

Munitions Supply Chain Modelling: A Top-Down Approach

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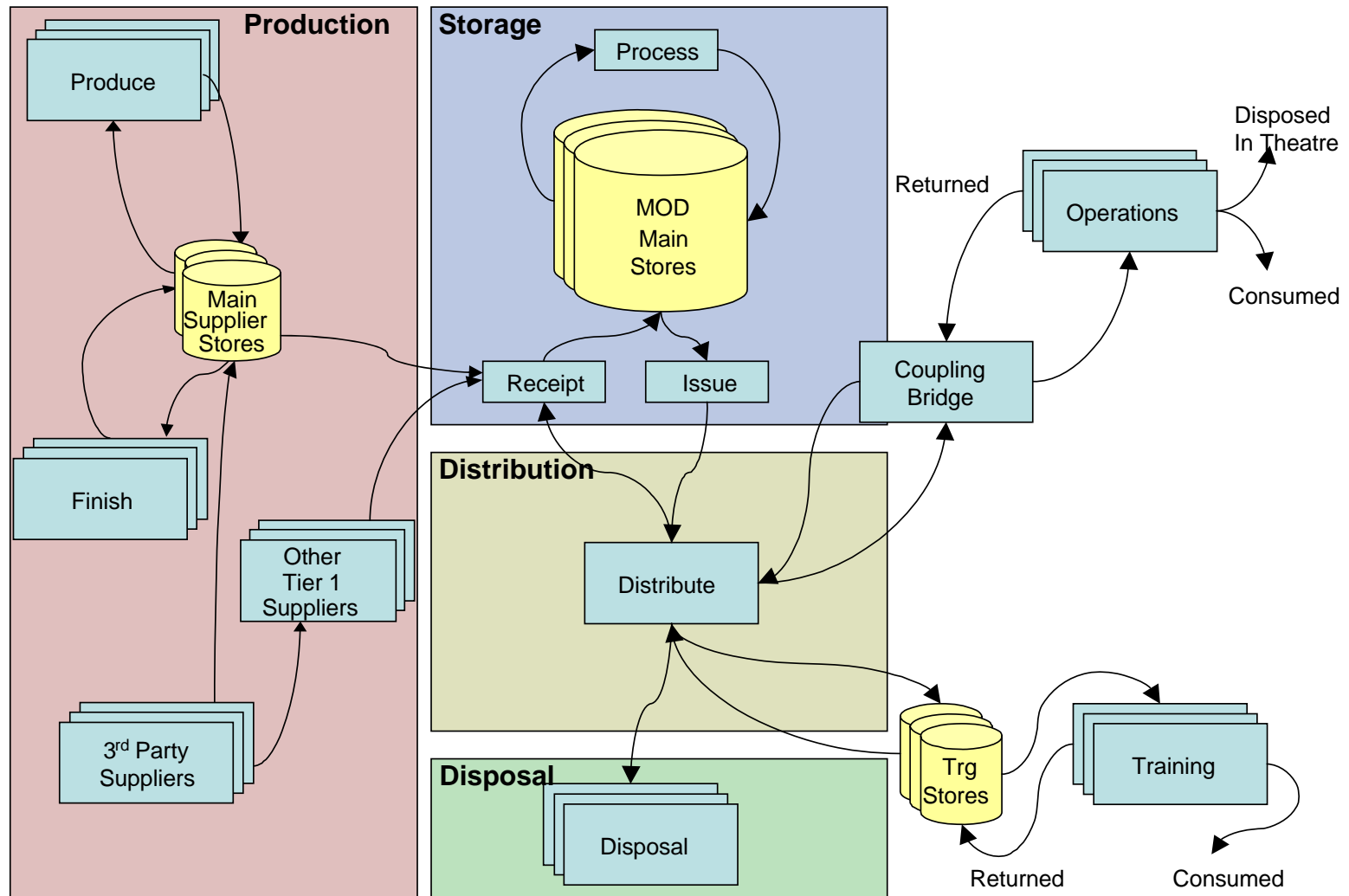
MASS =

Munitions Acquisition, the Supply Solution

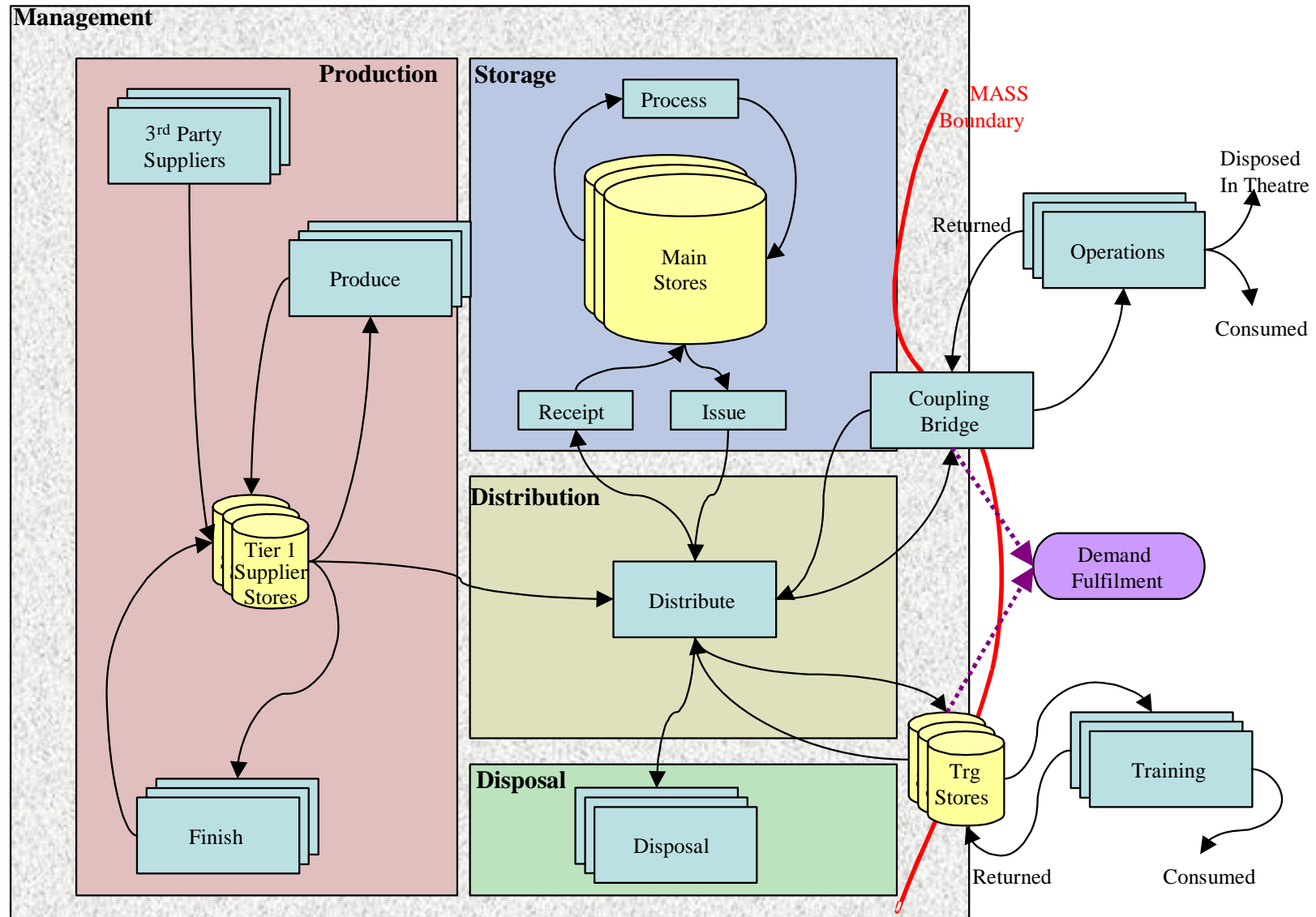
Objectives:

- Provide munitions at least as effectively as now
- Ensure long term security of supply
- Do it at lower cost

Current Munitions Supply Chain



Future MASS Supply Chain?



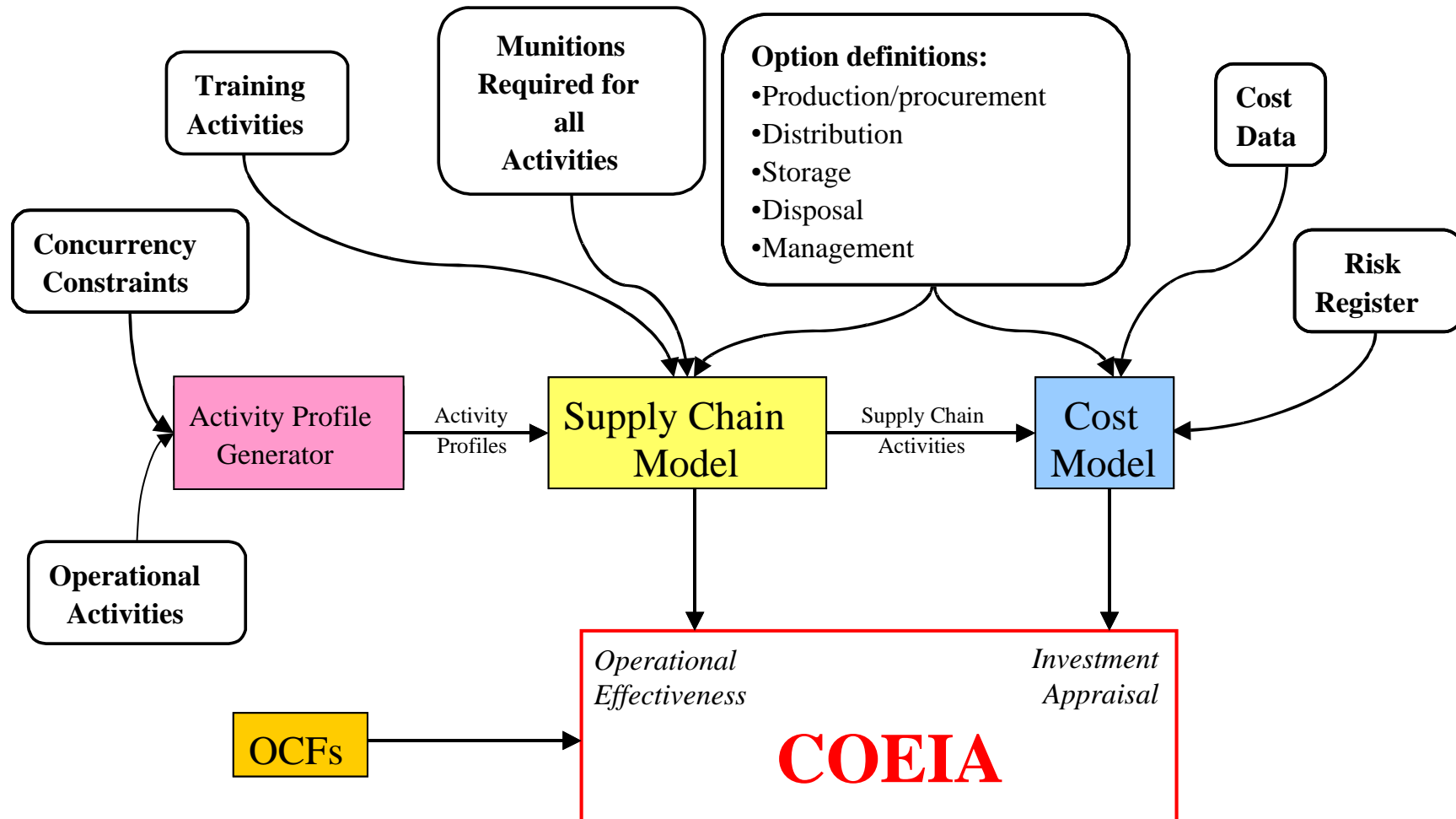
Requirement for Analysis

- Supply Chain Options vary by:
 - Process (surge capacity, distribution, storage)
 - Organisation (outsourcing, management structure)
- COEIA requirements:
 - Compare option effectiveness under varying conditions
 - Cost the options
 - Discriminate between the options

- A. Traditional stockpile-based supply system.
- B. Enhanced surge capacity to reduce stock holding requirement and direct delivery of training munitions.
- C. Industry Partner takes on responsibility for managing almost all aspects of the supply chain, including procurement from 3rd party suppliers.

- MoE: Demand fulfilment (at the MASS Boundary)
- Constant effectiveness
- Model demand side as well as supply side
 - “Meta-scenario” approach: Combinations of operational scenarios over 25 years

COEIA methodology overview



COEIA methodology overview



- A. Generate activity profiles
- B. Calculate demand profiles
- C. Determine target stock holdings
- D. Measure supply chain activities
- E. Cost the options
- F. Identify other contributory factors

A. Generate Activity Profiles

- Simulate 25 year profile according to frequencies for each size of scenario

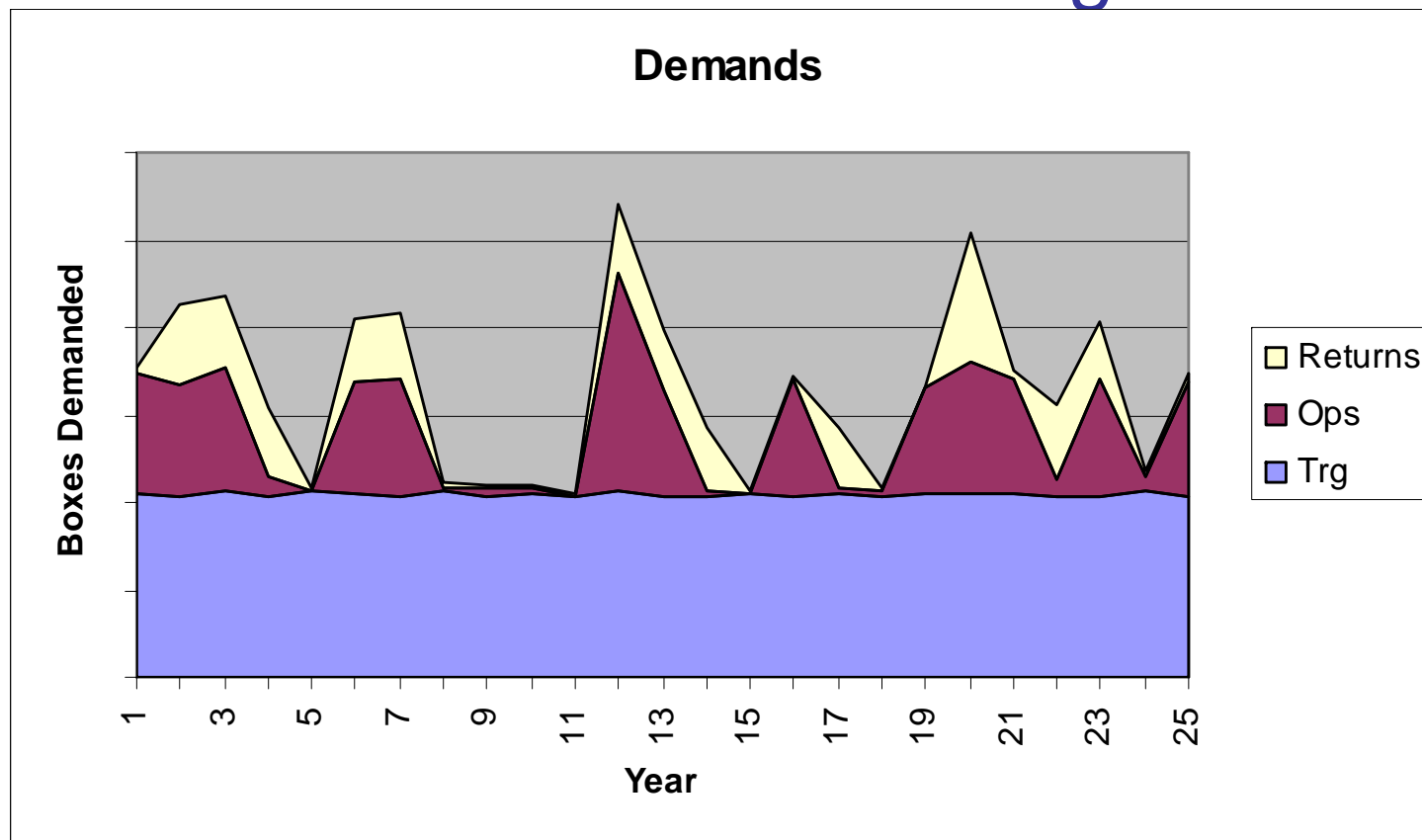
Size of scenario	Example Frequency (25 years)		
	Low	Medium	High
Large Scale	1	2	3
Medium Scale	5	10	15
Small Scale	10	20	30
Exercise	5	5	5

NB: Illustrative numbers

- Apply constraints on concurrency and minimum intervals between operations
- Apply probabilities for operations continuing (every 6 months)

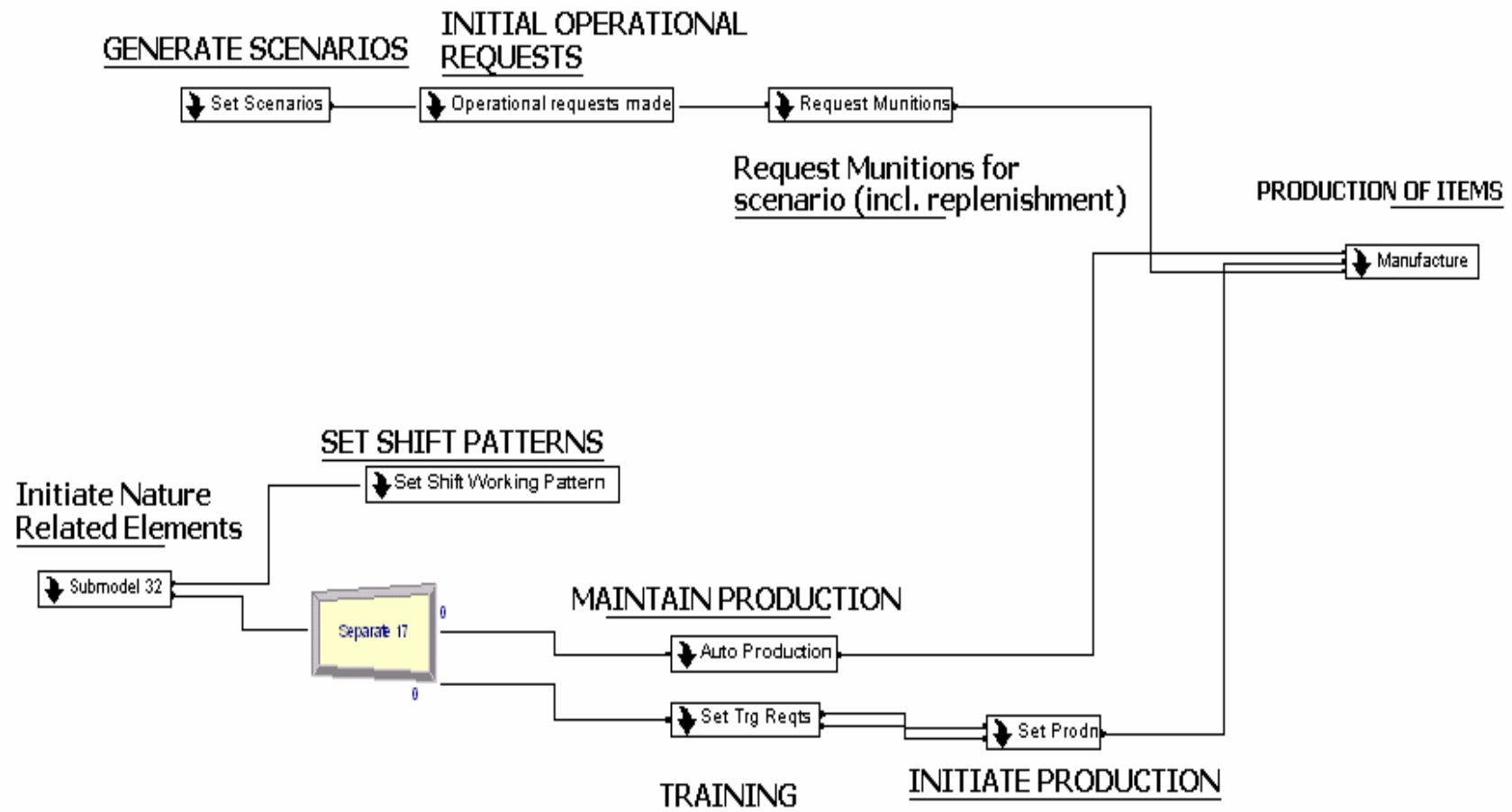
B. Calculate demand profiles

- Add munitions required for each activity in profile
- Factor in returns and training needs



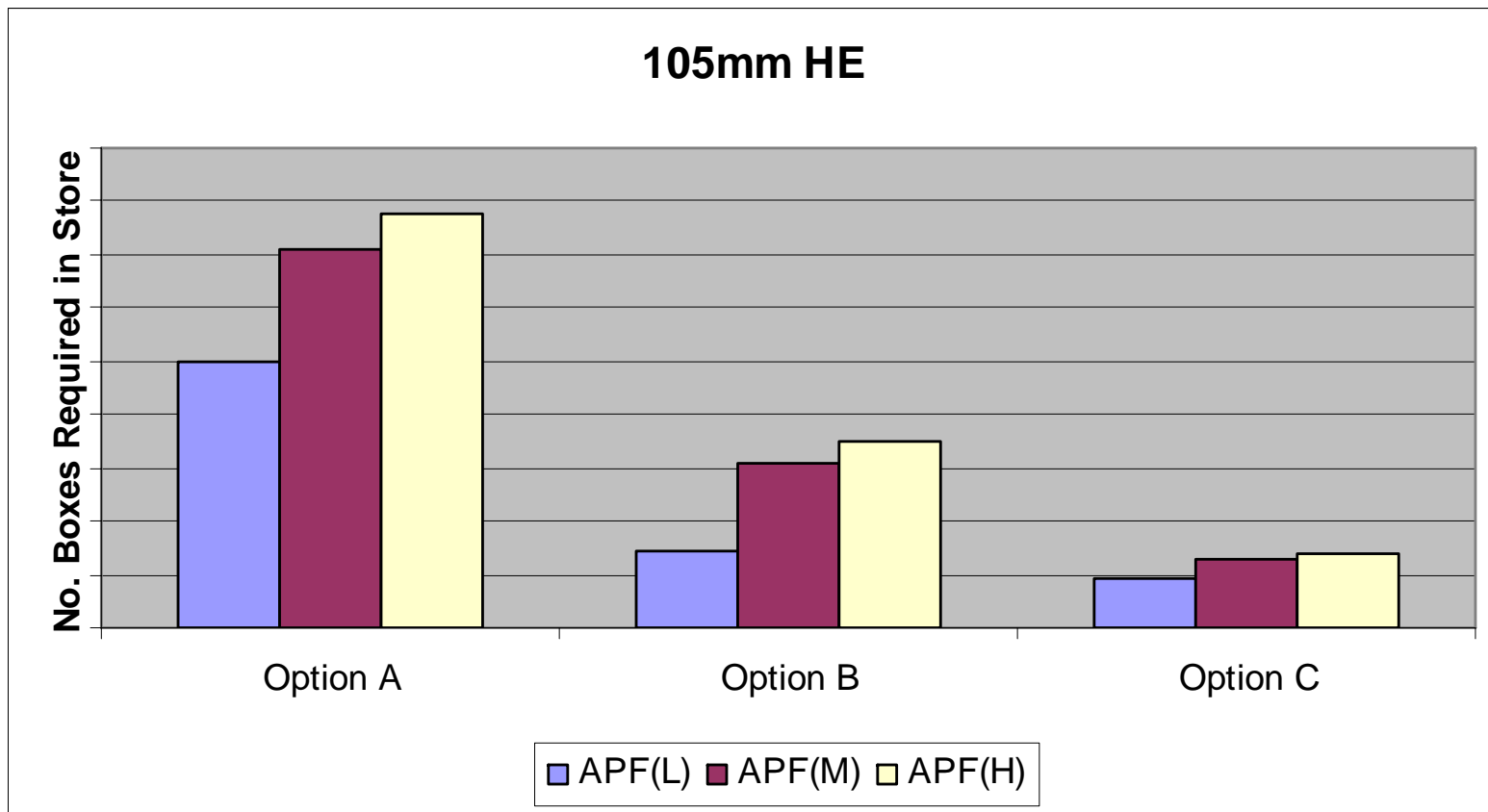
The Supply Chain Model

Functional components



C. Determine target stock holdings

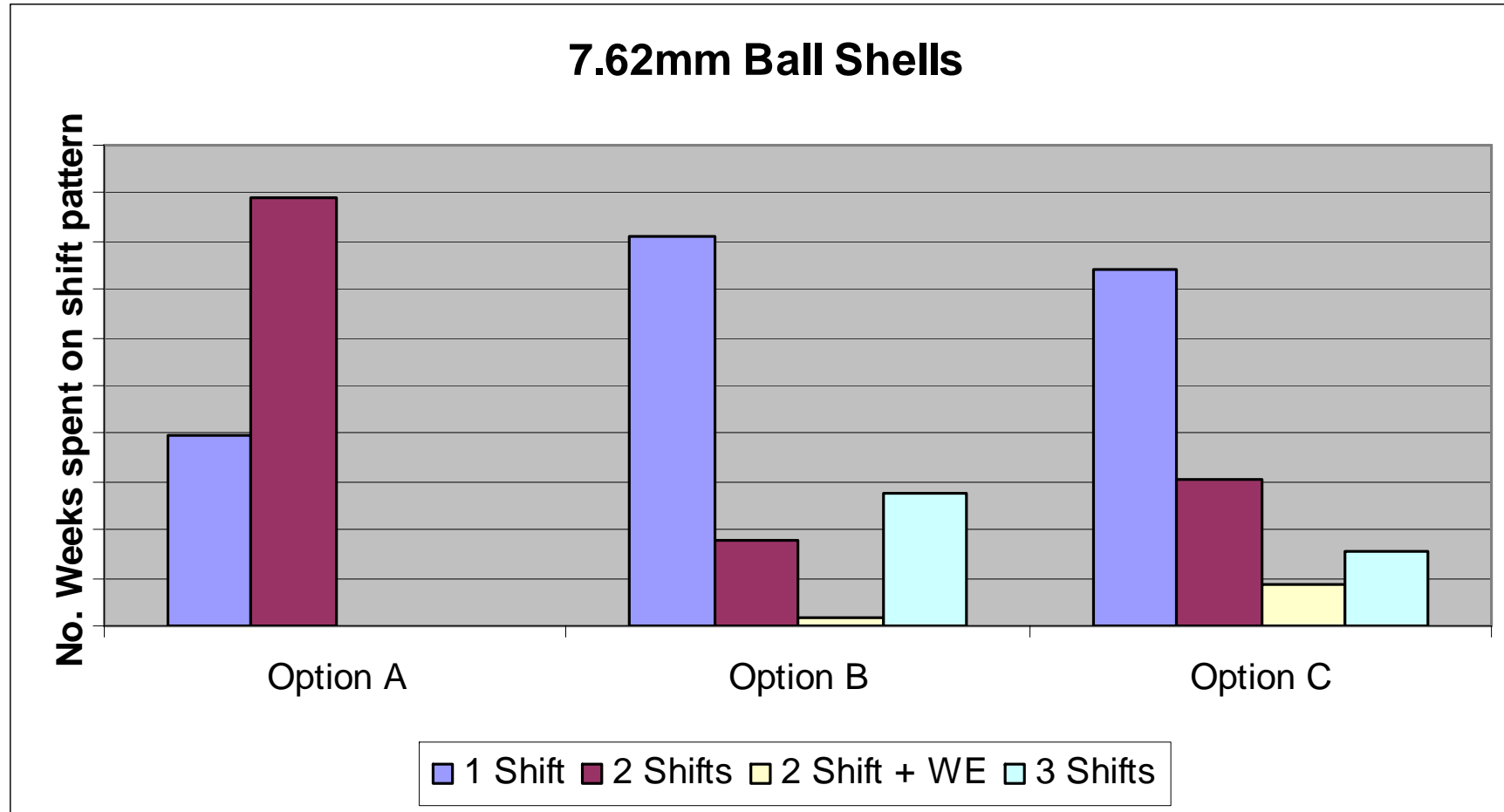
- Run all profiles using maximum holding
- Adjust holding and verify



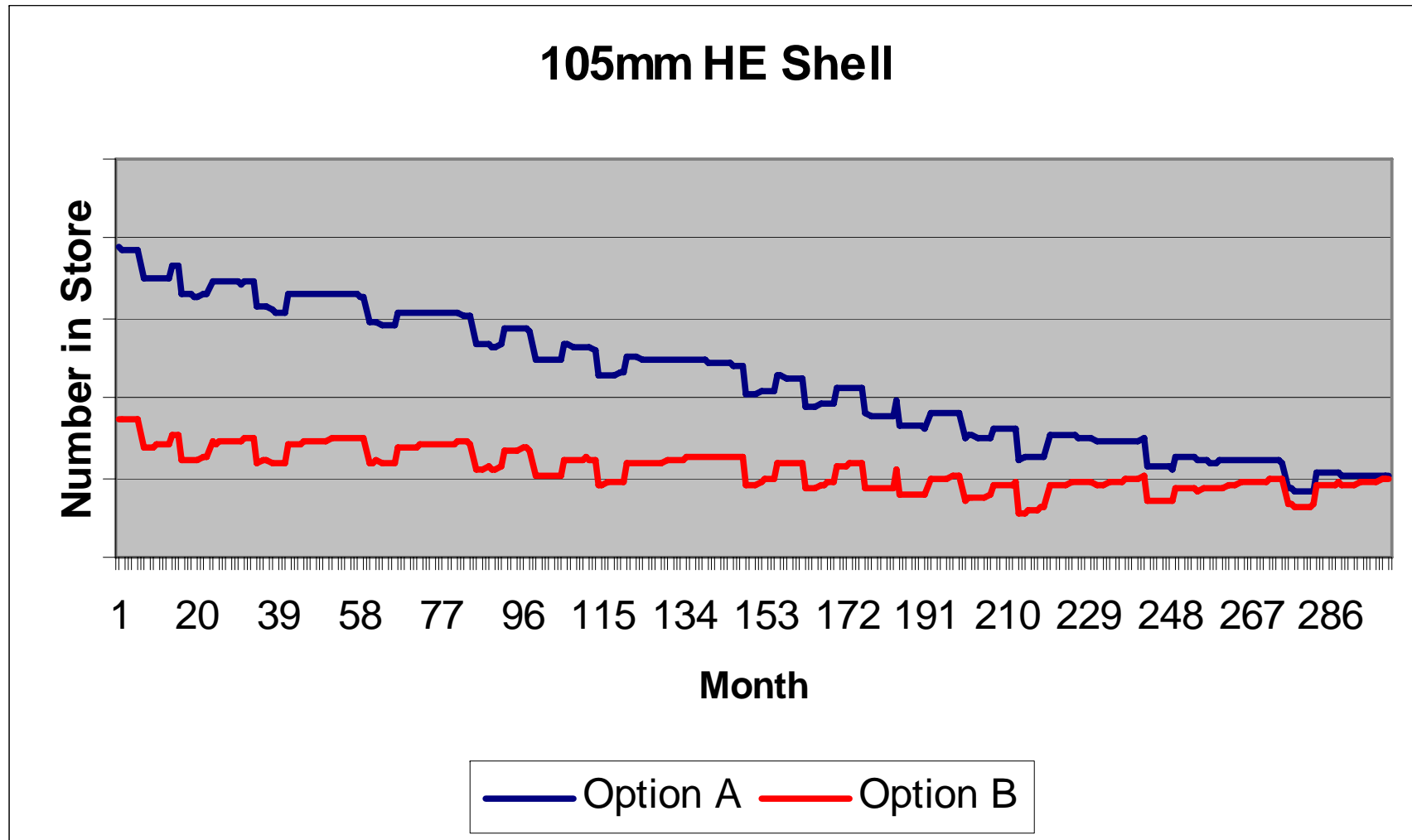
D. Measure supply chain activities

- Production:
 - Quantity of munitions produced
 - Shift patterns
- Storage:
 - Quantities in store
 - Time in store
- Distribution:
 - Quantities transferred between each pair of nodes
- Returns
- Disposals

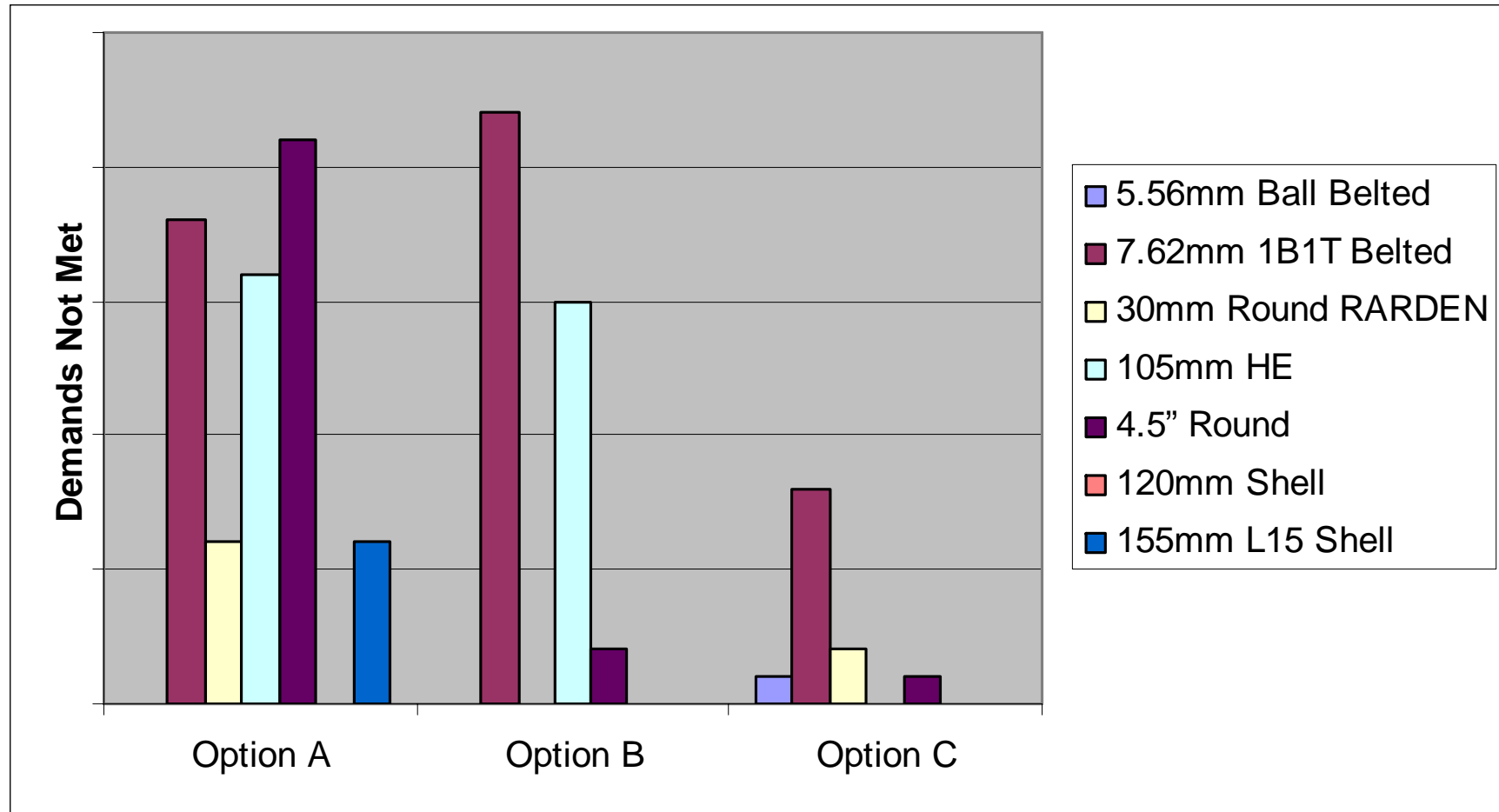
Illustrative Results 1: Shift Profile



Illustrative Results 2: Stock over time



Illustrative Results 3: Sensitivity



Target Holdings Low, Activity Levels High

- Start by considering key drivers
 - What is needed to discriminate between options?
 - How simple can it be?
- Consequences of this approach
 - Emphasis on modelling demand side: “meta-scenario” approach and APG
 - Generic form of supply chain model

- Top-down approach resulted in:
 - Method that encompassed key factors
 - Models comprehensive and quick to run
- Benefits to project:
 - Able to evaluate a wide range of options
 - Able to discriminate between options
- Method and models are fit for purpose