

# Objectives of Chapters 4, 5, 6

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- ◆ Designing the SC Network: (Ch4,5,6)
  - Ch4 → Explores how to design a distribution network
  - Ch5 → Considers facility related decisions to be made when designing a SC network.
  - Ch6 → Methodologies for evaluation of network design decisions under uncertainty are discussed.

# **Supply Chain Management (3rd Edition)**

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## **Chapter 5 Network Design in the Supply Chain**

# Outline

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- ◆ The Role of Network design in the SC
- ◆ Factors Influencing Network Design Decisions
- ◆ A strategic framework for facility location
- ◆ Models for facility location and capacity allocation

# Network Design Decisions

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SC network design decisions are classified as follows:

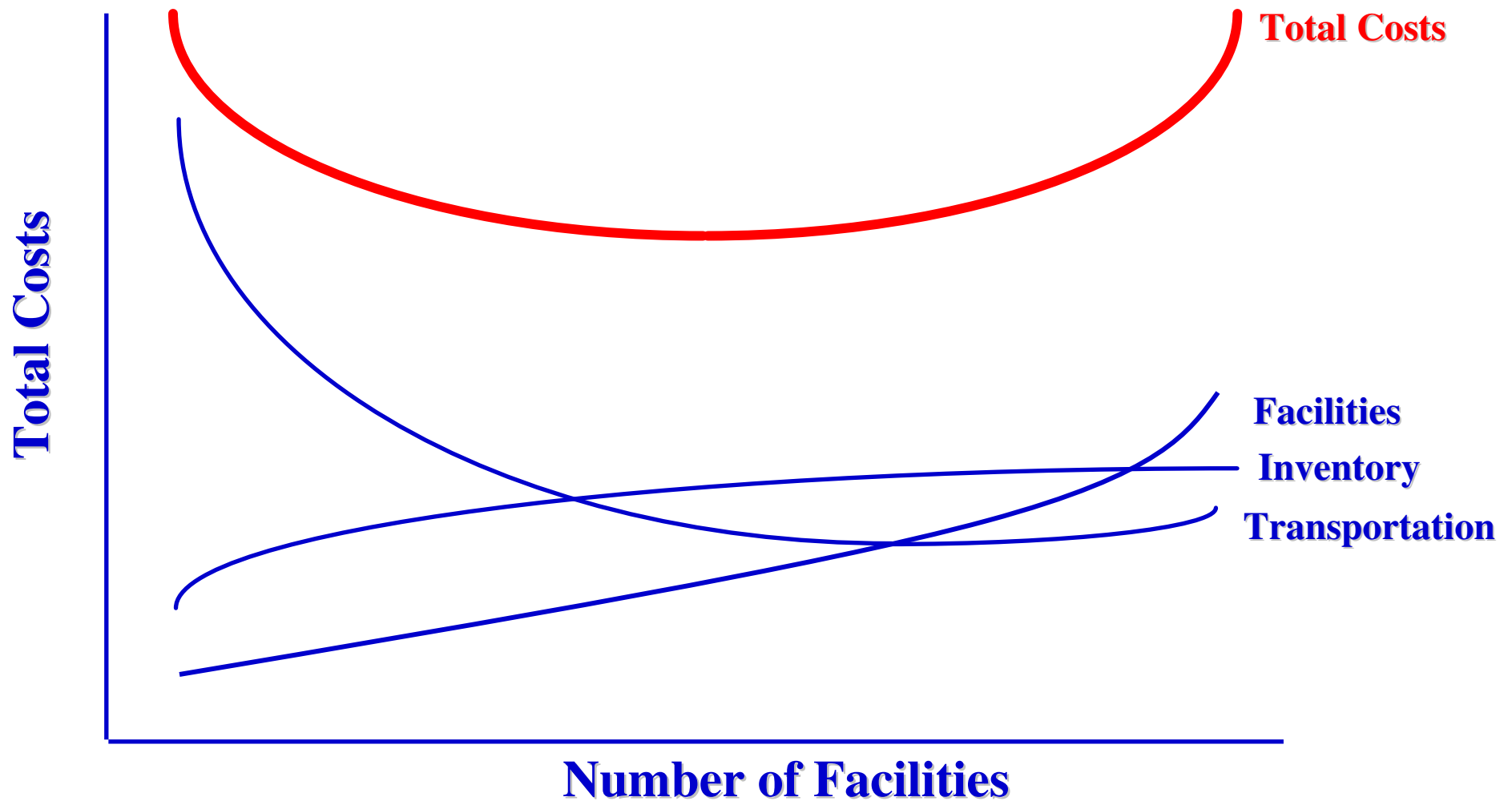
- Facility role
- Facility location
- Capacity allocation
- Market and supply allocation

# Factors Influencing Network Design Decisions

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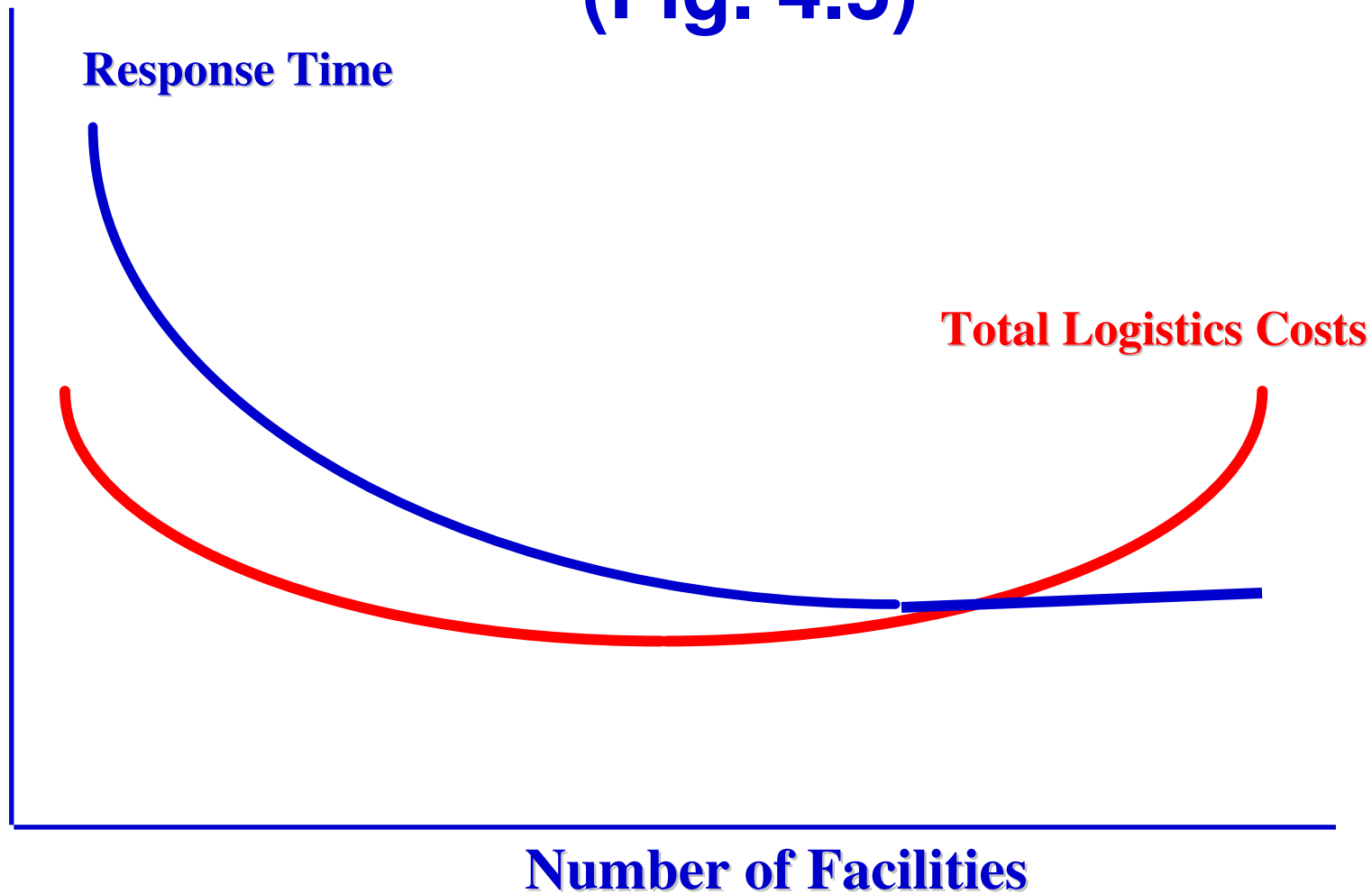
- ◆ Strategic factors → Local vs. global SC networks
  - Strategic role of each facility: Offshore facility, Source facility, Server facility, Contributor facility, Outpost facility and Lead facility.
- ◆ Technological factors: technology fixed cost and flexibility
- ◆ Macroeconomic factors: taxes, tariffs, free trade zones, limits on import, exchange rates and demand risk.
- ◆ Political factors: Stability and clarity of legal systems.
- ◆ Infrastructure: availability of sites and labor, access to transportation
- ◆ Competitive factors: Positive externalities vs. locating to split the market.
- ◆ Customer response time and local presence
- ◆ Logistics and facility costs:

# Total logistics Costs Related to Number of Facilities

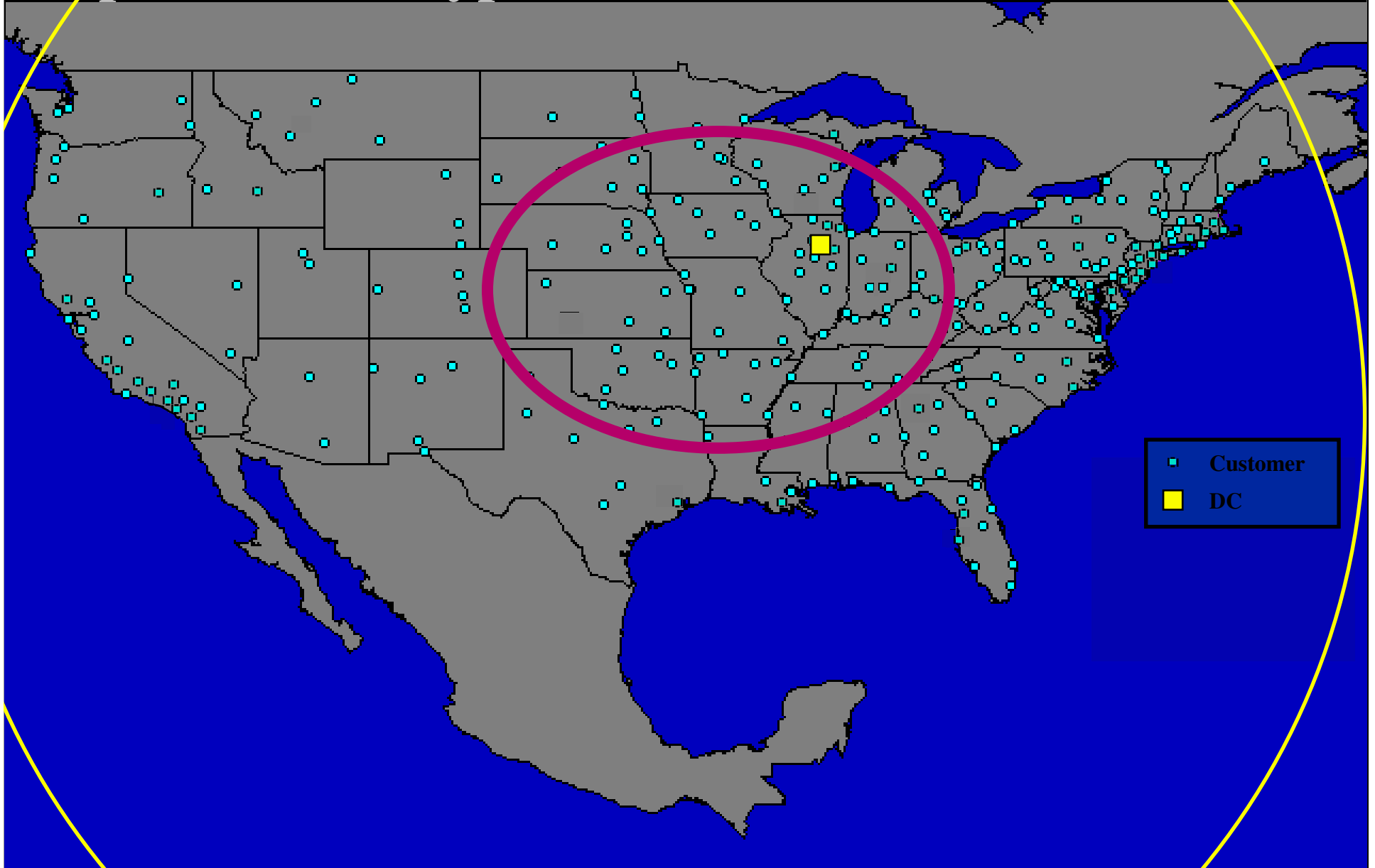


# Variation in Total Logistics Costs and Response Time with Number of Facilities

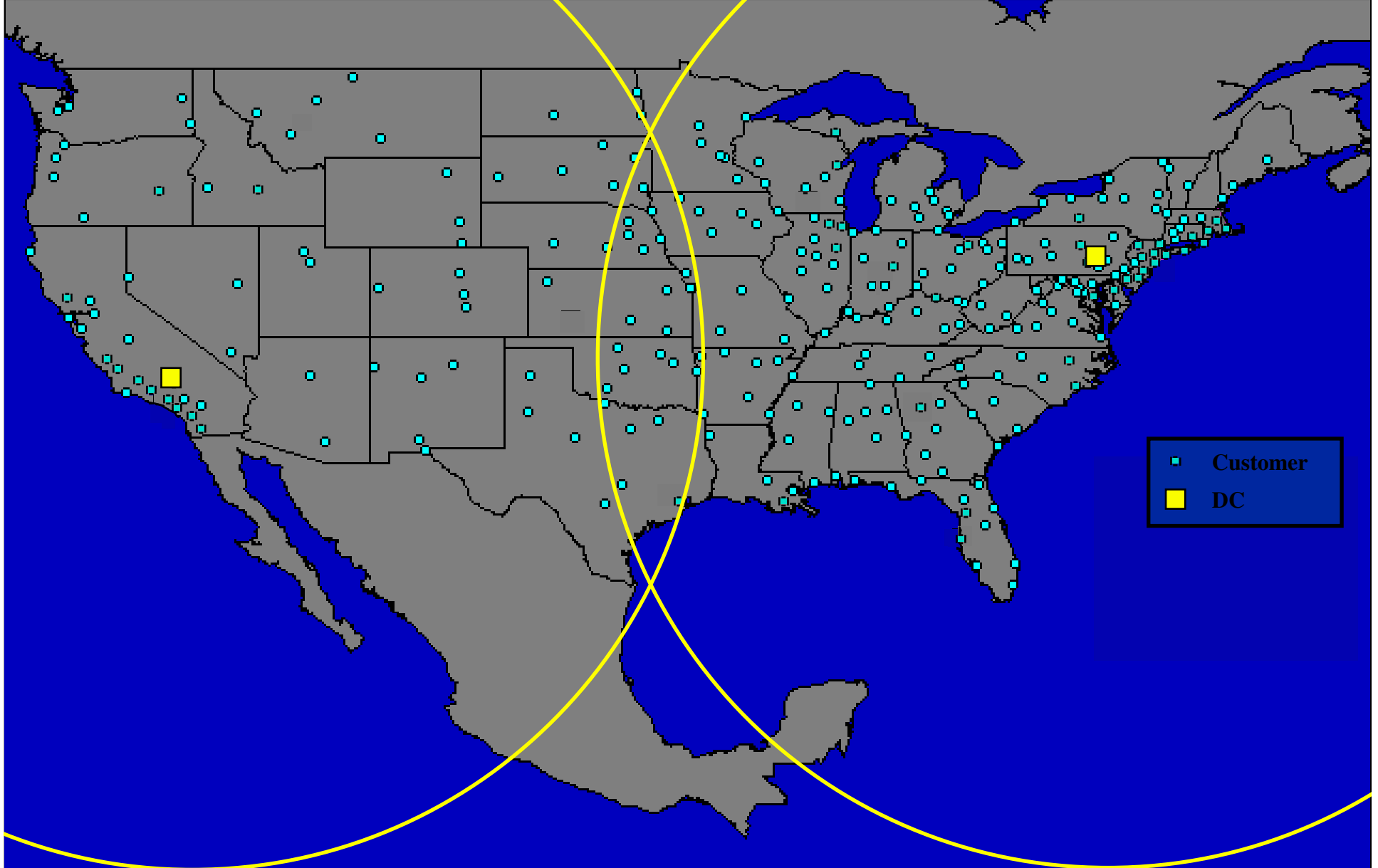
(Fig. 4.5)



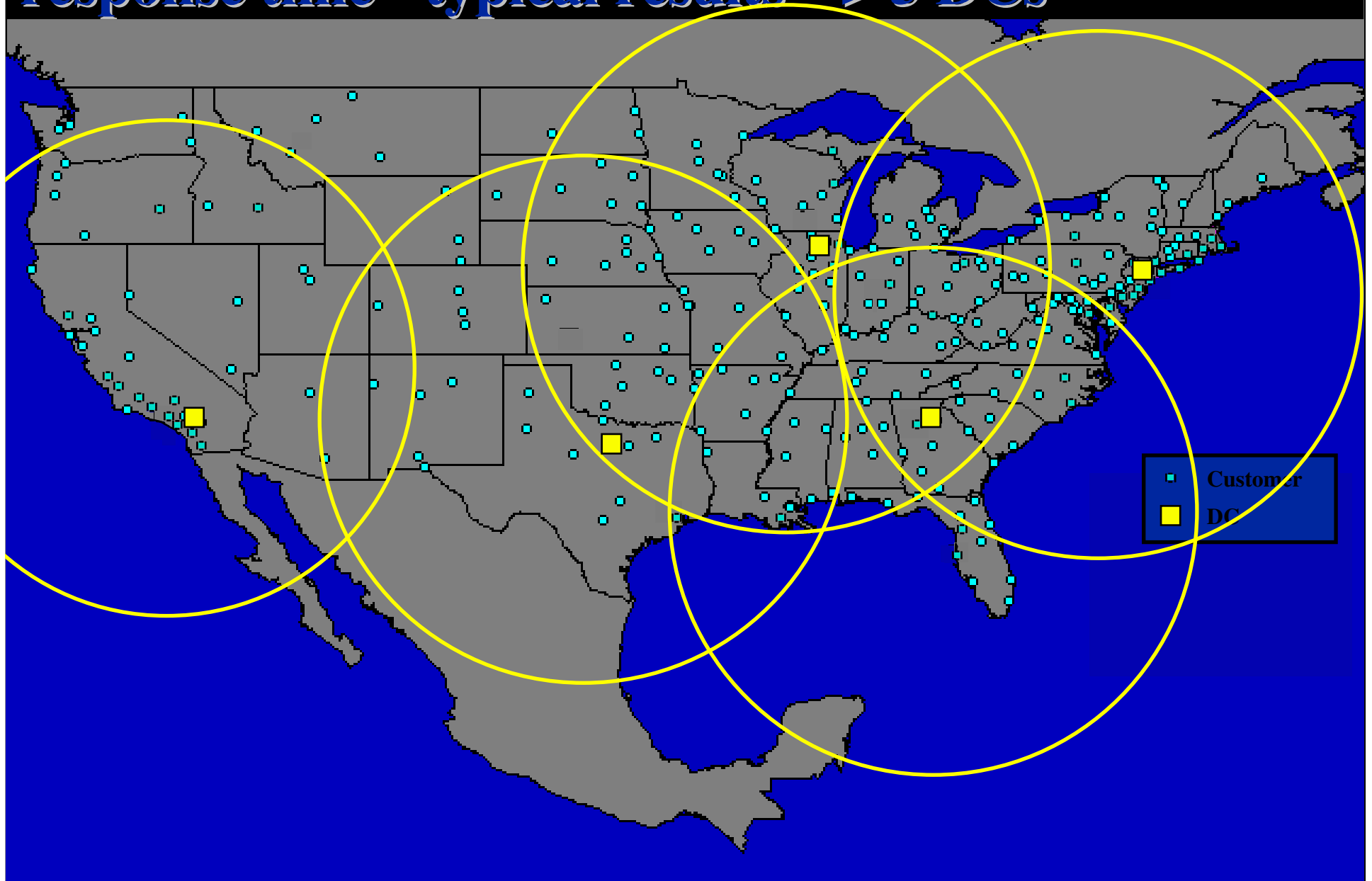
# Where inventory needs to be for a one week order response time - typical results --> 1 DC



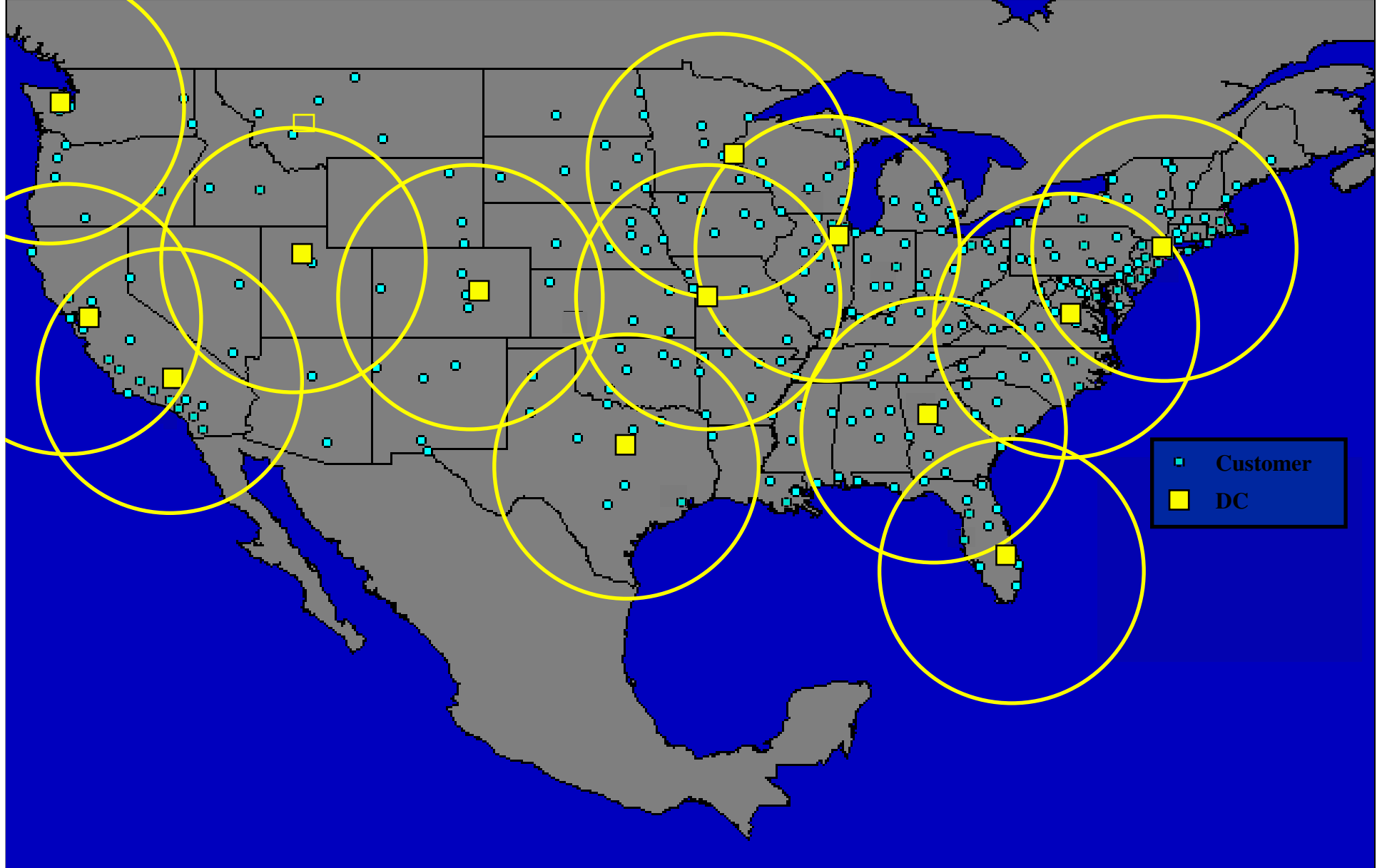
**Where inventory needs to be for a 5 day order response time - typical results --> 2 DCs**



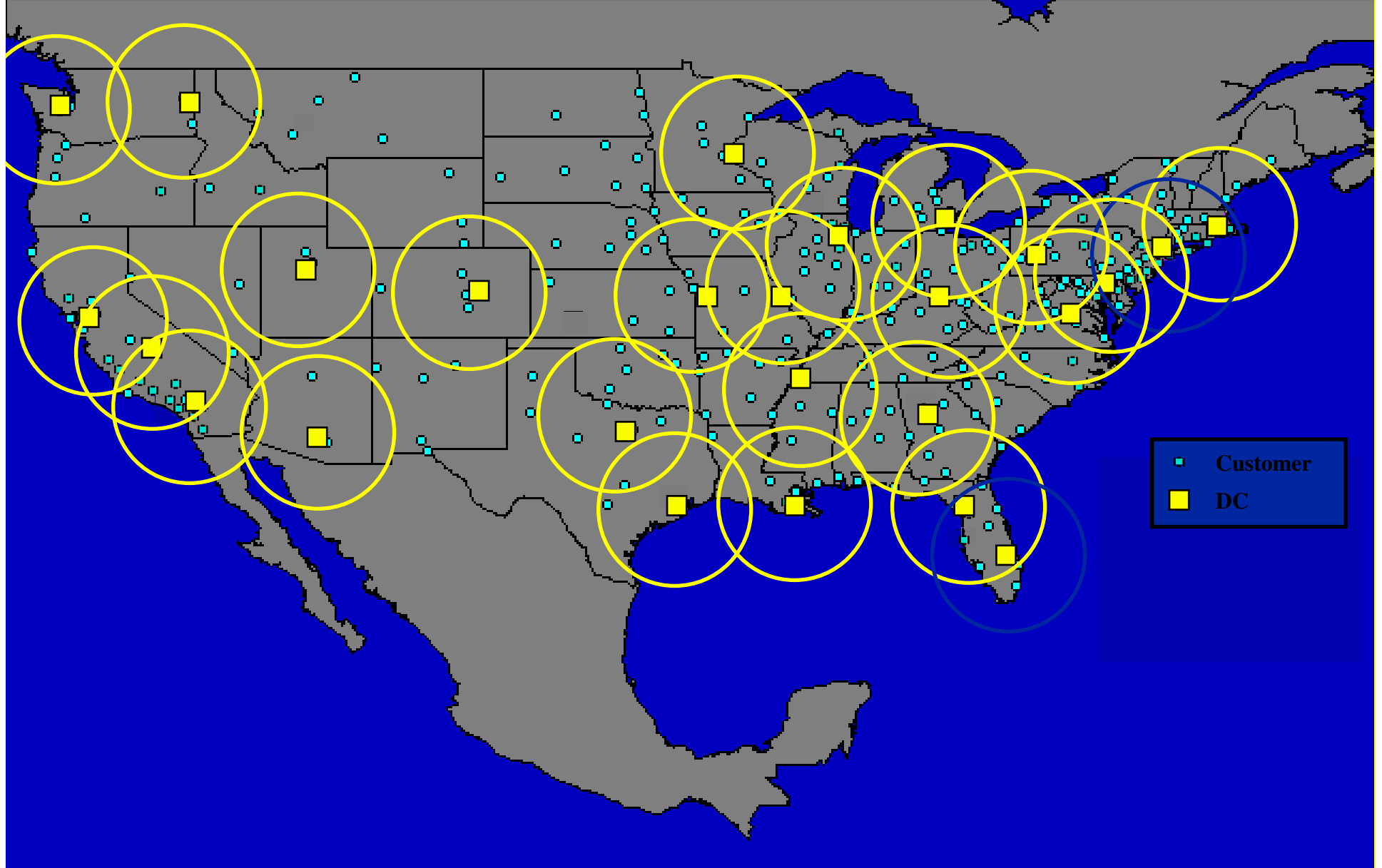
# Where inventory needs to be for a 3 day order response time - typical results --> 5 DCs



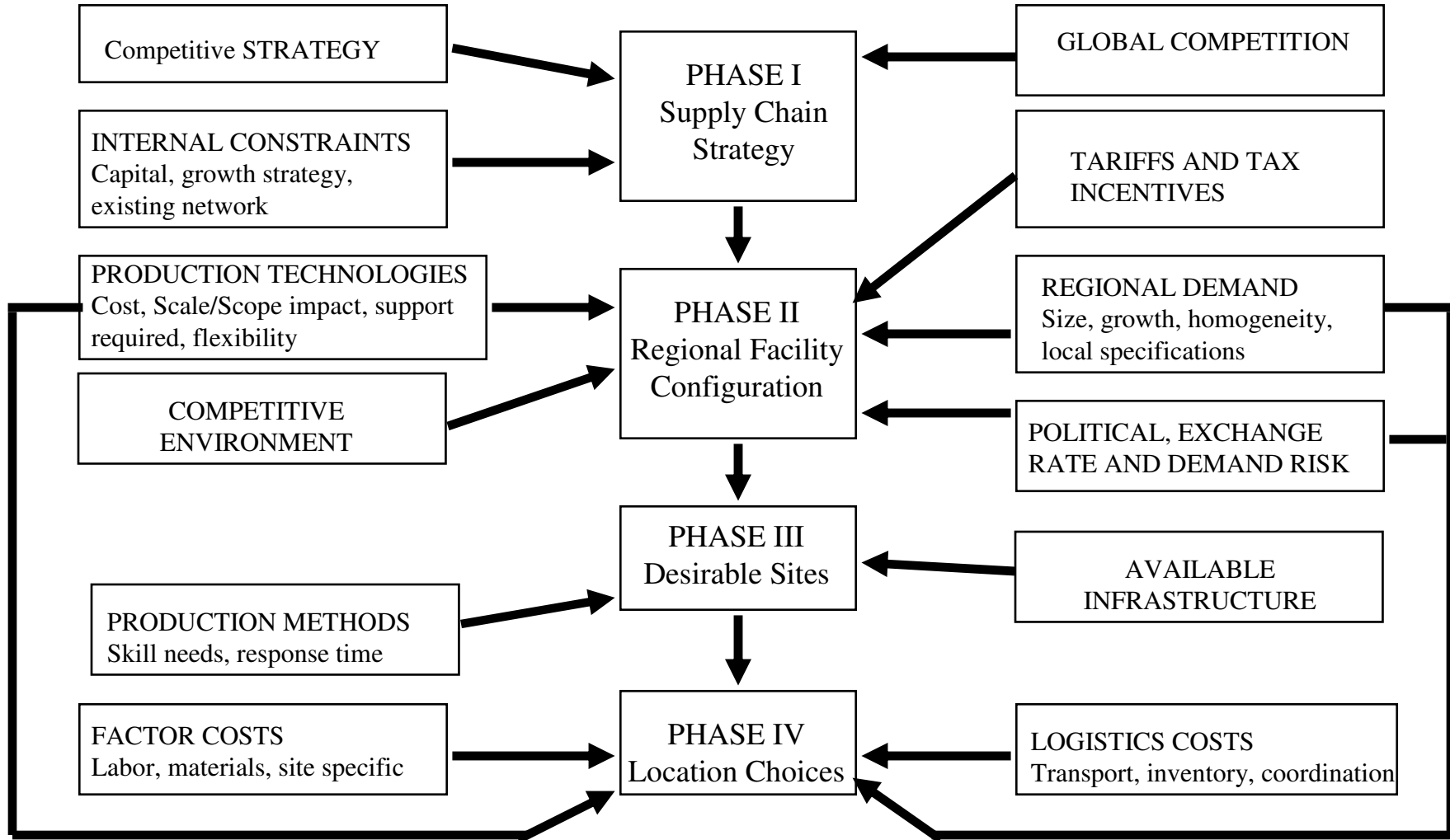
# Where inventory needs to be for a next day order response time - typical results --> 13 DCs



# Where inventory needs to be for a same day / next day order response time - typical results --> 26 DCs



# A Framework for Network Design Decisions



# Network optimization models: The capacitated plant model

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- ◆ See example in the textbook and the spreadsheets.

# Summary of Learning Objectives

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- ◆ What is the role of network design decisions in the supply chain?
- ◆ What are the factors influencing supply chain network design decisions?
- ◆ Describe a strategic framework for facility location.
- ◆ How are the following optimization methods used for facility location and capacity allocation decisions?
  - Gravity methods for location
  - Network optimization models