Requirements Process Final 28 May 82

DOCUMENT IDENTIFICATION
Contract F 33600-81-C-0613

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REQUIREMENTS PROCESS

to

DIRECTORATE OF LOGISTICS MANAGEMENT
SYSTEM REQUIREMENTS (XRB)
DCS/PLANS AND PROGRAMS
AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AFB, OHIO 45433

May 28, 1982

by

J. O. Coogan

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FINAL REPORT

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BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
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FINAL REPORT

on

REQUIREMENTS PROCESS

to

DIRECTORATE OF LOGISTICS MANAGEMENT
SYSTEM REQUIREMENTS (XRB)

from

BATTELLE
Columbus Laboratories

May 28, 1982

INTRODUCTION

This document provides a description of the Requirements Process as it pertains to recoverable items. The description is in terms of what must be done to effectively determine future requirements based on current and historical data. The necessary inputs and outputs are described as a means of defining the interfaces between this LAG and other LAGs. The details of how requirements are computed are intentionally excluded from this LAG description because there are many options for accomplishing the same function, and the LAG definition should be sufficiently robust to encompass all or most of those options. There are, however, basic functions that must be accomplished for all options. It is the intent of this description to address these basic functions.

This LAG description is in five parts as follows:

1. **Purpose** - A brief statement of purpose for the Recoverable Item LAG

2. **System Description** - A definition of the scope and functions of the Recoverable Item LAG

3. **System Characteristics** - A definition of the characteristics of this LAG that differentiate it from other LAGs.

4. **System Interfaces** - A definition of the inputs and outputs of the system at the critical interfaces

5. A set of data sheets for input to FCMS.
The effective use of this LAG as a management tool for LMS system evaluation requires that the interfaces be carefully defined and controlled using effective interface control methods. The details interior to the LAG should be provided wide latitude for change unless the interface criteria are breached. In those cases, the interface should be redefined and then controlled in the new configuration.
PURPOSE

The purpose of the Recoverable Item LAG is to provide a means of determining future requirements for recoverable items that meet the future needs of operational commands. An ancillary purpose is to provide an effective means of forecasting the materiel requirements of alternative force structure or operational scenarios under a variety of budget options. The output products must be rational, defensible statements of requirements that are time-phased to meet fiscal and operational needs.
SYSTEM DESCRIPTION

General

The Recoverable Item requirements process involves the use of approved weapon system utilization data developed by the Air Staff, end-item-peculiar historical data, and industry capacity information to define the time-phased requirements for each of the AFLC-managed recoverable items. The process requires the consideration of many historical data elements, some of which are outside the direct control of AFLC and depend upon worldwide systems for input. Virtually all levels of AFLC are involved in either input of data on evaluation of the results of computation.

Figure 1 provides a generalized description of the key elements of the Recoverable Item process and some of the interrelationships between the functions. An important note is that the scope of the requirements process as depicted in Figure 1 does not include the activities associated with deciding to buy, nor the evaluation of impacts of not buying a given requirement.

Functions of the System

In this section the major functions of Recoverable Item requirements determination are discussed. Figure 1 provides an overview of the major functions and could serve as a top level diagram of the Recoverable Item LAC. At this level of detail, the major inputs and outputs are defined. In order to differentiate between methods of accomplishing the function, a much greater amount of detail is required. In support of that objective, each of the major functions have been decomposed one level of detail. These are presented in Figures 2 through 6.

In order to determine the need to acquire recoverable items, there are five basic functions that must be performed regardless of how they are performed. The basic functions are:

1. **Determine Future Usage.** There must be a determination of how and how frequently the systems that contain the recoverable items will be used. This may be determined from formal planning documents such as published by the
Air Staff or could result from "What if" questions by senior AFLC staff members. In order to compute a defensible buy quantity, the source must be formal, approved documents such as the PD. The determination of future usage must include a definition of the items that make up a system and a definition of new systems and their recoverable components. The period of interest for future usage is the lead time for the items in the case of a buy computation and lead-time-plus-budget cycle for budgetary computation.

The major output of this function is use-by-item for all items based on the system use input. (See Figure 2 for details.)

2. **Compute Future Needs.** This function uses end item use and current factors (such as maintenance factor, base repair cycle time, depot repair cycle time, order and shipping time, not-reparable-this-station rates, condemnation rates, negotiated levels, safety level factors, and modification information) to compute the number of assets necessary to fill the requirement. This computation can be done independently of the current asset position if the output is considered a raw need. Instances of repair can also be computed in this function and, in fact, are a byproduct of the asset requirement computation. The actual method of computation is optional and could be different for buy computations and budget computations. The input data are the same regardless of the method of computation. Correctness of these inputs is a key determinant in the accuracy of the computation. Therefore, there must be an effective means of updating these inputs and carefully controlling the input values to preserve the credibility of the output. (See Figure 3 for details.)

3. **Evaluate Current Assets.** This function involves establishing a current assessment of the worldwide asset position for each recoverable item. The primary ingredients are the status of on-hand assets at each of the bases, the depots and in-transit, due-in assets from maintenance and as a result of previous buys, and the status of modification programs which produce assets of a new configuration while consuming the assets of a prior configuration. Modification programs frequently require turnaround assets which must be included in the overall asset assessment. The output is a current picture of the worldwide asset position for use in comparison to future needs. (See Figure 4 for details.)
FIGURE 2. DETERMINE FUTURE USAGE
FIGURE 4. EVALUATE CURRENT ASSETS
4. **Define Buy Requirements.** Given a future need by end item by quarter and an asset position, it is possible to compute the shortfall by quarter and therefore the need to buy by quarter. The assets must be procured lead time away from actual need. Therefore, it is necessary to define the buy requirements at need date minus administrative and production lead time. The requirement, as output from this function, should be in terms of numbers of each item, delivery schedule, value, and priority. Since there are not always sufficient funds available to procure all required items, the priority and funding constraints must be input to this function as well as the cost of each item. (See Figure 5 for details.)

5. **Define Excesses.** In the process of determining shortfalls, some cases of excess will be identified. After verification of the factors used in computation, the excess assets must be identified to management for possible disposal. In a future system it may be possible to use excess assets as a resource to modify factors for shortfall items. For example, excess F-4 radar units might be used to realign the depot repair cycle at Warner Robins ALC so that priority is given to F-15 radar repairs, thus shortening F-15 radar depot repair cycle and increasing F-4 depot repair cycle times. In such a case the excess assets would be used as a pool to enable factor adjustments by the Equipment Specialists. (See Figure 6 for details.)
FIGURE 5. DEFINE BUY REQUIREMENT
FIGURE 6. EXCESS ASSET DISPOSITION
SYSTEM CHARACTERISTICS

The Recoverable Item Requirements LAG represents one of the most critical aspects of AFLC's business. Because of the relatively high cost of recoverable items, the extended value of the recoverable item inventory exceeds the value of all other inventories except aircraft systems. Recoverable items also represent the major element of AFLC annual budget. Of the 12 to 15 billion dollar annual budget for AFLC, approximately one half is applied to the procurement or repair of recoverable items.

Each of the five Air Logistics Centers (ALCs) is involved in determining the basic requirement for recoverable items under an arrangement where item management for each item is assigned to an ALC. Headquarters AFLC is directly involved in the process from the standpoint of establishing policies, computational methods, and resolving fiscal shortages.

The Recoverable Item Requirements Process is not a single-pass system. Even if all input data were perfectly accurate, the reality that sufficient funds are seldom available to buy all requirements dictates recomputations.

Dependency on outside agencies for input data, such as failure rates and base repair cycle times, requires extensive interaction between AFLC and other agencies in the course of validating inputs. Contingency plans and the need to support higher levels of command in the Air Force with logistics planning data causes elements of the Recoverable Item process to be exercised, at least in part, for more than buy determinations.

Support for Foreign Military Sales (FMS) customers present special problems to the Recoverable Item Requirements Process. Legal prohibitions against buying in anticipation of a sale, combined with agreements to support FMS customers from jointly-owned or Air Force assets, causes the need for a flexible method of requirements computation that can adjust to rapidly changing political conditions.

Introduction of concepts such as Variable Safety Level, Missionization of Aircraft, and Mod Metric causes the need to accomplish requirements computations for groups of items under a variety of constraints and to meet a variety of output conditions. In some cases there is a need to exercise parts of the requirements process to determine the impact of implementing a contingency option given the existing set of resources.
SYSTEM INTERFACES

In this section the key interfaces of the Recoverable Item LAG are defined in terms of the inputs and outputs. For the purpose of this draft, the interfaces were kept relatively simple and stated in terms of the processes rather than each of the other LAGs. Ideally, the interface with each other LAG would be defined in this manner. Control of the LAG could then be exercised by control of the interface in a true systems engineering approach. Figure 7 shows a generalized view of the interfaces of recoverable items with other processes. The specifics of each interface are shown in the interface table (Table 1). An inspection of Table 1 compared to Figures 1 through 6 will show that outputs from the logic clusters of Figures 1 through 6 frequently go to more than one other LAG or process.

A proper interface specification for a LAG such as Requirements would define the level of detail, format, and frequency of each input/output that crosses the interface. The development of a proper interface cannot be done from the perspective of one LAG. It must result from interaction between LAGs in a systems engineering environment. Future efforts should be oriented to developing proper interfaces.
### TABLE 1. RECOVERABLE ITEM LAG INTERFACES WITH OTHER PROCESSES AND PERSPECTIVES

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FCMS DATA SHEETS

The following section of this report contains sample data sheets which translate information in the text and figures to FCMS format.

The data sheets are at three levels. The first is at the LAG level and summarizes the entire LAG. The second set are at the process level, as defined by PSL/PSA conventions. The third set are at the entity level, as defined by PSL/PSA.

Each data sheet contains sufficient information to relate it to higher levels within FCMS, and other elements in the same level of FCMS. When this information has been entered into the FCMS data base it should be possible for the system to construct a diagram of the process. When the FCMS data base is complete for all LAGs, it should be possible to indicate any inconsistencies in interfaces as they are defined.
Definition Process: LMS LAG 14

Date of Last Change: 5/1/82

Synonyms Are: Requirements LAG, Recoverable Items

Description: The Recoverable Item Requirements LAG provides a means of computing future requirements for recoverable items based on historical data and future program operating hours.

Key Words Are: Recoverable items, Buy requirement, Repair requirements

Sub-Parts Are: Determine future usage - 14A, Compute future needs - 14B, Evaluate current assets - 14C, Define buy requirements - 14D, Define excess assets - 14E

Part of: AFLC LMS
PROCESS LEVEL
Define Process: 14 A

Date of Last Change: 5/1/82

Synonyms Are: Determine Future Usage

Description: This process uses approved program guidance and specific item data to determine the future operating hours for each recoverable item. The period of interest is lead time for acquiring additional quantities of each item.

Key Words Are: Lead time

Program operating hours

Part of: LAG 14 (Recoverable Item Requirements LAG)

Derives: Use by item

Employs: Item lead times

Application data

QPT

New system

Initial provisioning

Inputs: Program operating hours

Outputs: EL-
Define Process: 14B

Date of Last Change: 5/1/82

Synonyms Are: Compute Future Needs

Description: This process uses end item use and current factors to compute the number of assets required to meet the future need. This process also computes the number of each item that will be repaired.

Key Words Are: Lead times

Repair times

Part of: LAG 14 (Recoverable Item Requirements LAG)

Derives: Needs by item

Repair needs

Employs: Current factors

Negotiated levels

Approved changes

Inputs: 

Outputs: 

Define Process: 14C

Date of Last Change: 5/1/82

Synonyms Are: Evaluate Current Assets

Description: This process provides a current assessment of the worldwide asset position for each recoverable item. It uses current inventory and due-in assets from both maintenance and previous buys to develop a comprehensive, worldwide asset position.

Key Words Are: Lead times
Repair times

Part of: LAG 14 (Recoverable Item Requirements LAG)

Derives: Turnaround asset availability
Shortfalls
Excess assets

Employs: Condition
Worldwide assets
Due-ins

Inputs:

Outputs:
Define Process: 14D

Date of Last Change: 5/1/82

Synonyms Are: Define Buy Requirements

Description: This process uses the needs by item compared to the worldwide asset position to compute the shortfall in assets expected lead time away.

Key Words Are: Asset position
Due-in assets

Part of: LAG 14 Recoverable Item Requirements LAG)

Derives: Expected asset position
Expected demands
Expected critical items
Buy requirement
POM Budget input

Employs: Shortfalls

Inputs: Priority

Outputs:
Define Process: 14E

Date of Last Change: 5/1/82

Synonyms Are: Define Excess Assets

Description: This process uses asset needs versus asset position to identify items that are in excess position. This information is used to nominate assets for disposal. Options for use of each item are considered prior to disposal recommendation.

Key Words Are: Excess assets

Part of: LAG 14 (Recoverable Item Requirements LAG)

Derives: Excess item list

Employs: Options for disposition

Excess assets

Inputs: 

Outputs: 
Define Entity: Use By Item

Date of Last Change: 5/1/82

Synonyms Are: Item Usage

Description: This data element gives the expected total operating hours for each item by quarter over the lead time for the item.

Key Words: National Stock List (NSL)

Attributes: Item oriented
   Combined usage by item

Sub-Parts Are: Data output for each item

Source is: LAG 14A

Use is: LAG 14B
ENTITY LEVEL

Define Entity: Application Data

Date of Last Change: 5/1/82

Synonyms Are: Use on Code

Description: These data define the systems on which each item is used and the quantity per installation (QPI) for each item.

Key Words: QPI

Use on

Attributes: National stock list oriented

Sub-Parts Are: Use on code

QPI

National stock list number

Substitutability

Source is: Provisioning data/SM requirements

Use is: LAG 14A
Define Entity:  Item Lead Time

Date of Last Change:  5/1/82

Synonyms Are:  Acquisition Lead Time

Description:  The total lead time to order and receive an item given a decision to order.

Key Words:  Procurement

Attributes:  Calendar time in days

Sub-Parts Are:  Administrative lead

Source is:  Acquisition LAG

Use is:  LAG 14A
Define Entity: Program Operating Hours

Date of Last Change: 5/1/82

Synonyms Are: Program Guidance

Description: The official Air Force program of operating hours for each system; contained in the P series documents.

Key Words: Flying hours
- Operating hours

Attributes: Operating hours by system
- Programmed equippage of AF units

Sub-Parts Are: Each weapon system

Source is: USAF PD

Use is: LAG 14A
ENTITY LEVEL

Define Entity: Needs by Item

Date of Last Change: 5/1/82

Synonyms Are: Raw Requirements

Description: This entity provides a definition of the total pipeline and safety level needs for recoverable items. Pipeline includes repair, order, and ship asset requirements.

Key Words: Safety level
            Order and ship

Attributes: Requirements by quarter

Sub-Parts Are: Order and ship quantity
               Base repair cycle assets
               Depot repair cycle assets
               Safety levels
               Negotiated levels

Source is: LAG 14B

Use is: LAG 14C
ENTITY LEVEL

Define Entity: Repairs by Item

Date of Last Change: 5/1/82

Synonyms Are: Incidents of Repair

Description: This entity contains a projection of the quantity of each item that will require repair in each quarter over the lead time and the dollar value of those repairs.

Key Words: Labor standard
DMIF rate

Attributes:

Sub-Parts Are: List of repair by NSL items

Source is: LAG 14B

Use is: LAG 14C
Define Entity: Negotiated Levels

Date of Last Change: 5/1/82

Synonyms Are: Special Levels

Description: This entity conveys the approved special or negotiated levels that must be honored over the lead time of each item.

Key Words:

Attributes: By NSL item

Sub-Parts Are: List by NSL item

Source is: IM specialist (1996s)

Use is: LAG 14B
Define Entity: Approved Changes

Date of Last Change: 5/1/82

Synonyms Are: Turnaround Assets; Modification Program

Description: This entity conveys the time-phasing and asset requirement to support modifications. It also defines the phase-out schedule of replaced items.

Key Words: Configuration control
Interchangeability

Attributes: By NSL item

Sub-Parts Are: Class V modification schedules
Class IV modification schedules

Source is: Improvement LAG

Use is: LAG 14B
ENTITY LEVEL

Define Entity: Current Factors

Date of Last Change: 5/1/82

Synonyms Are: D041 Factors

Description: This entity provides the approved values for all factors used in the requirements computation.

Key Words:

Attributes: Data by NSL item

Sub-Parts Are: Maintenance factor

Base repair cycle time
Depot repair cycle time
Order and ship time
Not-reparable-this-station rate
Condemnation rate

Source is: Equipment specialist (IM)

Use is: LAG 14B
ENTITY LEVEL

Define Entity: Turnaround Asset Availability

Date of Last Change: 5/1/82

Synonyms Are: ____________________________________________

Description: This entity identifies the assets that could be made available to support modifications. The list is generated for each item programmed for modification.

Key Words: Modification

Attributes: Number of assets available

Sub-Parts Are: List by NSL item

Source is: LAG 14C

Use is: Improvement LAG
ENTITY LEVEL

Define Entity: Shortfalls

Date of Last Change: 5/1/82

Synonyms Are: Buy Option Quantity

Description: This entity conveys the total number of each item that must be acquired to meet the projected operating hours.

Key Words: Buy quantity
Dollar requirement

Attributes: List by NSL item

Sub-Parts Are: List of all items that are short

Source is: LAG 14C

Use is: LAG 14D
ENTITY LEVEL

Define Entity: Excess Assets

Date of Last Change: 5/1/82

Synonyms Are: Overage

Description: This entity conveys a list of all items that are in long supply with the number of each asset that is excess.

Key Words: Excess assets
Long supply

Attributes: By item

Sub-Parts Are: List by NSL item

Source is: LAG 14C

Use is: LAG 14E
ENTITY LEVEL

Define Entity: Worldwide Assets

Date of Last Change: 5/1/82

Synonyms Are: Inventory, Worldwide

Description: This entity conveys the current worldwide asset position for each recoverable item. It defines the number, location, and condition of each asset.

Key Words: On-hand

Reparable

Serviceable

Attributes: By item

Sub-Parts Are: Serviceable

Reparable

Depot stock

Base stock

Source is: IM specialist, item records

Use is: LAG 14C
Define Entity: Due-In’s

Date of Last Change: 5/1/82

Synonyms Are: Expected Assets

Description: This entity conveys the quantity and schedule for the arrival of assets that are "due in" from all sources.

Key Words: DIFM
- Delivery schedule

Attributes: By NSL item

Sub-Parts Are: Due in from maintenance
- Due in from previous buys
- Return of turnaround assets

Source is: IM specialist/Acquisition

Use is: LAG 14C
Define Entity:  
Expected Asset Position

Date of Last Change:  
5/1/82

Synonyms Are:  
Projected Asset Position

Description:  
This entity portrays the asset position for each item for each quarter over the lead time of the asset.

Key Words:  
Asset

Attributes:  
By item

Sub-Parts Are:  

Source is:  
LAG 14D

Use is:  
IM specialist
ENTITY LEVEL

Define Entity: Expected Demands

Date of Last Change: 5/1/82

Synonyms Are: 

Description: This entity conveys the worldwide demand pattern for each item over the lead time for the item.

Key Words: Demand rate

Fill rate

Attributes: 

Sub-Parts Are: 

Source is: LAG 14D

Use is: Movement LAG

Custody LAG
Define Entity: Expected Critical Items

Date of Last Change: 5/1/82

Synonyms Are: Critical Item Projection

Description: This entity conveys the expected number of unfilled back orders to be expected over the item lead time.

Key Words: Fill rate

Back orders

Attributes: Computed by quarter

Sub-Parts Are: List by Federal Stock Number (FSN)

Source is: LAG 14D

Use is: IM specialist

SM
ENTITY LEVEL

Define Entity: Buy Requirement

Date of Last Change: 5/1/82

Synonyms Are: Item Requirements

Description: This entity is a list by FSN of each item that is to be procured within the approved budget.

Key Words: By option

Budget constraint

Attributes: Modified by priority

Sub-Parts Are: 

Source is: LAG 14D

Use is: Acquisition LAG
ENTITY LEVEL

Define Entity: POM Budget Input

Date of Last Change: 5/1/82

Synonyms Are: Program Objective Memorandum Input

Description: This entity projects AFLC's future dollar requirements for recoverable items and the impacts of not satisfying them.

Key Words: Impacts
Budget

Attributes: By item
Extended value

Sub-Parts Are: Dollars by fiscal year
Impacts by system

Source is: LAG 14 D

Use is: PPBS LAG
SM LAG
Define Entity: Priority

Date of Last Change: 5/1/82

Synonyms Are: Air Force Priority

Description: This entity defines the priority of each weapon system in the Air Force and is used to apportion critical Air Force resources.

Key Words: Force activity designator

Mission essentiality

Attributes: A numerical value by system

Sub-Parts Are: System priority

Force activity designator

Essentiality code

Source is: PD series documents

Use is: LAG 14D
ENTITY LEVEL

Define Entity: Options for Disposition

Date of Last Change: 5/1/82

Synonyms Are: Other Requirements

Description: This entity defines the alternative uses for items subject to disposal. Examples are: foreign country needs, training organizations, etc.

Key Words: Excess assets
Disposal lists

Attributes: Policy developed by DoD

Sub-Parts Are: Foreign country needs
State institutions
Schools
Clubs

Source is: DoD policy

Use is: LAG 14E
Define Entity: Excess Item List

Date of Last Change: 5/1/82

Synonyms Are: Long Supply Items List

Description: This entity defines the quantity of each item that is in long supply and provides recommended disposition of those items.

Key Words:

Attributes:

Sub-Parts Are: Items to be retained

Items to be disposed of

Source is: LAG 14E

Use is: Custody LAG
CONCLUSIONS

The use of data sheets as demonstrated here should greatly facilitate the translation of descriptions developed by functional planners into FCMS format. Further, the use of data sheets will standardize output and increase consistency in describing the functional areas.

A suggested addition to these data sheets is the development of a simple narrative description of each of the data elements required. This would allow functional planners to complete the sheets with a minimal amount of orientation.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRC</td>
<td>Base Repair Cycle</td>
</tr>
<tr>
<td>DRC</td>
<td>Depot Repair Cycle</td>
</tr>
<tr>
<td>DIFM</td>
<td>Due in from Maintenance</td>
</tr>
<tr>
<td>FCMS</td>
<td>Functional Configuration Management System</td>
</tr>
<tr>
<td>FMS</td>
<td>Foreign Military Sales</td>
</tr>
<tr>
<td>FSN</td>
<td>Federal Stock Number</td>
</tr>
<tr>
<td>GFE</td>
<td>Government Furnished Equipment</td>
</tr>
<tr>
<td>I&amp;S</td>
<td>Interchangeability &amp; Substitutability</td>
</tr>
<tr>
<td>LAG</td>
<td>Logical Application Group</td>
</tr>
<tr>
<td>LMS</td>
<td>Logistics Management System</td>
</tr>
<tr>
<td>NRTS</td>
<td>Not Repairable this Station</td>
</tr>
<tr>
<td>O&amp;S</td>
<td>Order and Ship</td>
</tr>
<tr>
<td>PD</td>
<td>Program Document</td>
</tr>
<tr>
<td>PSL/PSA</td>
<td>Problem Statement Language/Problem Statement Analyzer</td>
</tr>
<tr>
<td>QPI</td>
<td>Quantity Per Installation</td>
</tr>
<tr>
<td>TA</td>
<td>Turnaround</td>
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</tbody>
</table>