FRONT-END ANALYSIS: CORNERSTONE OF LOGISTICS

Presenter: Paul J. Nager, CPL

United Space Alliance, LLC

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FRONT-END LOGISTICS SUPPORT ANALYSIS

OVERVIEW

- **WHAT IS 'FRONT-END LOGISTICS SUPPORT ANALYSIS'?**
- **WHEN SHOULD IT BE PERFORMED?**
- **WHAT ARE THE BENEFITS OF PERFORMING FELSA AND WHY SHOULD IT BE DONE?**
- **HOW IS FELSA CONDUCTED?**
- **EXAMPLES**

FRONT-END LOGISTICS SUPPORT ANALYSIS

DISCLAIMER NOTE: ALL HARDWARE ITEMS AND COST OR OTHER FIGURES ASSOCIATED WITH THEM IN THIS PRESENTATION ARE FICTIONAL AND ARE USED FOR ILLUSTRATIVE PURPOSES ONLY.

FRONT-END LOGISTICS SUPPORT ANALYSIS

2 DEFINITIONS OF LSA:

- **LSA is an iterative analytical process by which the logistic support necessary for a new system is identified and evaluated. (Blanchard)**

- **LSA is the selective application of scientific and engineering efforts undertaken during the acquisition process, as part of the system engineering and design process, to assist in complying with supportability and other ILS objectives. (Jones)**

- **Front-End LSA**

- **Logistics Support Analysis Record (LSAR)**

FRONT-END LOGISTICS SUPPORT ANALYSIS

LSA GOALS AND OBJECTIVES

1. **CAUSE LOGISTICS SUPPORT CONSIDERATIONS TO INFLUENCE DESIGN**

2. **IDENTIFY SUPPORT PROBLEMS & COST DRIVERS EARLY**

3. **IDENTIFY LOGISTIC SUPPORT RESOURCE REQUIREMENTS FOR SYSTEM LIFE**

4. **DEVELOP A SINGLE LOGISTICS SUPPORT DATABASE**

FRONT-END LOGISTICS SUPPORT ANALYSIS

HOW THESE GOALS AND OBJECTIVES ARE ATTAINED

1. **INFLUENCE DESIGN**
   - **IDENTIFY THE QUANTITATIVE CHARACTERISTICS**
     - **DEFINE PERTINENT QUANTITATIVE OPERATIONAL PARAMETERS**
     - **ESTIMATE THE SYSTEM/EQUIPMENT LIFE CYCLE COST (LCC)**
   - **OPTIMIZE THE SYSTEM/EQUIPMENT OPERATION AND SUPPORT (O&S) COST**
     - **EVALUATE ALTERNATIVE OPERATIONAL, MAINTENANCE, AND SUPPORT CONCEPTS (SIMPLIFY WHERE POSSIBLE)**
     - **PROVIDE QUANTITATIVE MODELING SUPPORT FOR DESIGN TRADE-OFFS**
     - **CONDUCT FORCE STRUCTURE/MANPOWER IMPACT ANALYSIS**

FRONT-END LOGISTICS SUPPORT ANALYSIS

1. **INFLUENCE DESIGN (CONT.)**
   - **OPTIMIZE THE SYSTEM/EQUIPMENT O&S COST**
     - **IDENTIFY & DOCUMENT THE OPTIMUM SYSTEM SUPPORT CONCEPT**
       - **ESTABLISH THE SYSTEM, SUBSYSTEM & ASSEMBLY MAINT. CONCEPT**
         - » **MAINTENANCE SIGNIFICANT ITEMS LIST**
         - » **LEVELS OF MAINTENANCE AND REPAIR VS DISCARD POLICY**
         - » **DIAGNOSTIC CONCEPT (TESTABILITY REQUIREMENTS)**

2. **IDENTIFY SUPPORT PROBLEMS AND COST DRIVERS EARLY**
   - **DETERMINE SUPPORTABILITY, COST AND READINESS DRIVERS**
   - **CONDUCT SUPPORTABILITY RISK ASSESSMENT (SENSITIVITY ANALYSIS)**
   - **IDENTIFY LOGISTIC SUPPORT RESOURCE CONSTRAINTS**
   - **DETERMINE AVAILABILITY OF EXISTING SUPPORT RESOURCES**

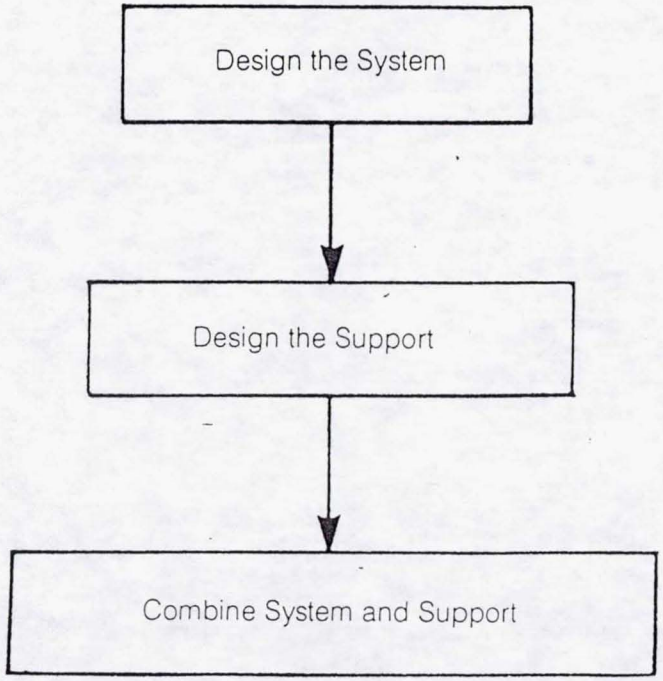
FRONT-END LOGISTICS SUPPORT ANALYSIS

3. IDENTIFY LOGISTIC SUPPORT RESOURCE REQUIREMENTS FOR SYSTEM LIFE

- ESTIMATE THE MANPOWER & PERSONNEL REQUIREMENTS
- DEFINE TRAINING REQUIREMENTS
- DEFINE TRANSPORTABILITY REQUIREMENTS
- DEFINE FACILITY REQUIREMENTS
- IDENTIFY AND DOCUMENT NEW OR CRITICAL LOGISTICS SUPPORT RESOURCES
  - PECULIAR TOOLS AND SUPPORT/TEST EQUIPMENT
  - TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT
  - COMMON TOOLS AND TEST EQUIPMENT

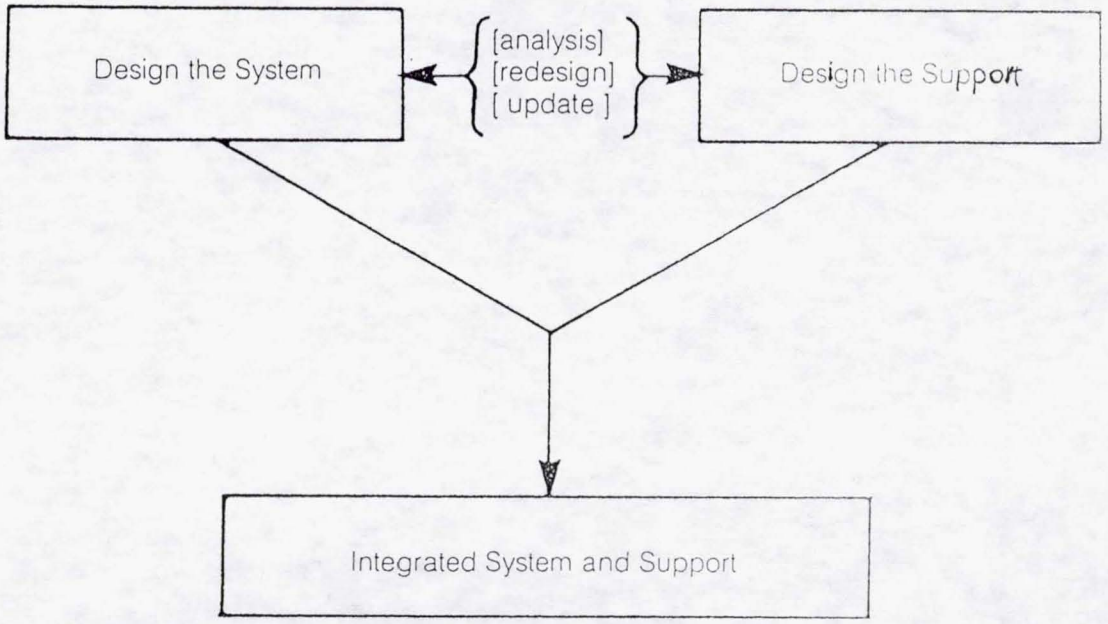
FRONT-END LOGISTICS SUPPORT ANALYSIS

FROM



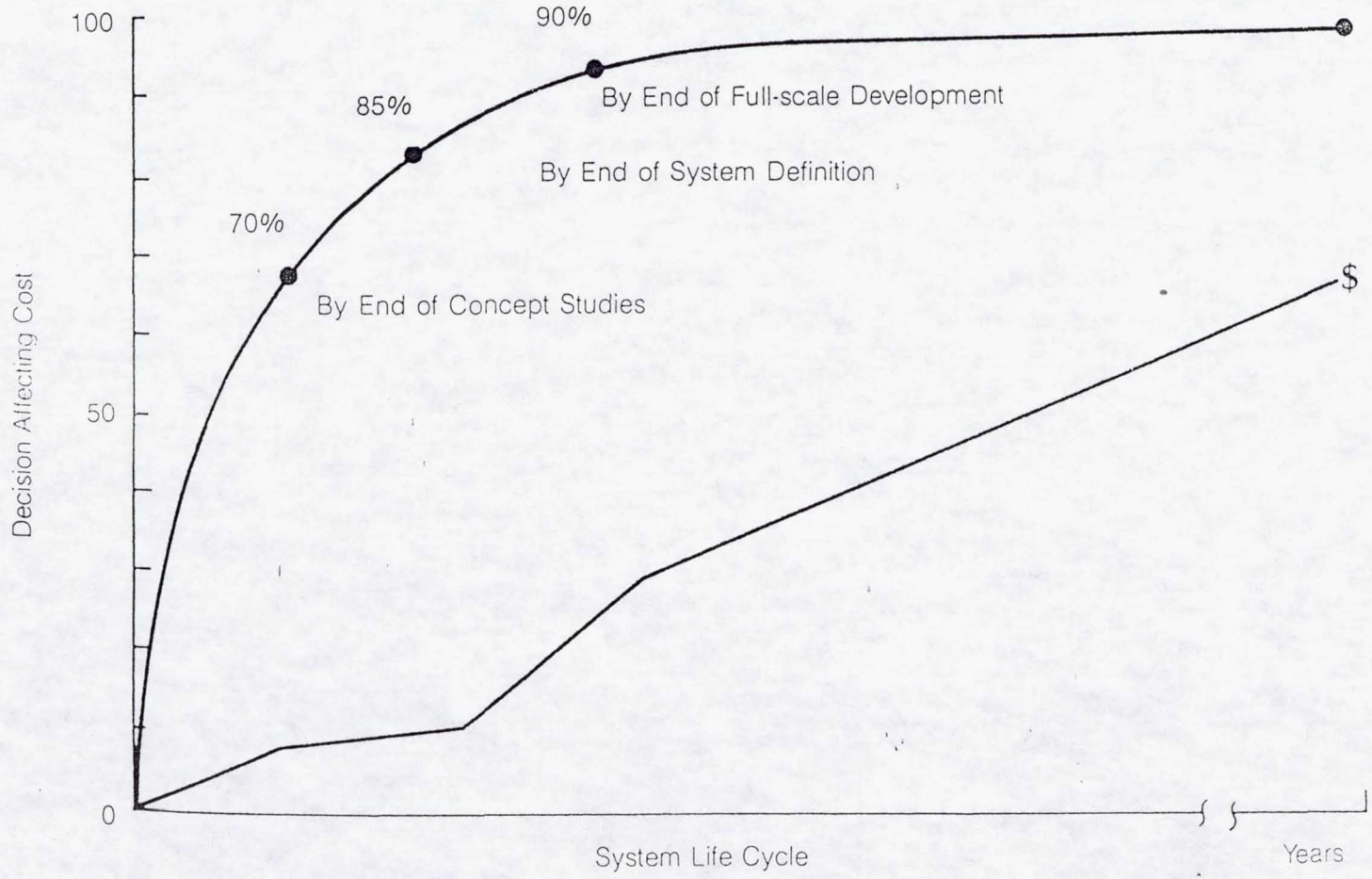
SEQUENTIAL ENGINEERING

TO



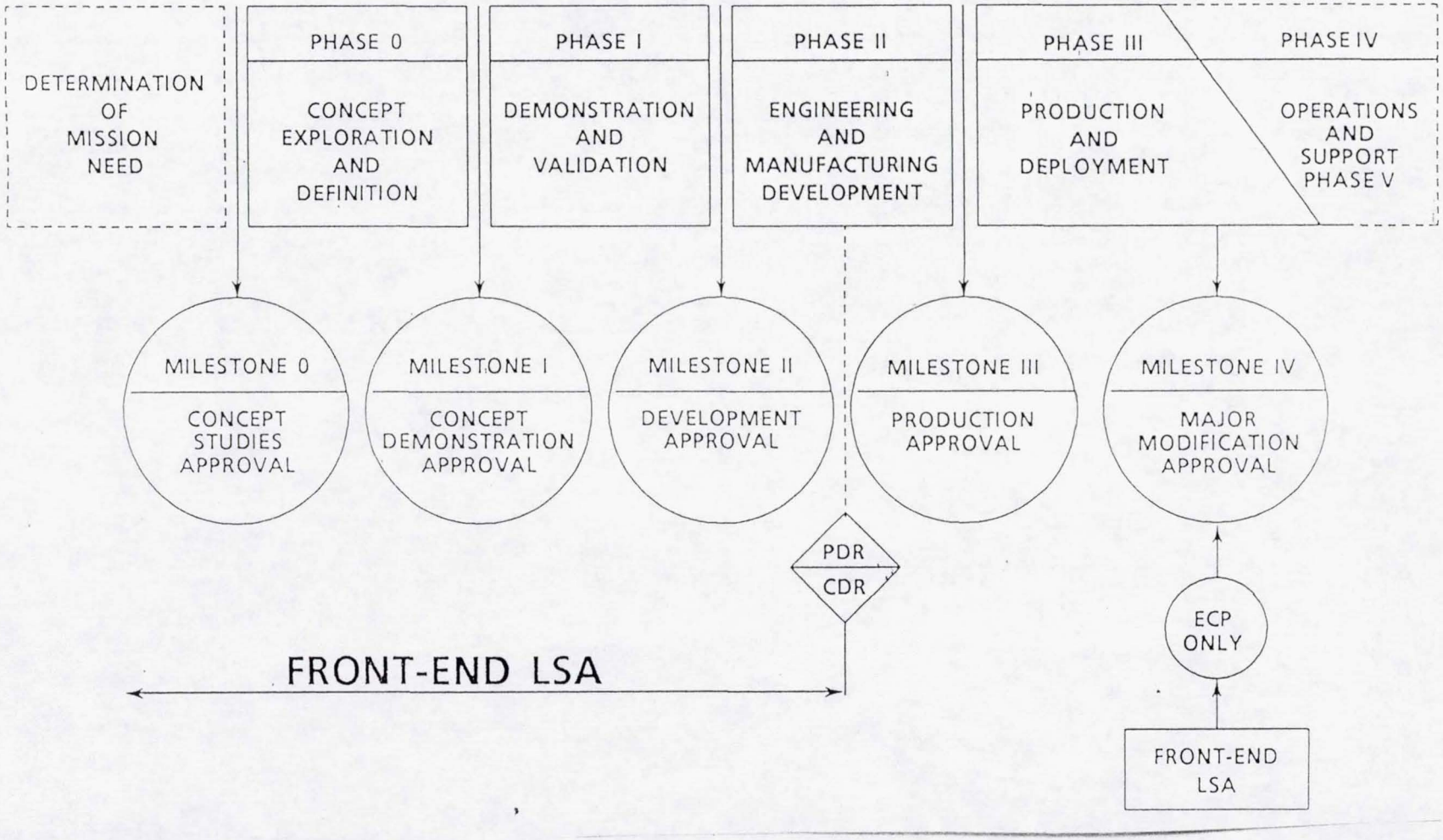
CONCURRENT ENGINEERING (INTEGRATED)

FRONT-END LOGISTICS SUPPORT ANALYSIS



FRONT-END LOGISTICS SUPPORT ANALYSIS

FRONT-END LSA IN SUPPORT OF ACQUISITION MILESTONES AND PHASES



FRONT-END LOGISTICS SUPPORT ANALYSIS

HOW FRONT-END LSA IS PERFORMED

- **FRONT-END ACTIVITIES AND PRODUCTS**
  - **PARTICIPATE IN USE STUDY**
  - **FORM BASELINE COMPARISON SYSTEM (BCS)**
  - **DATA GATHERING**
  - **ASSIST IN FORMING THE MAINTENANCE CONCEPT**
  - **EVALUATE ALTERNATIVES**
  - **CONDUCT REPAIR LEVEL ANALYSIS**
  - **PERFORM SENSITIVITY ANALYSIS**
  - **TRADE STUDIES/COMPARATIVE ANALYSIS**
  - **ESTIMATE MANPOWER & FORCE STRUCTURE IMPACTS**
  - **ESTIMATE LCC AND O&S COSTS**
  - **IDENTIFICATION OF COST AND SUPPORT DRIVERS**

FRONT-END LOGISTICS SUPPORT ANALYSIS

REMEMBER,

THIS IS AN

ITERATIVE

PROCESS!

- **MOST/MANY OF THESE ACTIVITIES AND PRODUCTS MUST BE REPEATED OR UPDATED AS THE DESIGN MATURES AND DATA IMPROVES**
  - **THE BETTER THE DATA, THE BETTER THE ESTIMATES**

FRONT-END LOGISTICS SUPPORT ANALYSIS

EXAMPLE

SUPPORTABILITY, COST, & READINESS DRIVERS

RELIABILITY DRIVERS:

LINE REPLACEABLE UNIT	FAIL/OP LIFE	%/SYSTEM FAILURES
POWER SUPPLY	651	17.02%
RELAY CARD ASSEMBLY	616	16.66%
DC/DC CONVERTER	369	9.83%

COST DRIVERS:

LRU	UNIT COST	COST/OP LIFE	%/SYSTEM COST
PROCESSOR ASSY	$32,150	$17,182,000	18.37%
POWER SUPPLY	$ 3,680	$18,957,000	17.58%
AFT MODULE	$ 7,265	$ 9,235,000	6.34%

FRONT-END LOGISTICS SUPPORT ANALYSIS

EXAMPLE: **SUPPORTABILITY TRADE-OFF**

Alternative Maintenance Concepts (System Level):

1. **Two-Level: Organizational: Remove/replace LRUs at failure**
   Depot: Repair LRUs

2. **Three-Level: Org: R/R LRUs**
   Intermediate: Screen LRUs/Discard selected failed LRUs
   Depot: Repair selected LRUs

3. **Contractor Repair: Org: R/R LRUs**
   Contractor: Repair LRUs

FRONT-END LOGISTICS SUPPORT ANALYSIS

EXAMPLE: **ALTERNATIVE MAINTENANCE CONCEPTS**
OPERATIONS & SUPPORT COST SUMMARY
(SYSTEM LEVEL)

1. TWO-LEVEL	**=**	**$18,783,800**
2. THREE-LEVEL	**=**	**$22,326,100**
3. CONTRACTOR REPAIR	**=**	**$35,155,600**

FRONT-END LOGISTICS SUPPORT ANALYSIS

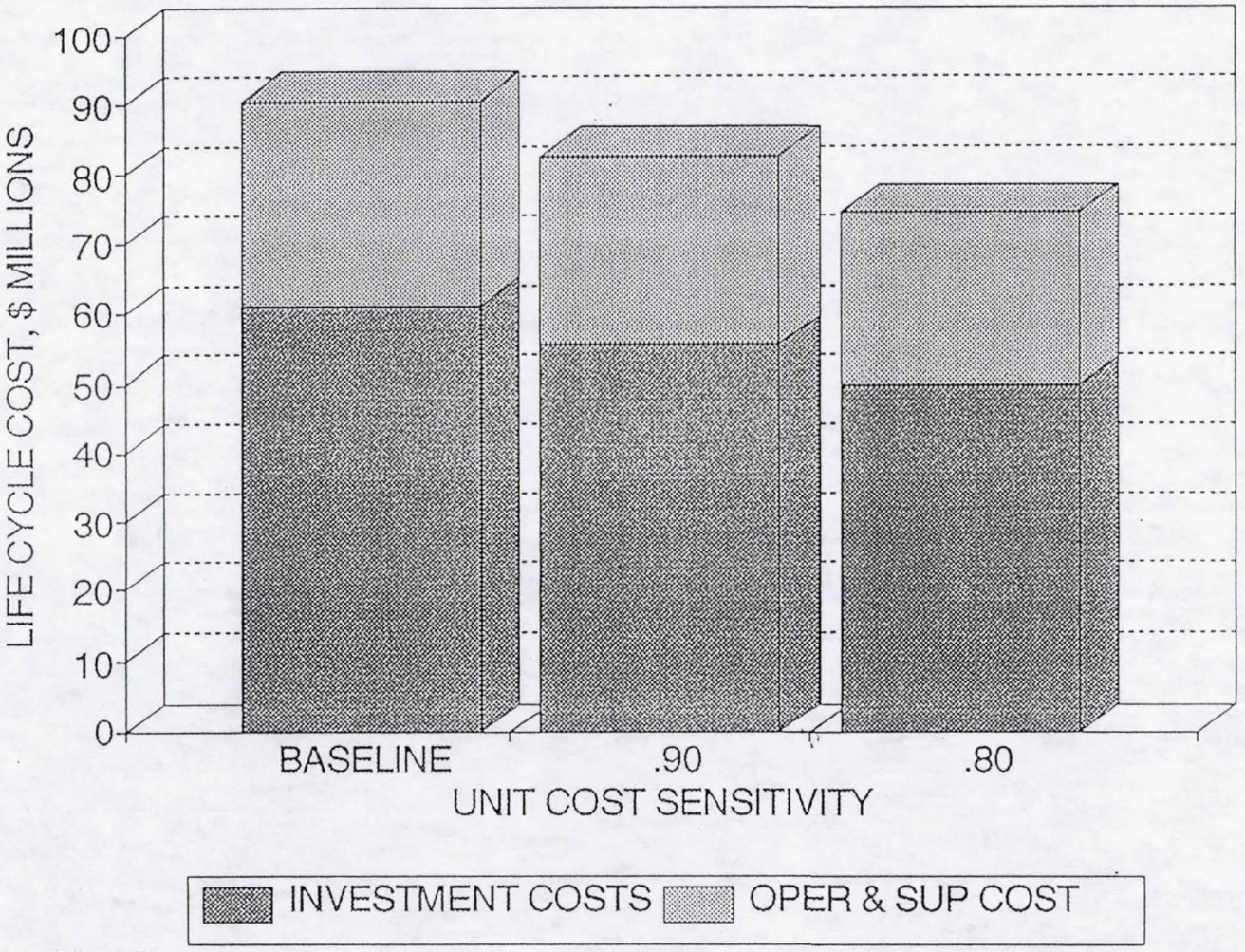
EXAMPLE: **LEVEL OF REPAIR ANALYSIS (LORA)**

COST SUMMARY ($,000)

LRU	CONTRACTOR REPAIR	DEPOT REPAIR	DISCARD	RECOMMEND
PROC. CCA	920	937	973	CONTRACTOR
INTERFACE CCA	876	859	892	ORGANIC DEPOT
HIGH SPD PROC	925	908	947	ORGANIC DEPOT
CABLE ASSY	767	815	743	DISCARD
POWER SUPPLY	1,895	1,950	2,015	CONTRACTOR

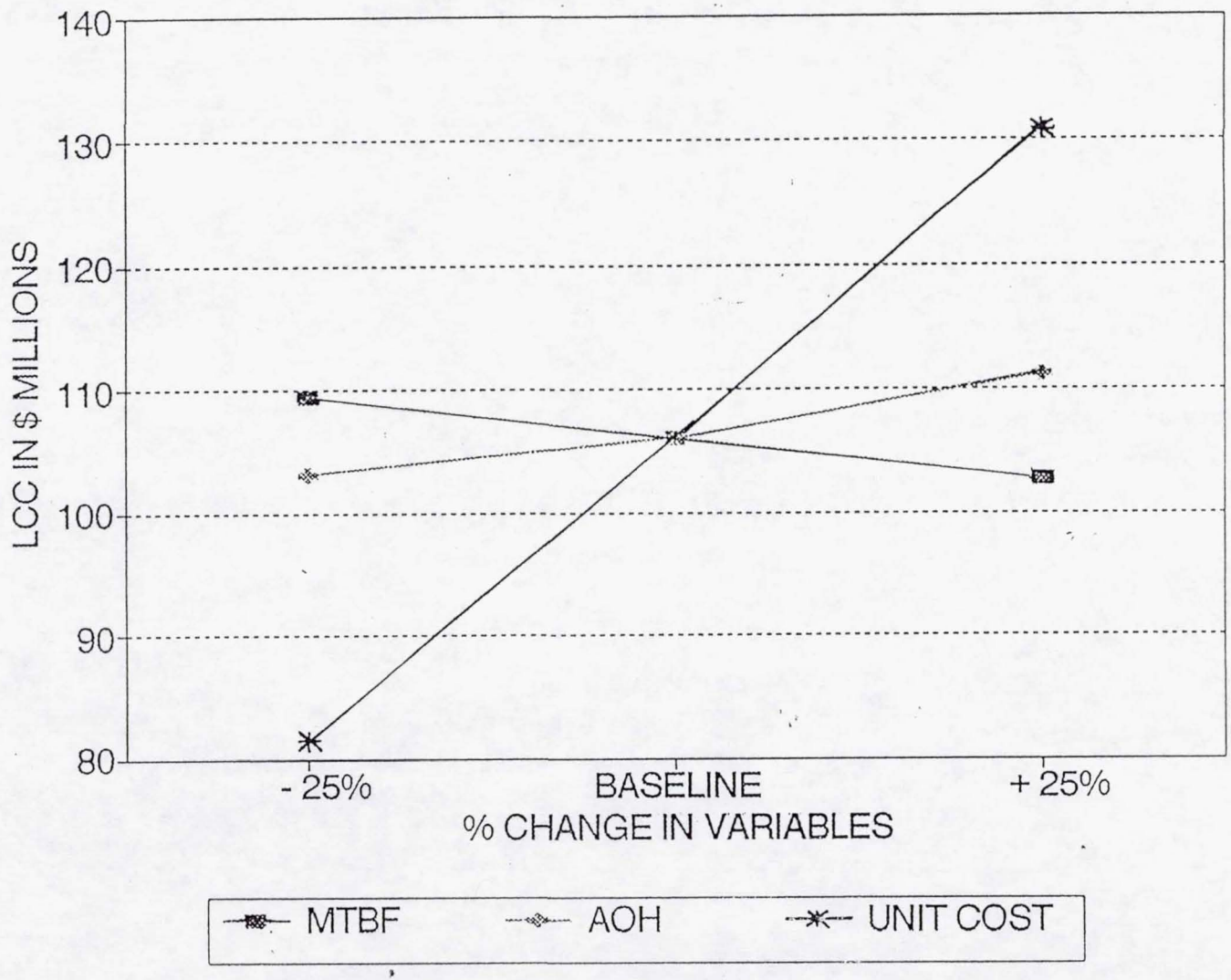
FRONT-END LOGISTICS SUPPORT ANALYSIS

EXAMPLE: **SENSITIVITY ANALYSIS**



FRONT-END LOGISTICS SUPPORT ANALYSIS

EXAMPLE: **SENSITIVITY ANALYSIS**



FRONT-END LOGISTICS SUPPORT ANALYSIS

SUMMARY

- MUST BEGIN "UP FRONT"
- MAKES OTHER LOGISTICS ACTIVITIES MORE WORTHWHILE
- AN ITERATIVE PROCESS
- VERY DYNAMIC AND ALLOWS FOR CREATIVITY
- ANSWERS MANY QUESTIONS:
  - WHICH DESIGN IS MORE SUPPORTABLE?
  - HOW WILL THIS IMPACT MY MANPOWER/FORCE STRUC?
  - FORECAST SPARING QUANTITIES AND LOCATIONS
  - ESTIMATE OF LCC AND O&S COSTS
  - IS THE REPAIR CONCEPT SENSITIVE TO _____ (VARIABLE)?
  - WHAT ARE MY COST AND SUPPORTABILITY DRIVERS?
- TRULY A "VALUE-ADDED" FUNCTION