Big Depot Hurricane Planning Game

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Game Set-up

- 10% in-class game
- **March 13 Wednesday 17:30-20:30 in BZ08**
- Play it with your project teams
- Every team must have at least one computer
- Do not forget to bring USB
- Peer evaluation form

Game Set-up

- Detailed instructions for this exercise will be sent
- The following MS Excel files should be ready to be opened on the computer:
  - Procurement Decision Tool
  - Allocation Decision Tool
  - Big Depot Answer Sheet

Download before the game!!
MacBook is not suggested

Introduction to the problem

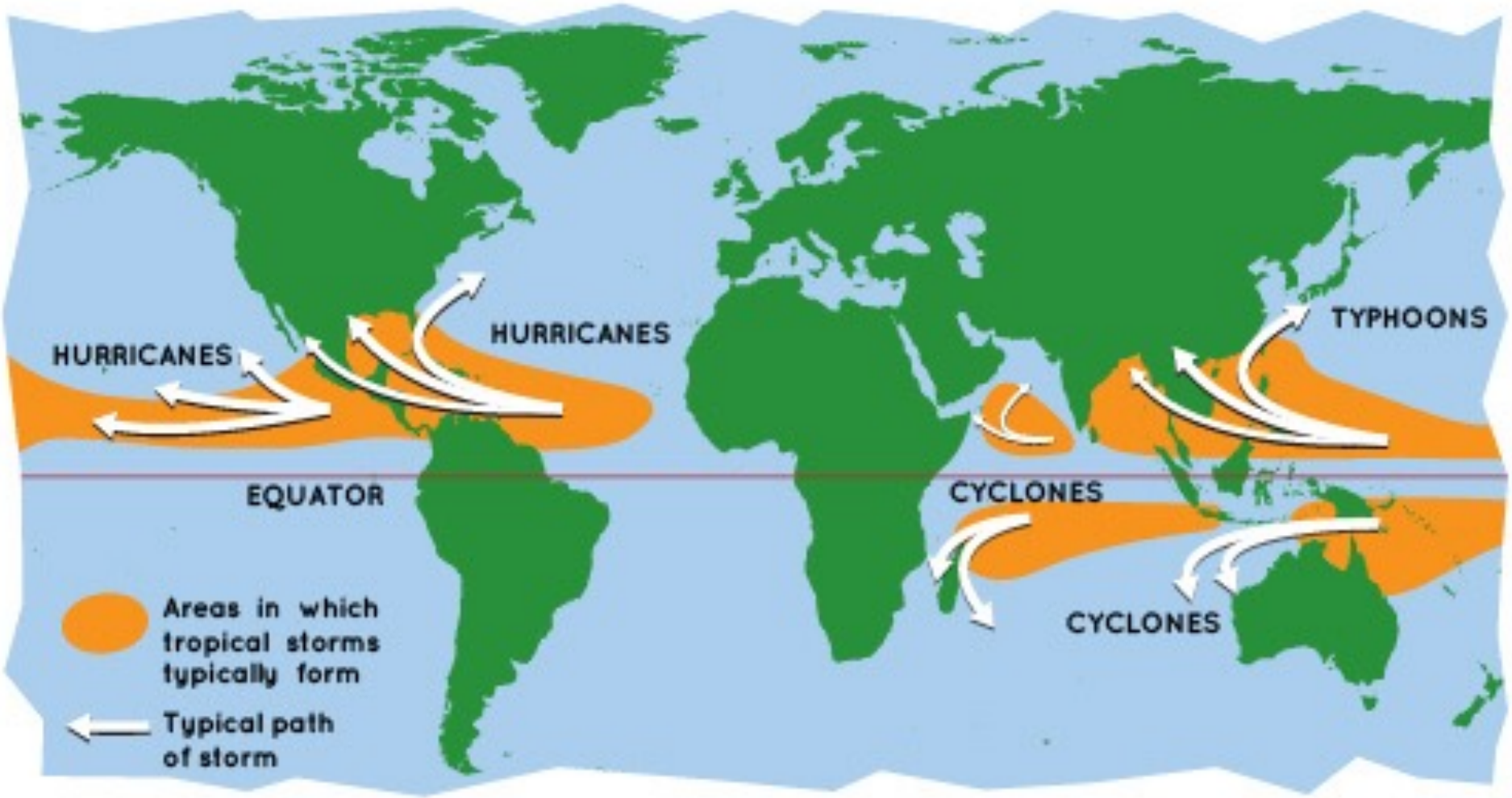
- Big Depot is a retailer of furniture and general home improvement products
- The GOAL:

  ensure that the necessary materials are delivered to their stores in the right amount and at the right time during the hurricane period.

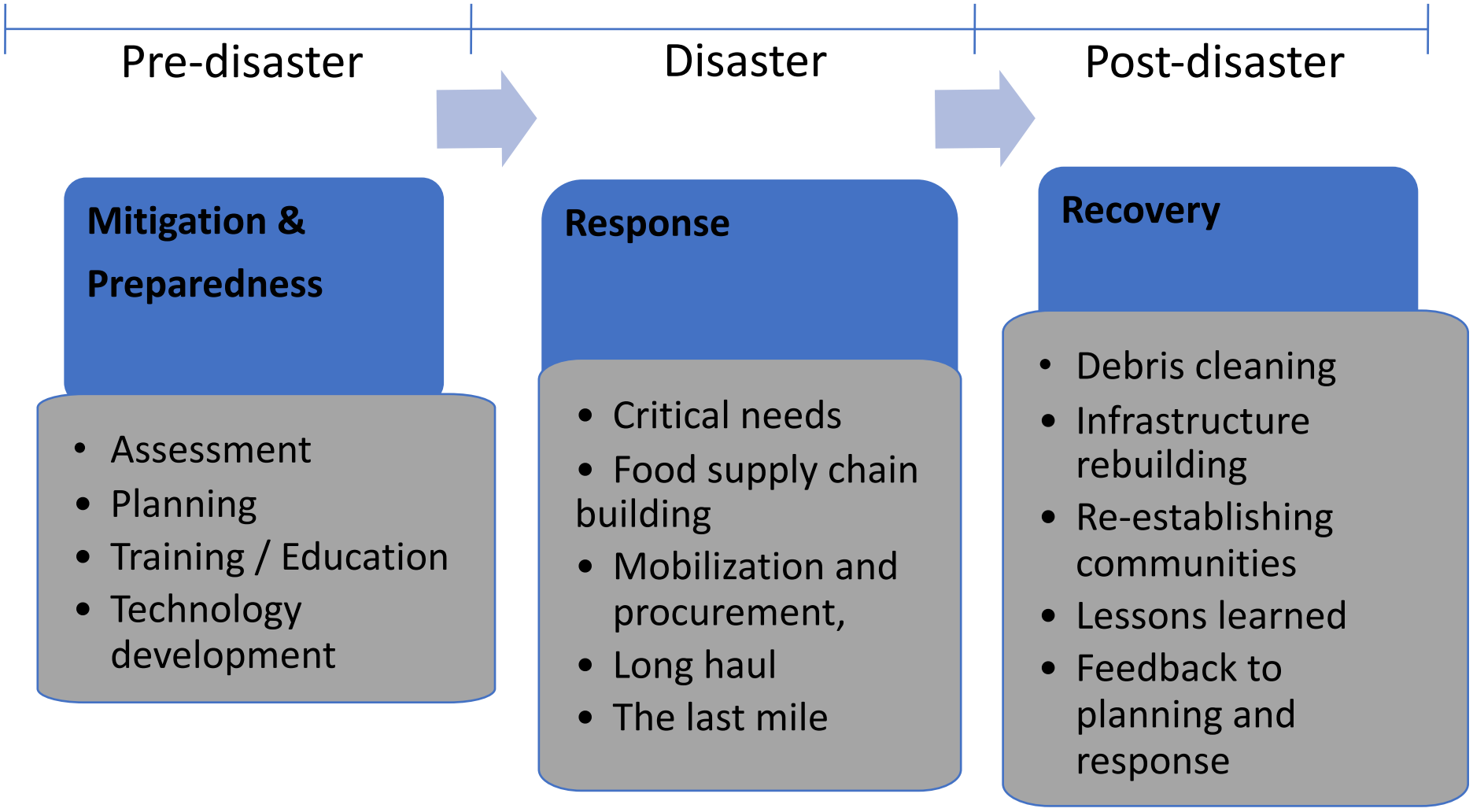
Hurricane

- Sudden onset
- Predictable location
- Predictable timing

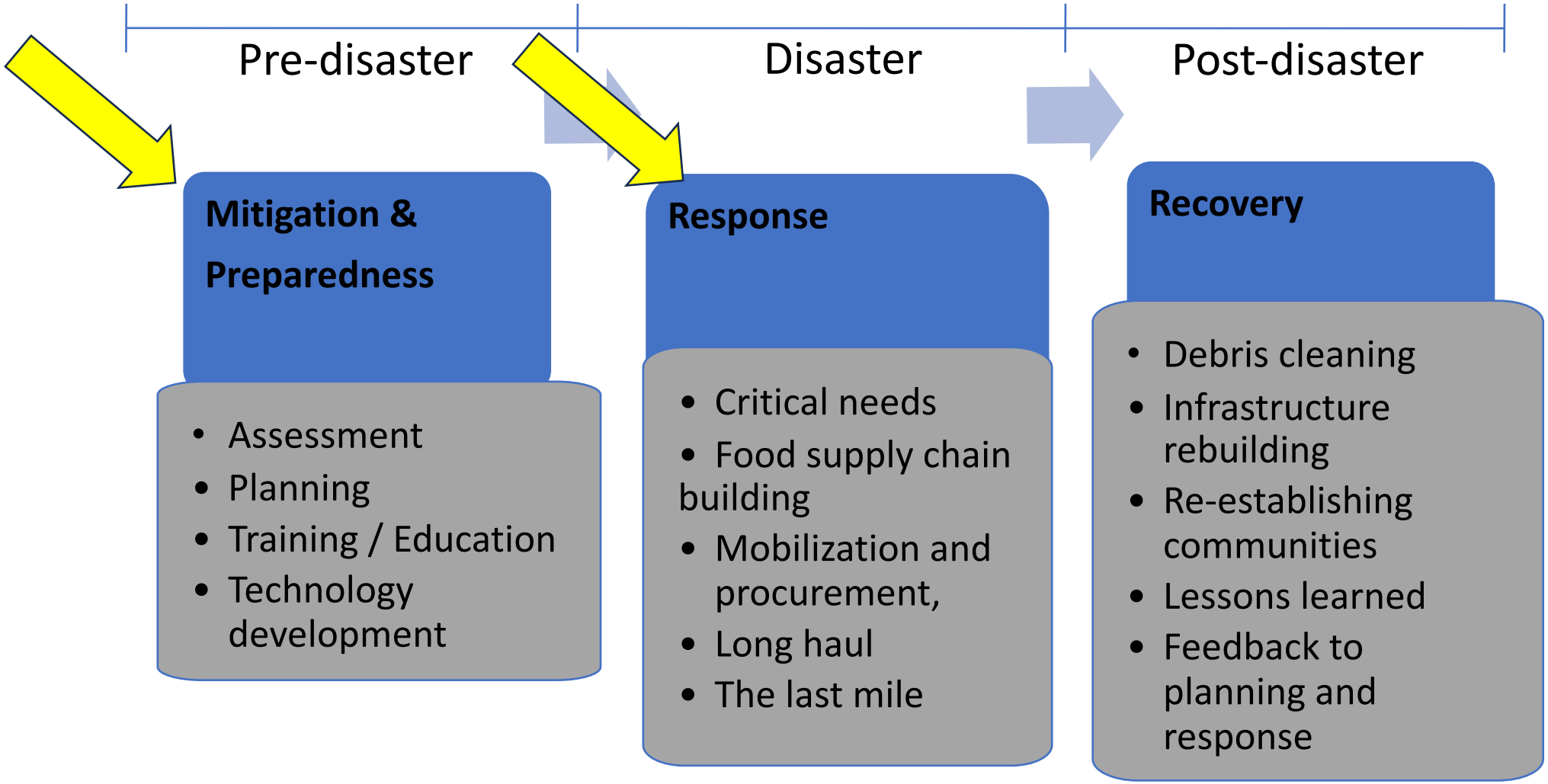
Hurricane


HURRICANES
HURRICANES
TYPHOONS
EQUATOR
CYCLONES
CYCLONES
Areas in which tropical storms typically form
Typical path of storm

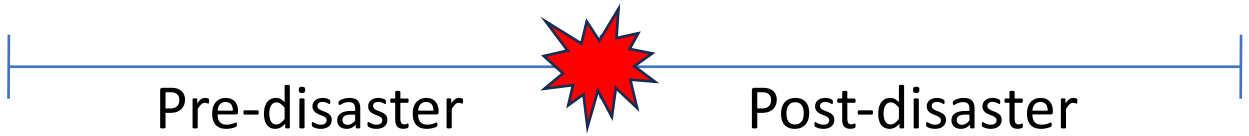
Disaster Timeline



Disaster Timeline

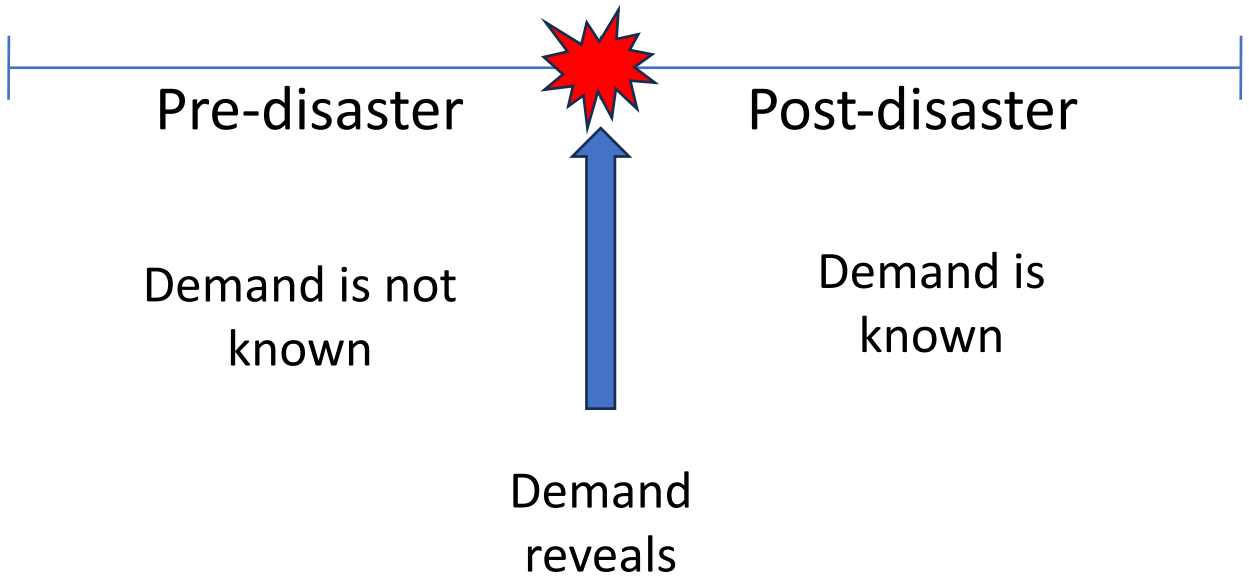


- 6 Product types: Cover set, Lighting set, Generator, Bottled water, Recovery set, Cleanup set
- 4 Regional Distribution Centers (DCs)



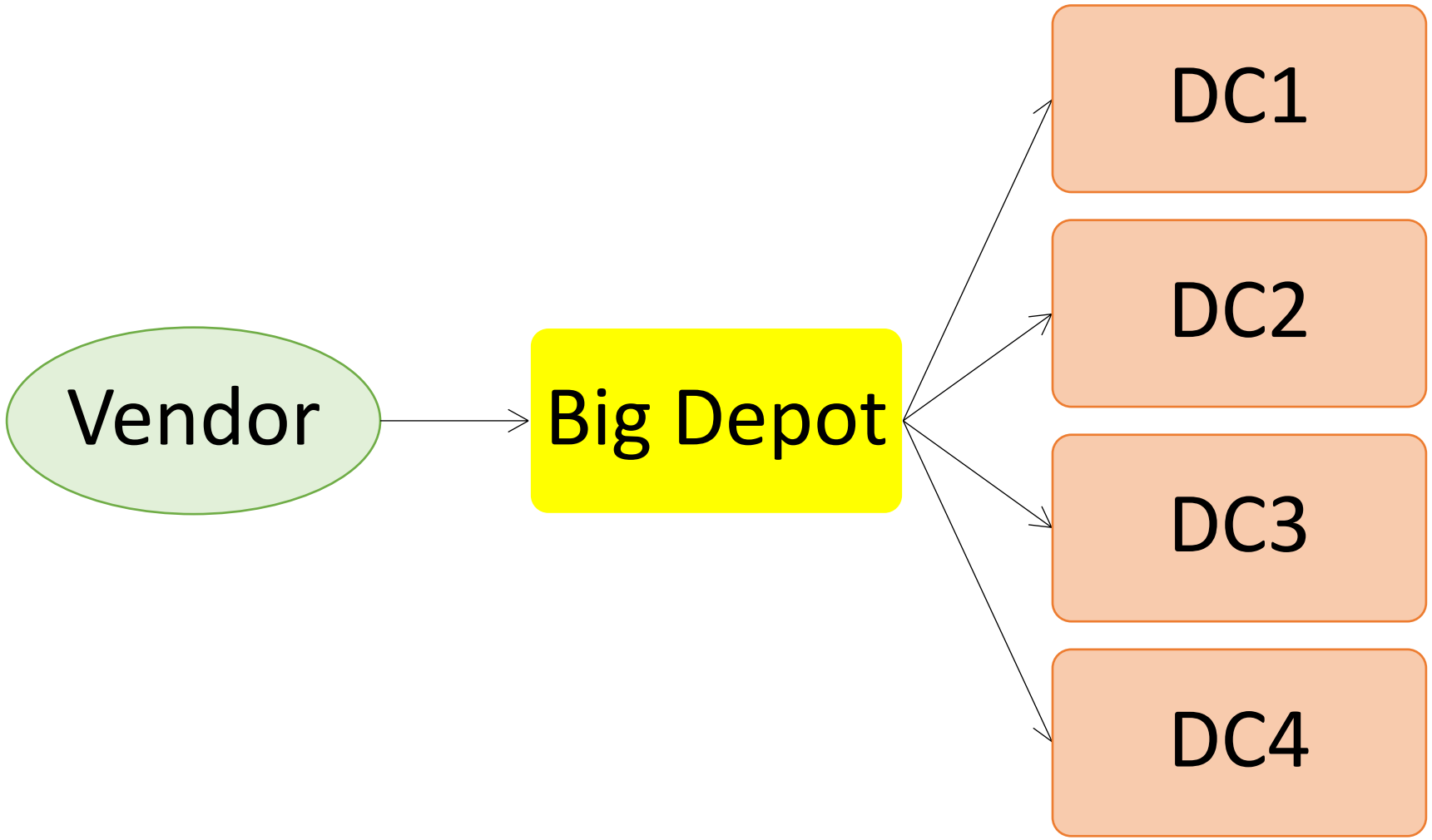
Demand is not known

- 6 Product types: Cover set, Lighting set, Generator, Bottled water, Recovery set, Cleanup set
- 4 Regional Distribution Centers (DCs)

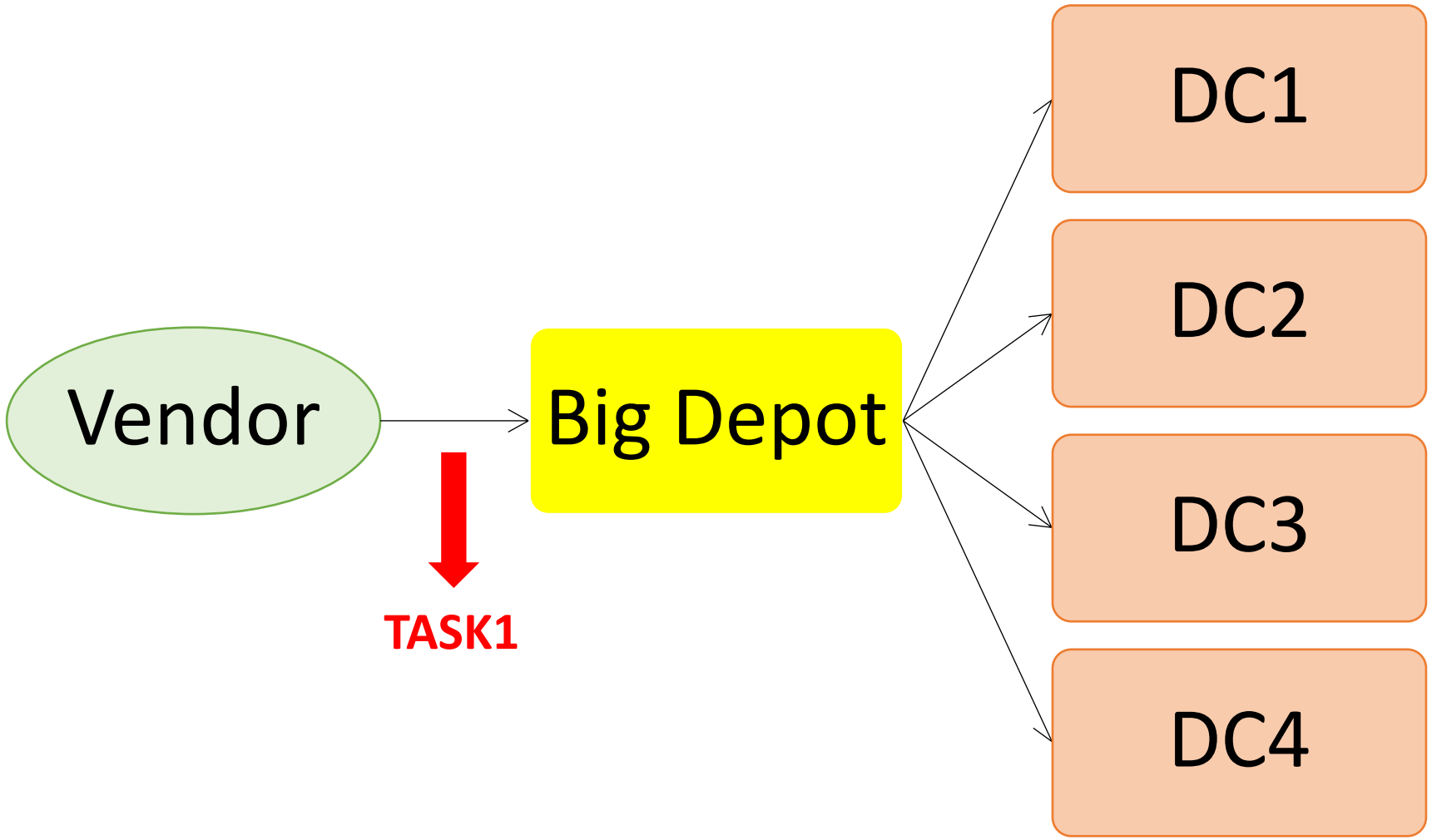


The Goal: Meeting all demand after the hurricane with the minimum total cost

Before the hurricane…



Before the hurricane…



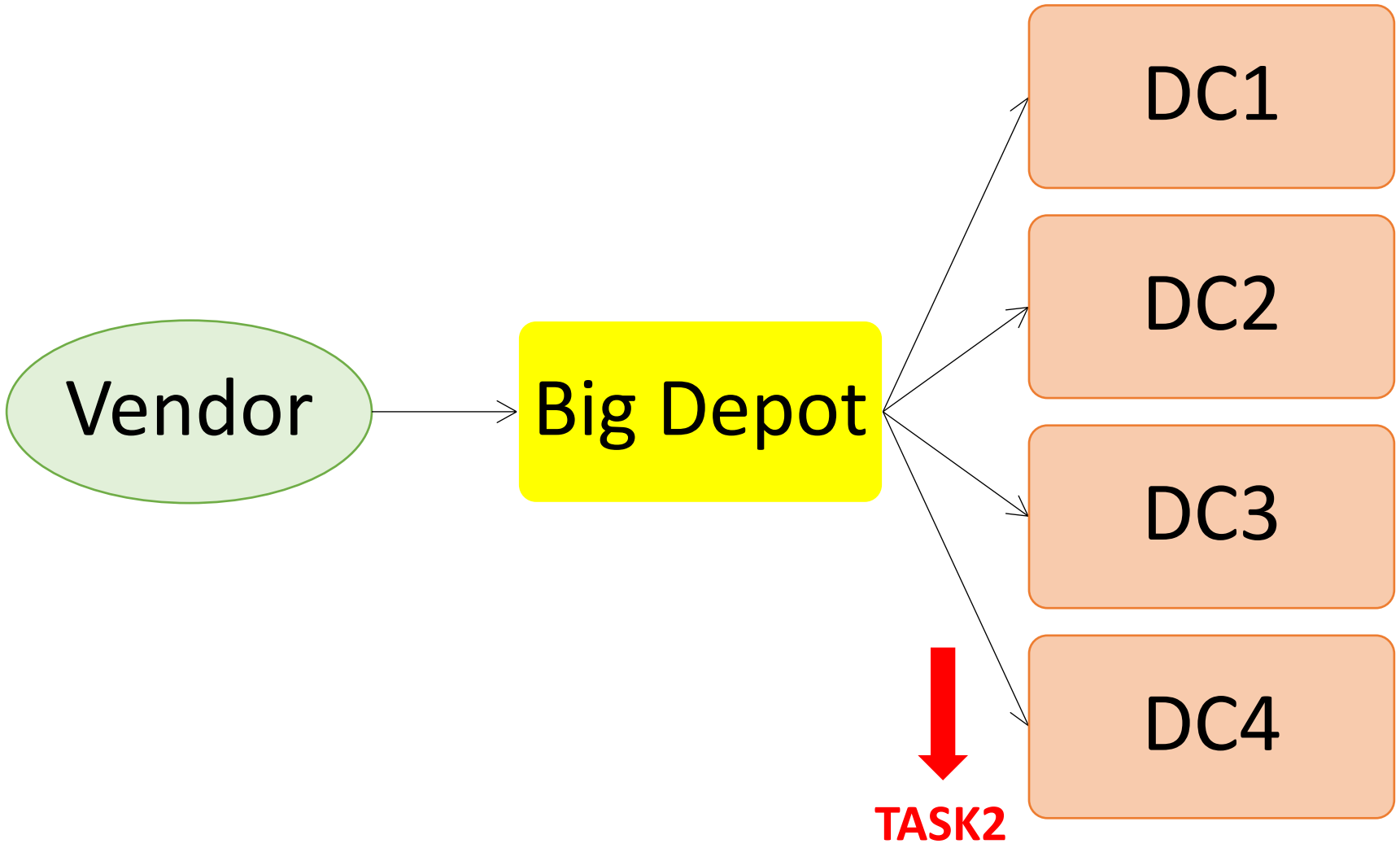
Procurement Decisions

- Vendors offer discounted prices for pre-disaster purchasing
  - Reservation cost or advance purchasing cost
- Limited budget for the advance orders

TASK-1 PURCHASING DECISIONS

- Demand is uncertain
  - You will have some statistical information on the total demand for each product type
- It is cheaper to buy before the hurricane
- There is a budget
- If you buy less product than the demand, you can buy more after the hurricane. But it will become more expensive
- If you buy more than the demand there is no salvage value

Before the hurricane…



TASK-2 ALLOCATION DECISIONS

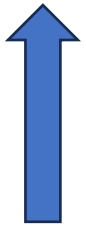
- You need to allocate the purchased items among the DCs
- Demand is still uncertain.
- Scenarios are provided for each hurricane path
  - Probability of each scenario
  - Demand distribution for each scenario
- If the stores' demand exceeds the regional warehouse (DC) inventory, the stores meet the unfulfilled demand paying higher prices to vendors for the expedited delivery of the required products (expedited cost)

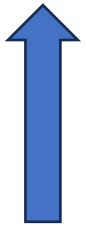
TASK-2 ALLOCATION DECISIONS

Procurement cost = Reservation cost + Expedited cost

TASK-2 ALLOCATION DECISIONS

Procurement cost = Reservation cost + Expedited cost





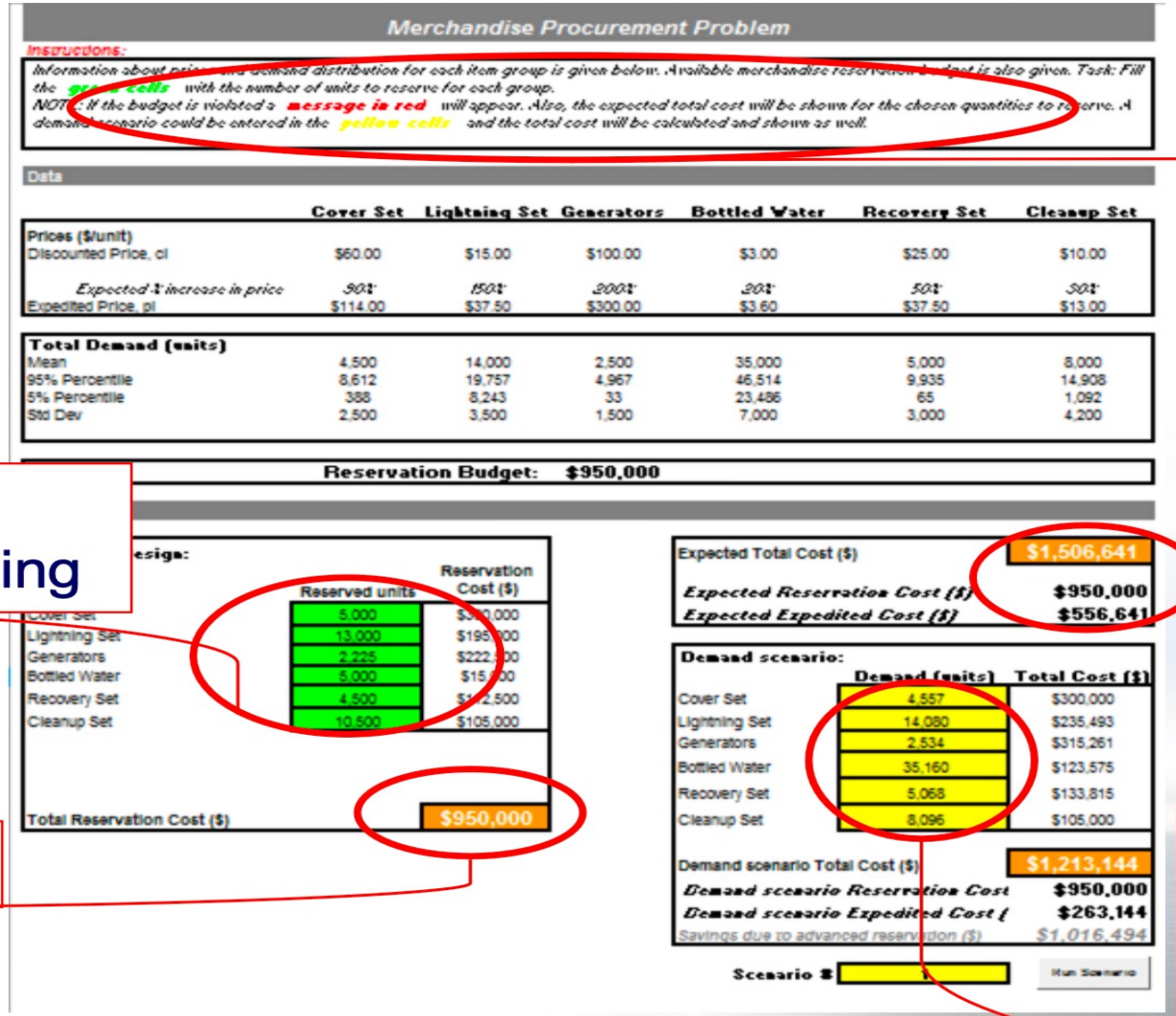
Budget

No Budget

TASK-3 PURCHASING AND ALLOCATION DECISION WITH TOOLS

- Two decision tools were developed:
  - Procurement Decision Tool
  - Allocation Decision Tool
  - Enable macros when opening the files
- These tools compute:
  - Expected costs of given decisions
  - Cost of given decisions, given a specific scenario
- Now, evaluate your proposed decisions and improve them using these tools.

Procurement Decision Tool



Merchandise Procurement Problem

Instructions:

Information about prices and demand distribution for each item group is given below. Available merchandise reservation budget is also given. Task: Fill the green cells with the number of units to reserve for each group.
NOTE: If the budget is violated a message is red will appear. Also, the expected total cost will be shown for the chosen quantities to reserve. A demand scenario could be entered in the yellow cells and the total cost will be calculated and shown as well.

Data

	Cover Set	Lightning Set	Generators	Bottled Water	Recovery Set	Cleanup Set
Prices ($/unit)						
Discounted Price, pi	$60.00	$15.00	$100.00	$3.00	$25.00	$10.00
Expected % increase in price	*90%*	*150%*	*200%*	*20%*	*50%*	*30%*
Expedited Price, pi	$114.00	$37.50	$300.00	$3.60	$37.50	$13.00

Total Demand (units)						
Mean	4,500	14,000	2,500	35,000	5,000	8,000
95% Percentile	8,612	19,757	4,967	46,514	9,935	14,908
5% Percentile	388	8,243	33	23,486	65	1,092
Std Dev	2,500	3,500	1,500	7,000	3,000	4,200

Reservation Budget: $950,000

esign:

	Reserved units	Reservation Cost ($)
Cover Set	5,000	$300,000
Lightning Set	13,000	$195,000
Generators	2,225	$222,500
Bottled Water	5,000	$15,000
Recovery Set	4,500	$112,500
Cleanup Set	10,500	$105,000

Total Reservation Cost ($): $950,000

Expected Total Cost ($): $1,506,641
Expected Reservation Cost ($): $950,000
Expected Expedited Cost ($): $556,641

Demand scenario:

	Demand (units)	Total Cost ($)
Cover Set	4,557	$300,000
Lightning Set	14,080	$235,493
Generators	2,534	$315,261
Bottled Water	35,160	$123,575
Recovery Set	5,068	$133,815
Cleanup Set	8,096	$105,000

Demand scenario Total Cost ($): $1,213,144
Demand scenario Reservation Cost: $950,000
Demand scenario Expedited Cost (: $263,144
Savings due to advanced reservation ($): $1,016,494

Scenario #: 1 Run Scenario

General Instructions

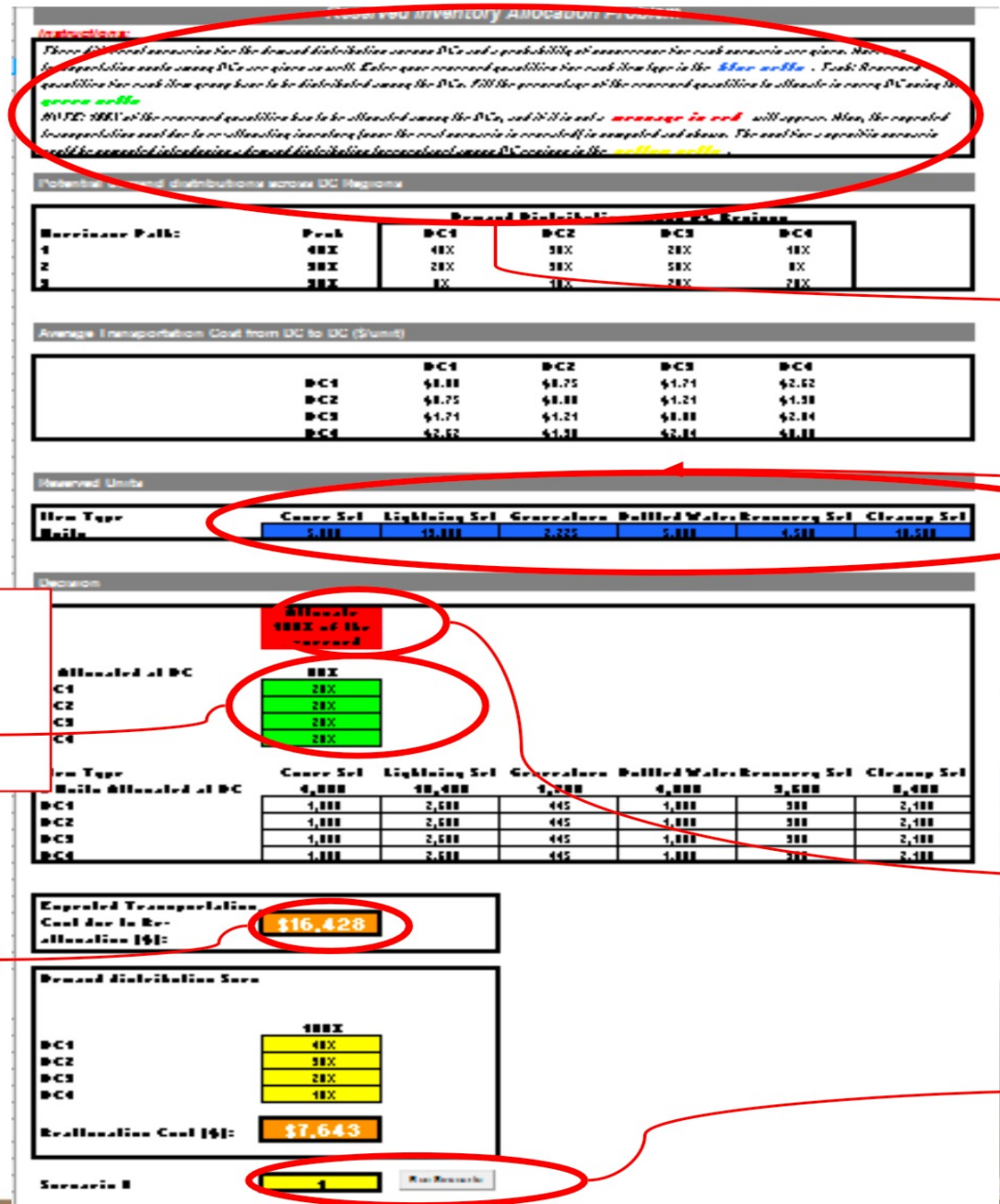
YOUR SOLUTION
for advance purchasing

Expected TOTAL
procurement cost

The budget

You can choose to
enter a
specific demand
scenario

Allocation Decision Tool



General Instructions

Enter solution from procurement problem

YOUR SOLUTION for inventory allocation

Message in red: %'s should sum 100%

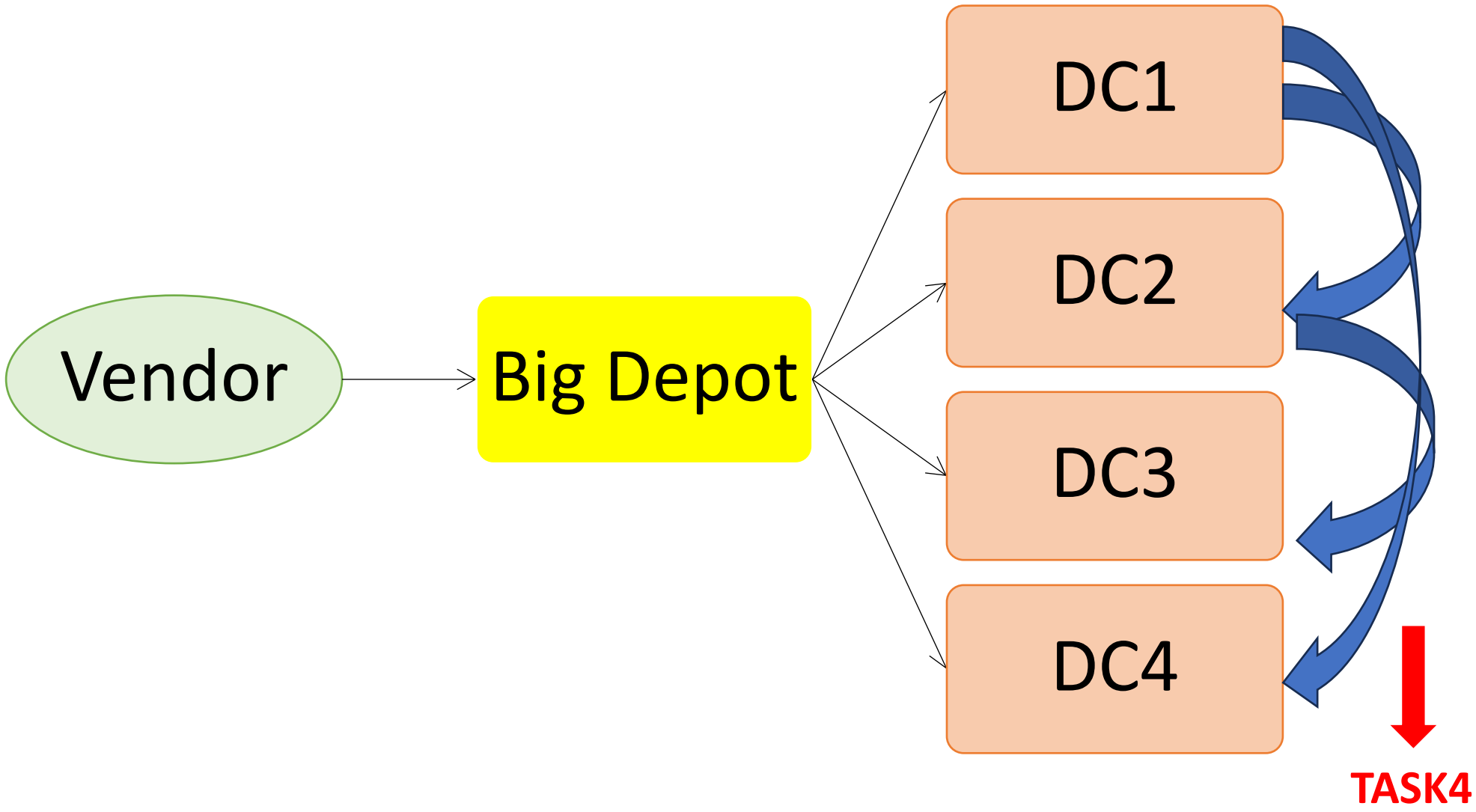
Expected TOTAL re-allocating cost

You can choose a specific path scenario

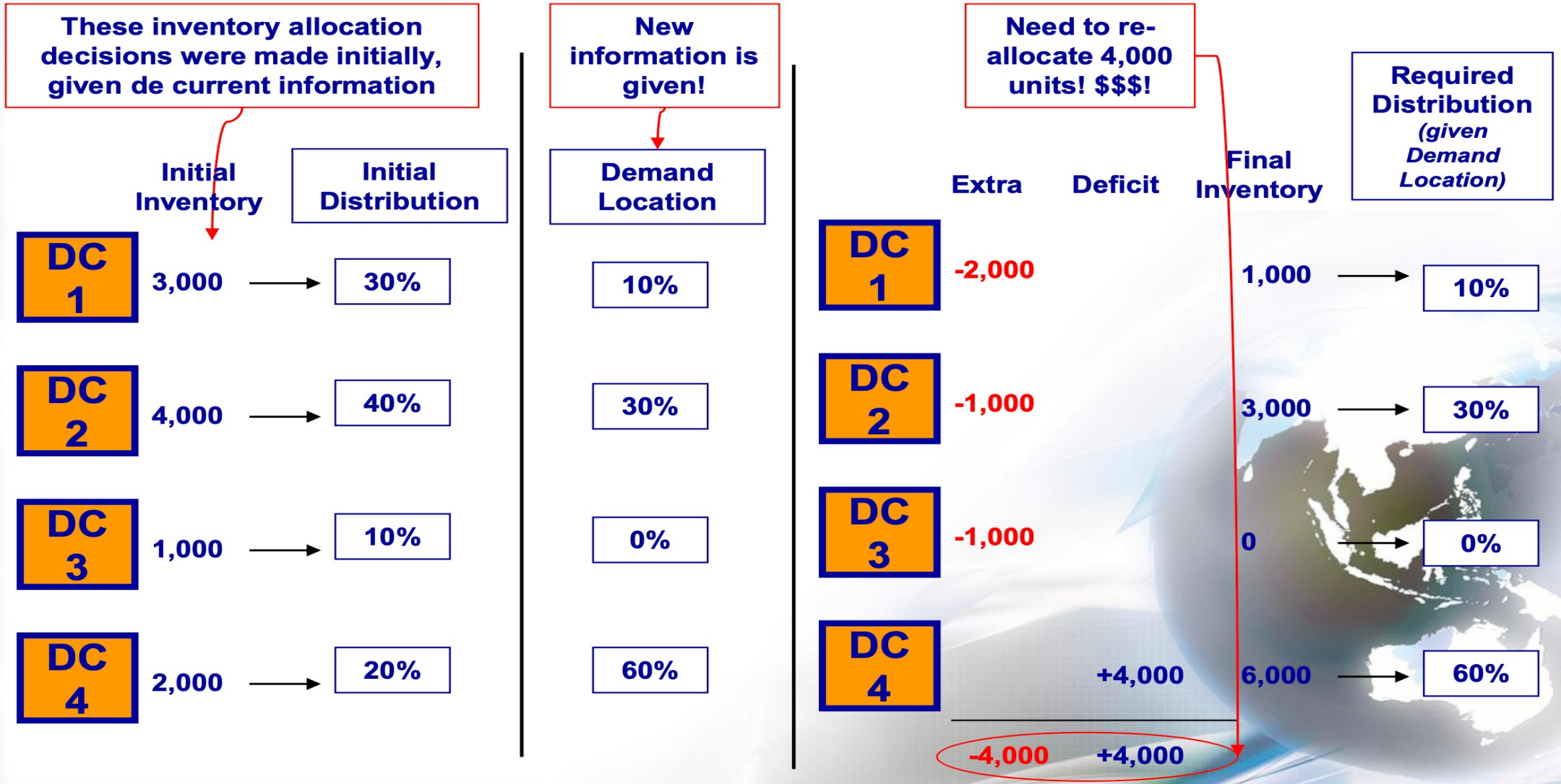
Revealed Demand Information

- The hurricane hit, now we will share the real demand for each DC

After the hurricane…



TASK-4 ALLOCATION BTW DCs

- You will determine the inventory quantities to be re-allocated given your last allocation decision by using the tools again
- Re-allocate reserved inventory proportionally to the demand of the region

What does this mean?