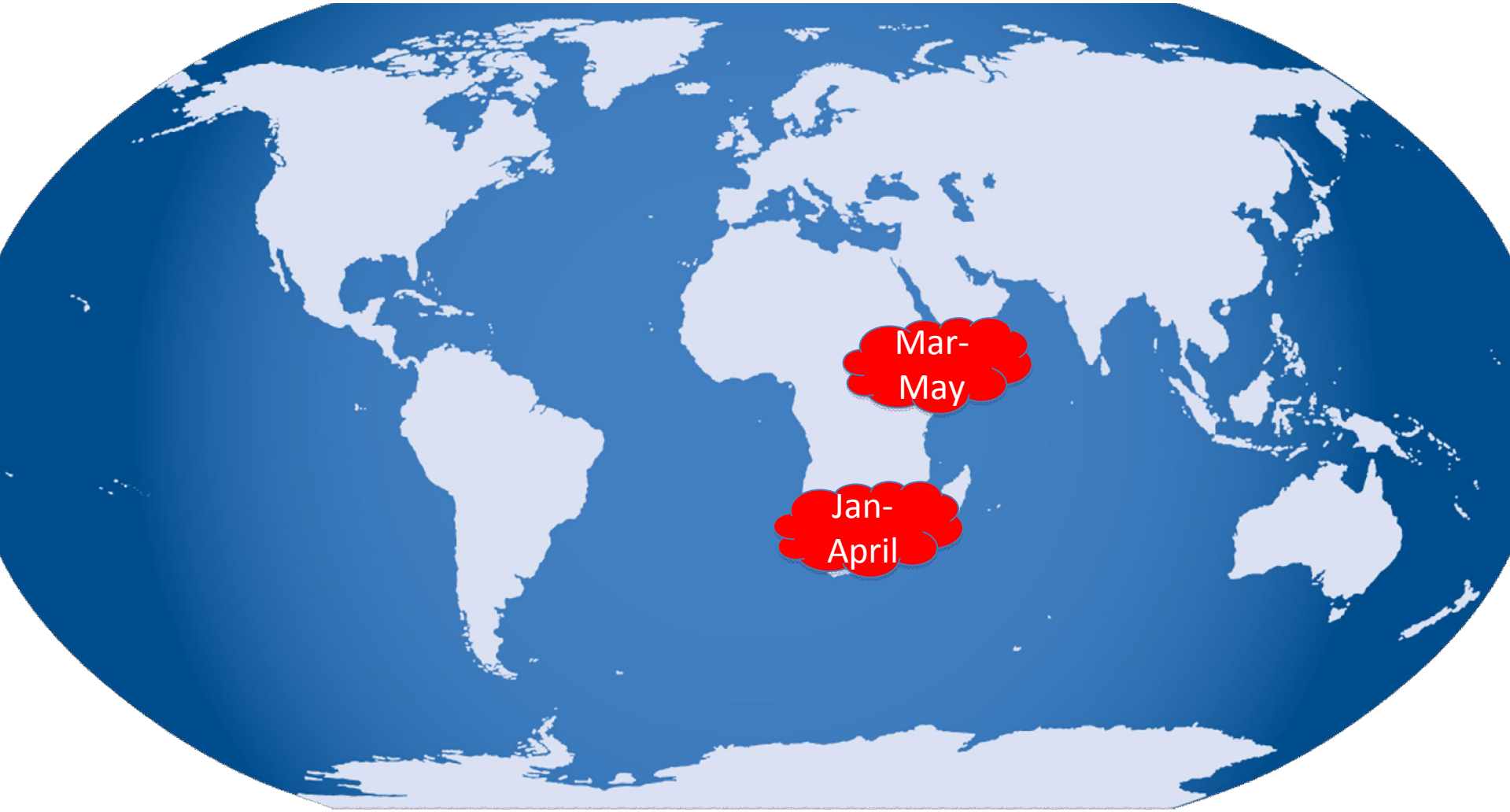
Design approach



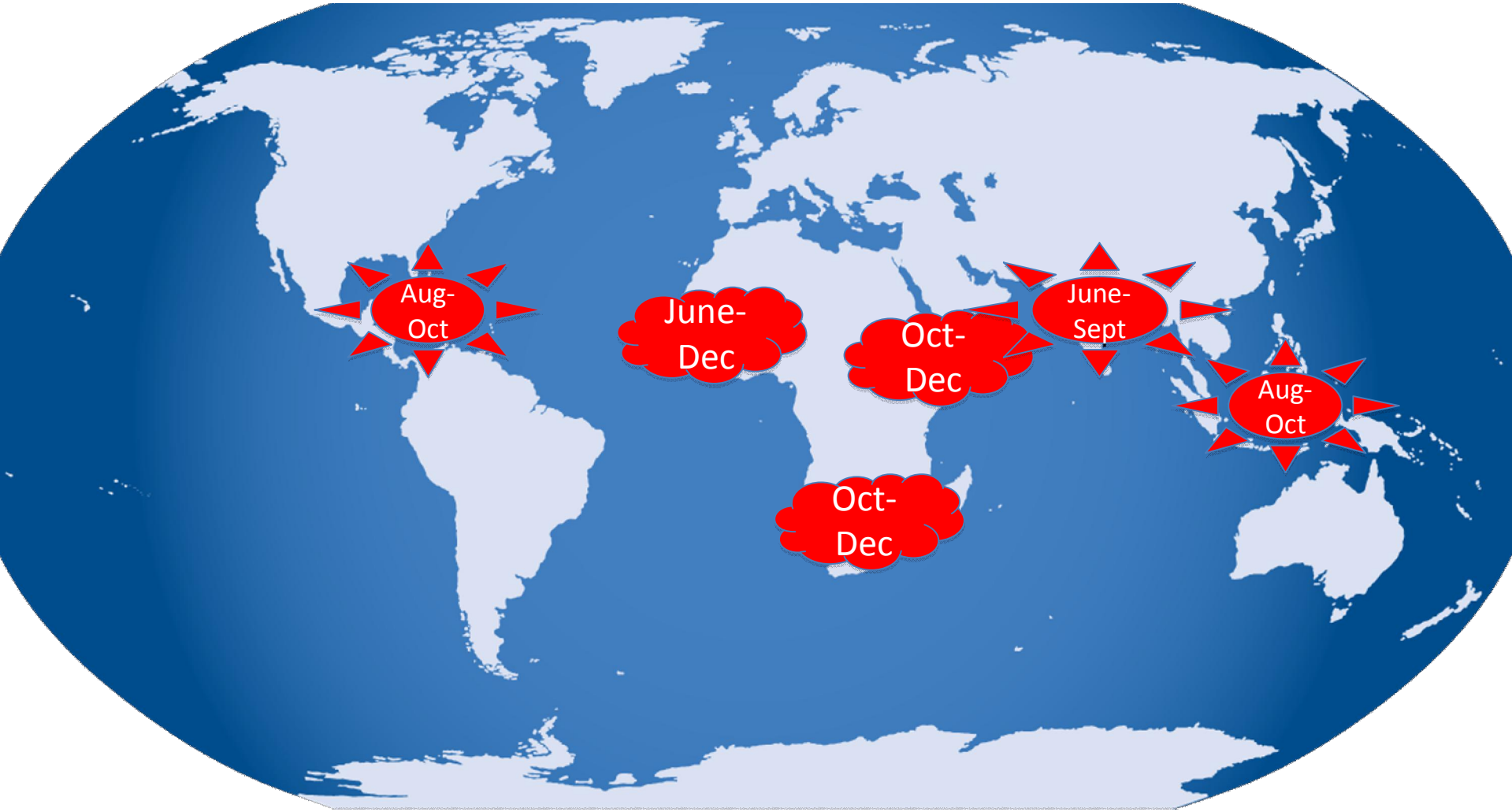
A Workshop on Demand and Service Requirements Was Held

- A demand analysis (location, timing, size) was done based on flash appeal data from 2005-2009 (with WASH cluster input) to determine:
  - for which emergencies WASH modules would have been deployed
  - which modules would have been deployed in what quantities
- Service requirements for dispatch speed and for replenishment time were discussed:
  - Dispatch speed: 48 hours – 7 days
  - Replenishment time: 60 days
- Difficult to get agreement!

Weather Influences Jan-June



Weather Influences July-Dec



Deployments That Would Have Been Made, 2006-2009, Four Years Combined*

	Quantity (Number of Deployments) July - December	Quantity (Number of Deployments) January - June
Africa/ME + Pakistan	65,000 (5)	10.000 (1)
Asia	15,000 (2)	30,000 (2)
Latin America	55,000 (3)	5,000 (2)

15 deployments out of 50 flash appeals during that time

Peak Season
Global = 33,750/Year

Off-Peak Season
Global = 11,250/Year

* If a WASH stockpile had been in place

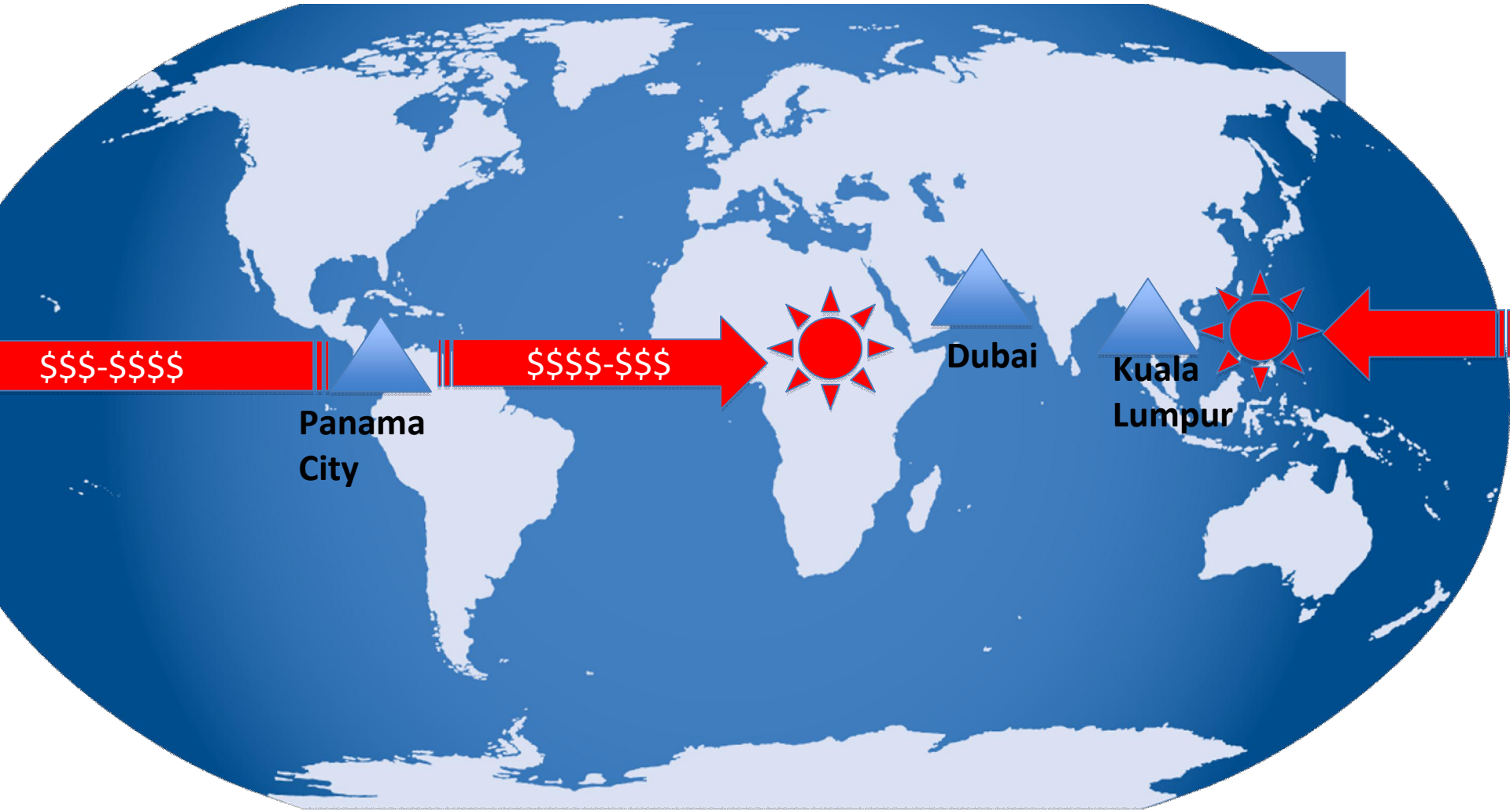
Annual Demand Scenario for Analyzing Warehouse Locations

- 1 big emergency (50K units)
  - 50% chance in Africa and 50% in Asia
  - May hit anytime throughout the year
- 3-4 small/medium emergencies totaling 45,000 units
  - 2 in Africa
  - 1 in Asia
  - 1.5 in Latin America

Validating alternatives

- Spreadsheet based analysis
- 6 facility locations: Oslo, Bicester (UK), Kuala Lumpur, Dubai, Las Palmas (Gran Canarias), Panama city (good access to airports, flight times <12 hours)
- To estimate transport costs we assumed disasters to take place in Pakistan, Haiti, Zimbabwe, Philippines, Burkina Faso, Uganda, Mozambique and we allocated probabilities to each location/disaster size combination
- Transport rates per route provided by two different service providers through agencies

Responding to Large Emergencies from Panama City Is Expensive



Availability of Commercial Air Cargo Capacity

TO:

FROM:	Pakistan	Haiti	Zimbabwe	Philippines	Burkina Faso	Uganda	Mozambique
Oslo	+	+	+	++	+	+	+/-
Bicester (UK)	++	+	+	++	+	++	+/-
Kuala Lumpur	+	+/-	+/-	++	+/-	+	+/-
Dubai	++	+	+	++	+	+	+/-
Las Palmas (Gran Canarias)	-	-	-	-	-	-	-
Panama city	-	+/-	-	+	-	+	-

LEGEND

0 = no availability of commercial air transport on this route

- = commercial air transport availability on this route is very limited

+/- = commercial air transport available on this route but not sufficient

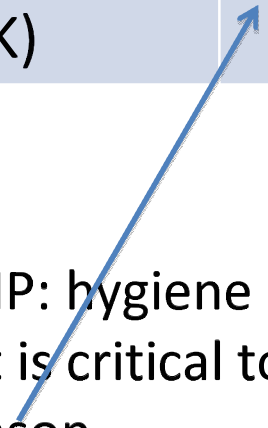
+ = commercial air transport sufficiently available on this route

++ = very good availability of commercial flights on this route (good choice of carriers)

SOURCE: UNICEF

A possibility: position stock at 3 locations

	Peak Season	Off-Peak Season
Dubai	30,000 + 10,000 HP	30,000+ 10,000 HP
Kuala Lumpur	10,000	10,000
Bicester (UK)	20,000	10,000



- HP: hygiene promotion kit
- It is critical to be fully stocked in June, to be ready for the peak season.
- Second wave/expedited replenishment should be active during peak season.

Findings: factors to consider in humanitarian supply chain design

UNICEF tranposrt rates favoured the north, bicester
IFRC transport rates favoured their regional hubs in KL and Panama City

- Seasonal demand – uncertainty about quantities and locations
  - We did this study before Haiti happened
- Imbalance in transport rates suggests putting more stock in Dubai
- Generally gained insight, but results inconclusive as rates quoted by service providers were so different that they lead to different solutions
- Charter rates may increase significantly during emergencies
  - Possibilities for use of commercial air
- Location of stock:
  - During a big emergency, Dubai may become congested
  - Panama City is expensive for large emergencies (as they happen mostly in Asia or Africa)
  - Bicester/Oslo are less expensive than distances might suggest
  - Peak stock is helpful in meeting peak demand; stocking at multiple locations reduces cost for responding to small emergencies and alleviates capacity issues (e.g. loading of aircraft: 1 IL 76 fits Watsan materials and equipment for 10,000 people)
- Some locations allow locating stock near water item suppliers and agency WASH engineers (eg Bicester, Oslo)