CAIV Seminar

An Approach to Design-to-Cost

Guy Wagner
Defense Avionics Systems
Honeywell, Inc.

Disclosure Statement

- Data used in this presentation is representative of the actual data.
- The processes depicted are the actual processes that were/are used.

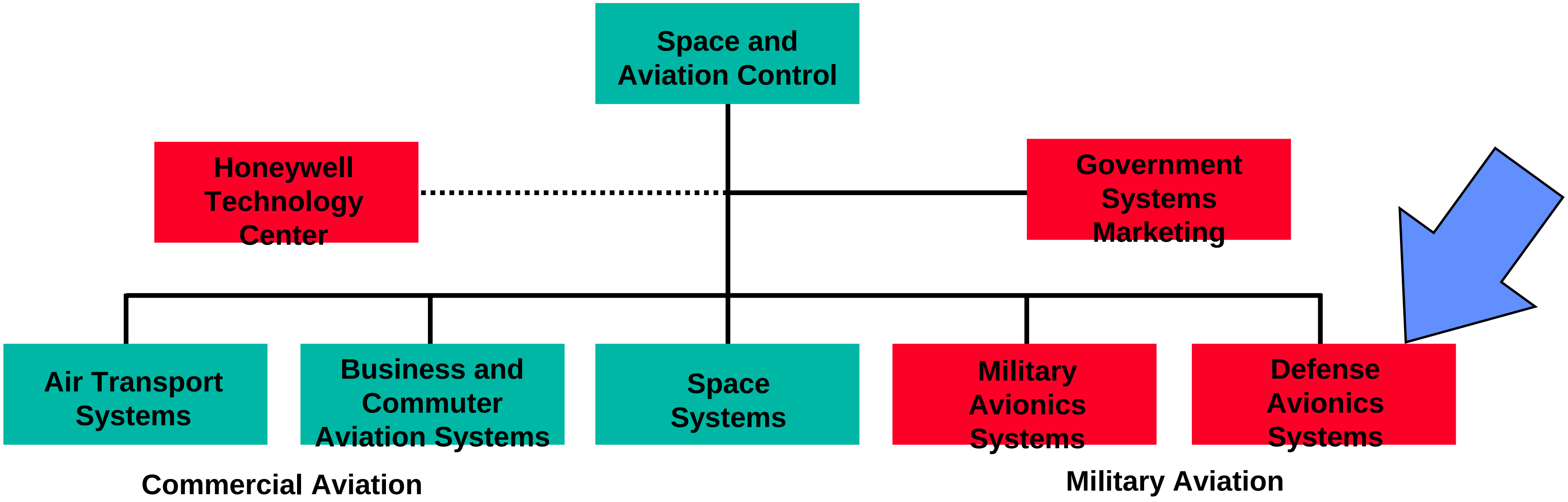
Agenda

- Background
  - Honeywell, Defense Avionics Systems
  - Preferred Computer Aided Engineering Environment
- DAS effort as part of RASSP Beta Site
  - Integration of RDD, Price, and RAM-ILS
- Design to Cost example
- Summary

Background

Honeywell, Inc.

- World-wide corporation with divisions in the United States and 47 countries
- Three main businesses
  - Home and Building Control (H&BC)
  - Industrial Automation and Control (IAC)
  - Space and Aviation Control (S&AC)



Space and Aviation Control

Honeywell Technology Center

Government Systems Marketing

Air Transport Systems

Business and Commuter Aviation Systems

Space Systems

Military Avionics Systems

Defense Avionics Systems

Commercial Aviation

Military Aviation

Typical DAS Products and Platforms

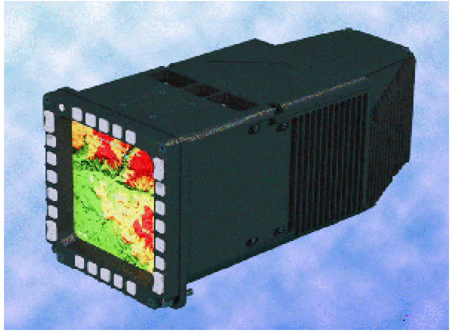
C-130

- Displays
- Flight Management
- Vehicle Management
- Digital Maps

F-117

F-18

Color Multi-Function Display



F-15

AH-1W

- Albuquerque, NM
- ~200M sales/yr
- ~1200 employees

CH-47

DAS use of RASSP

(Beta Site in 1996)

Motivation for Design-to-Cost

- DoD Instruction 5000.2 Defense Acquisition Management Policies and Procedures
- MIL-STD-337 Design to Cost

The DTC program is one of several management tools used to control program life-cycle costs. To be effective, production and O&S costs must be addressed in the development contracts. Cost must be made an active design parameter for engineers.

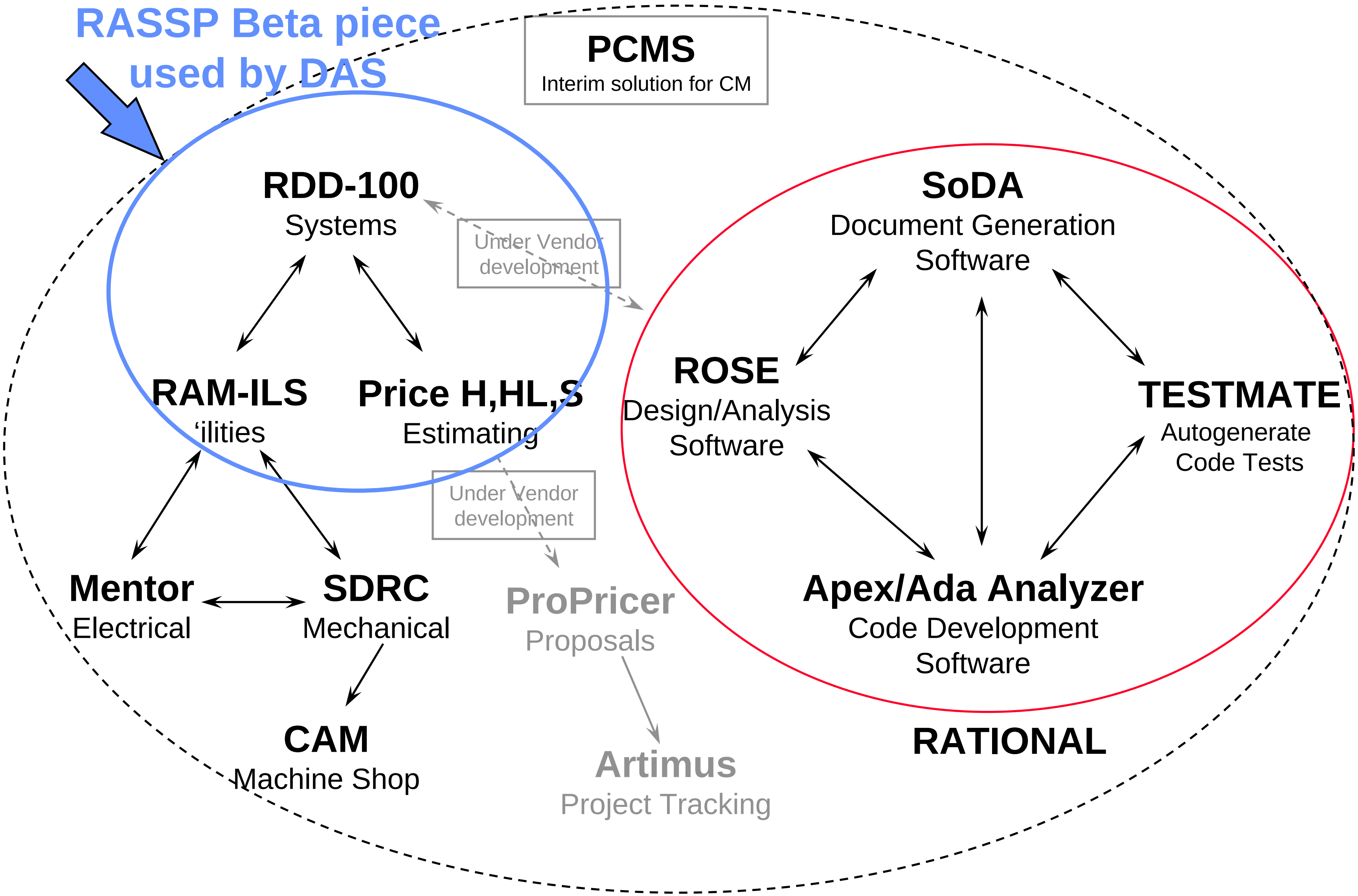
Motivation for an integrated environment

- Requirements tracking to component architecture
- RAM-ILS impacts to cost:
  - Redundancy Analysis
  - Failure Modes Effects Analysis (FMEA)
  - Reliability trades
    - Mean time between failure (MTBF)
    - Time to repair (TTR)
- Parametric Estimating
  - Design to Cost
  - Rough Order Magnitude
  - Basis of Estimate
- Highly Iterative Process -- Concurrent Engineering
  - Shorter delivery schedules
  - More complex products/cubic volume
  - Smaller work teams

DAS Definitions (relative to using Price)

- Design-to-Cost (DTC)
  - Using Price out of the box, no tailoring of financials or complexities
  - Used for trade studies
- Rough Order Magnitude (ROM)
  - Some “calibration” of MCPLXS and MCPLXE
  - May use division labor rates and overhead
- Basis of Estimate (BOE)
  - Calibrated MCPLXS and MCPLXE
  - Division labor rates and overheads
  - Validated details such as: NEWST, NEWEL, EREL, MREL, WECF, INTEGS, INTEGE, etc.

DAS Preferred CAE Environment



RASSP Beta piece used by DAS

PCMS
Interim solution for CM

RDD-100
Systems

Under Vendor development

RAM-ILS
'ilities

Price H,HL,S
Estimating

Under Vendor development

Mentor
Electrical

SDRC
Mechanical

CAM
Machine Shop

ProPricer
Proposals

Artimus
Project Tracking

SoDA
Document Generation Software

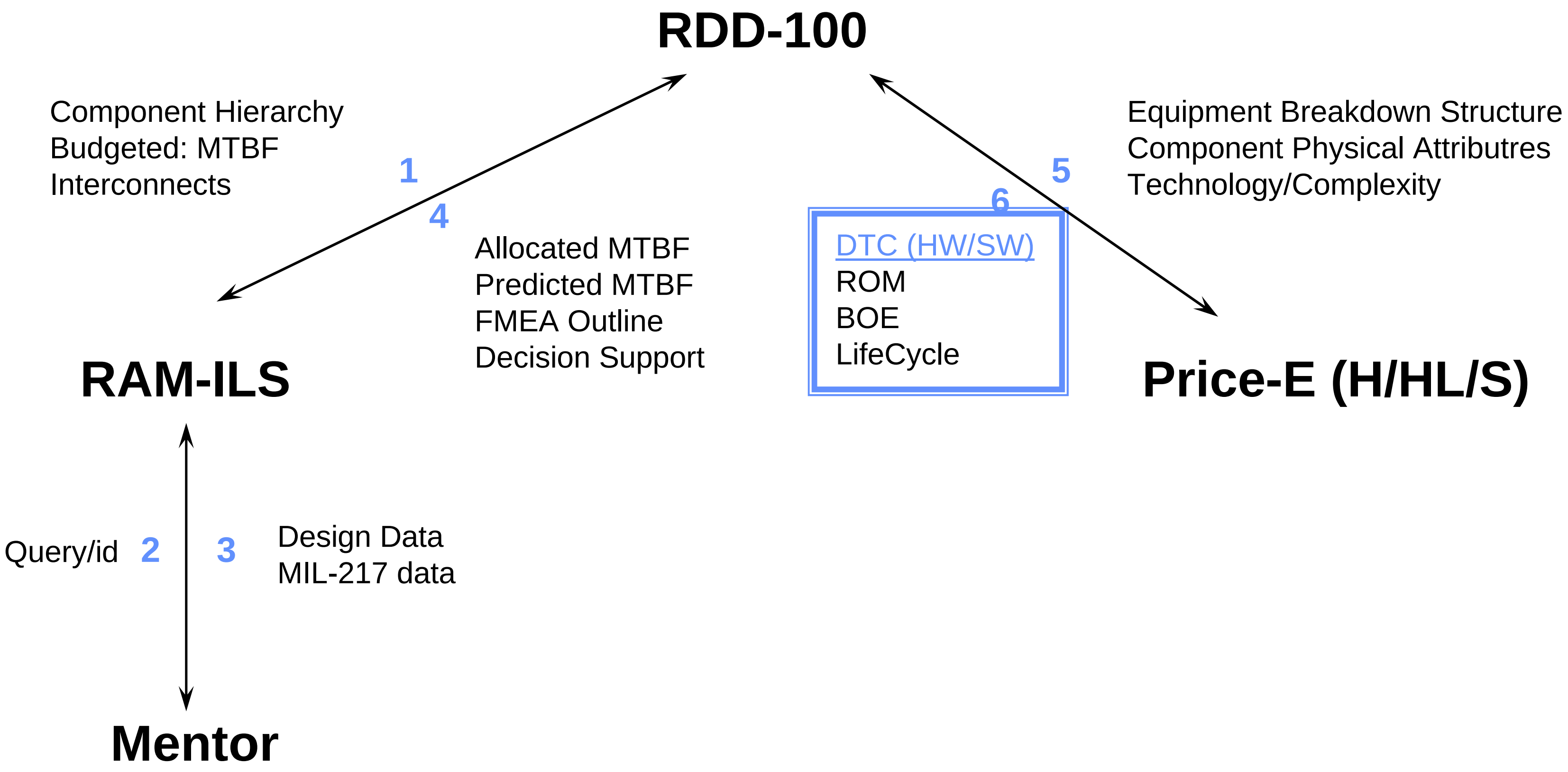
ROSE
Design/Analysis Software

TESTMATE
Autogenerate Code Tests

Apex/Ada Analyzer
Code Development Software

RATIONAL

DTC Data Relationships



RDD-100

Component Hierarchy
Budgeted: MTBF
Interconnects

1

4

Allocated MTBF
Predicted MTBF
FMEA Outline
Decision Support

5

6

DTC (HW/SW)
ROM
BOE
LifeCycle

Equipment Breakdown Structure
Component Physical Attributres
Technology/Complexity

RAM-ILS

Price-E (H/HL/S)

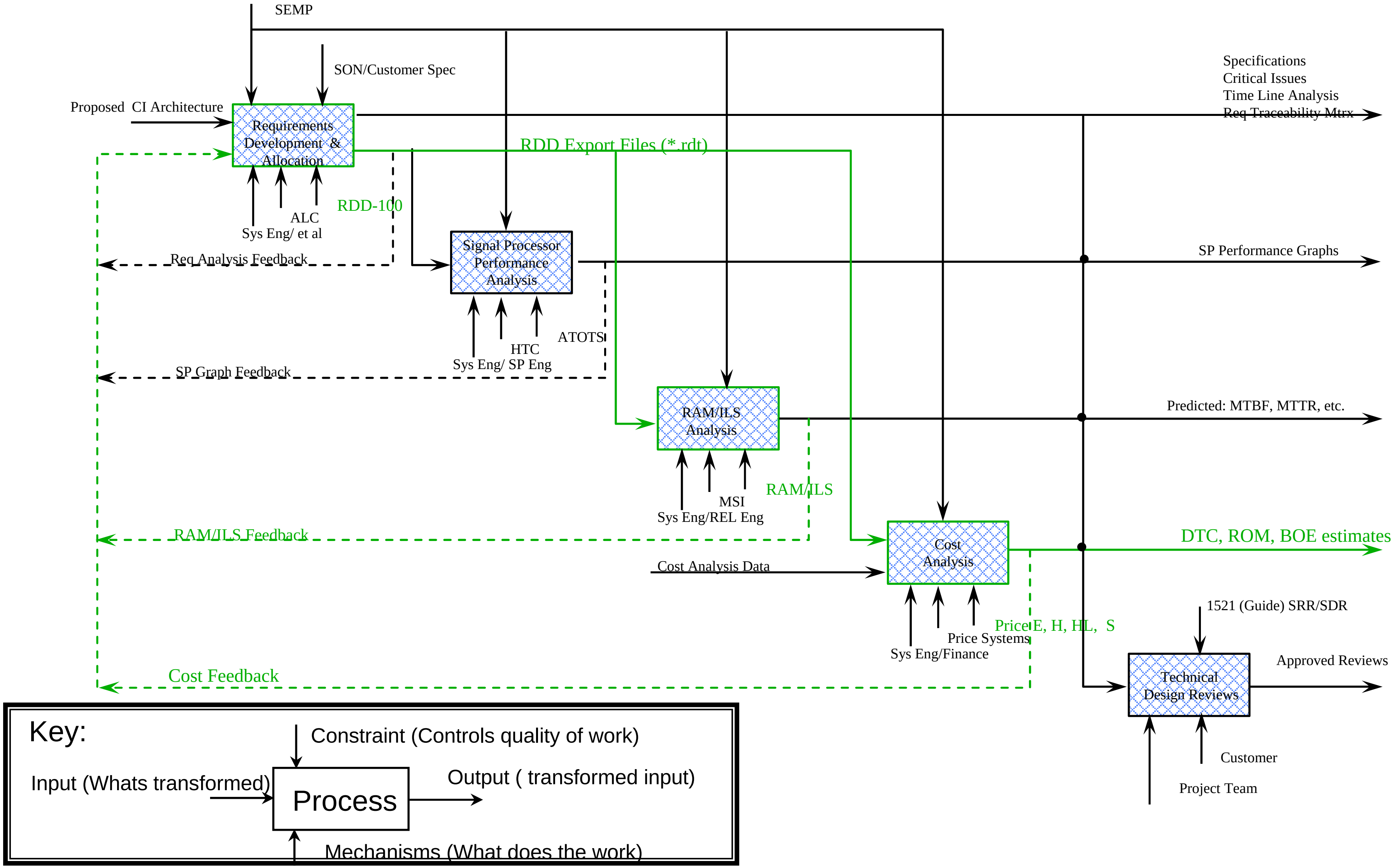
Query/id 2

3

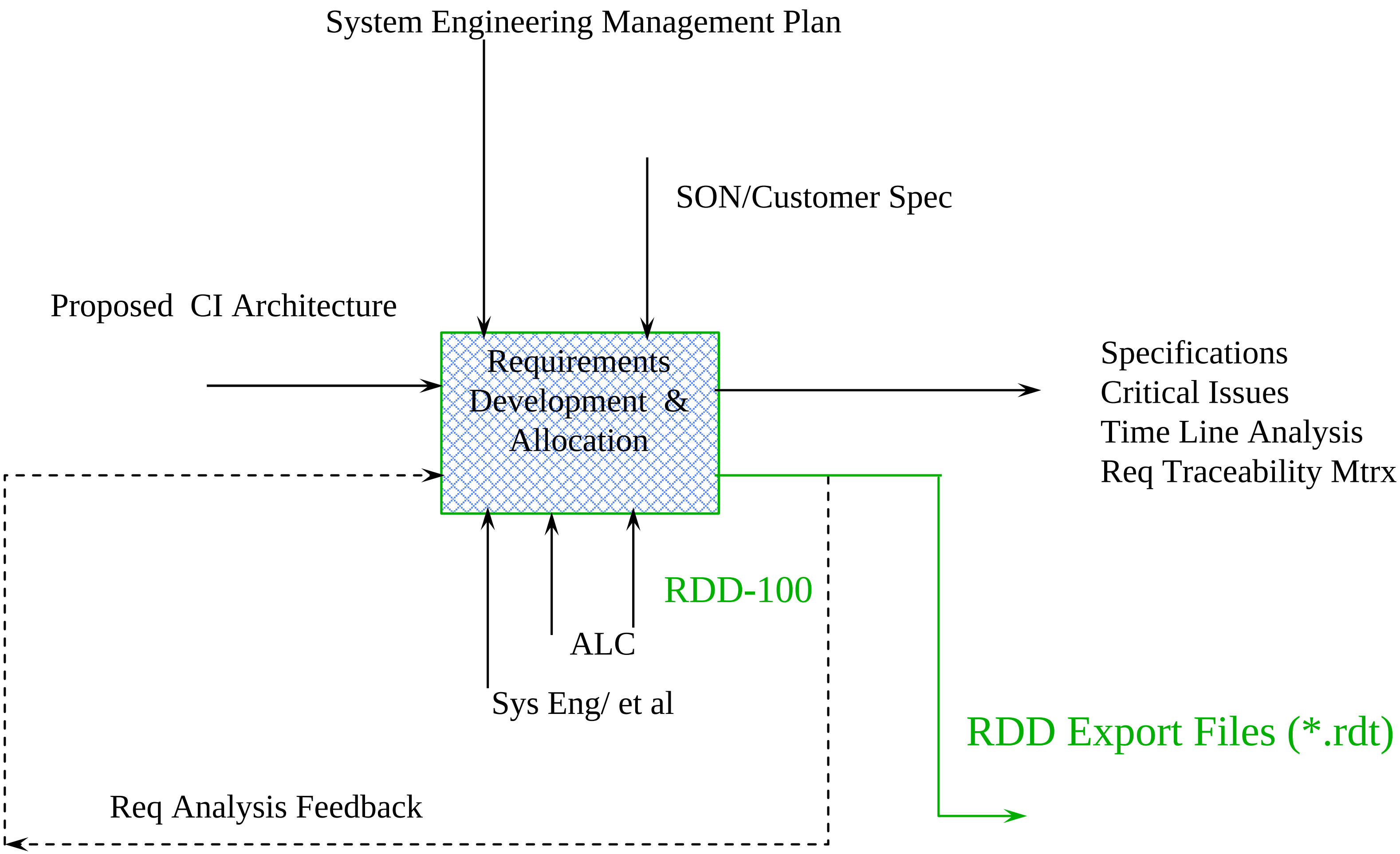
Design Data
MIL-217 data

Mentor

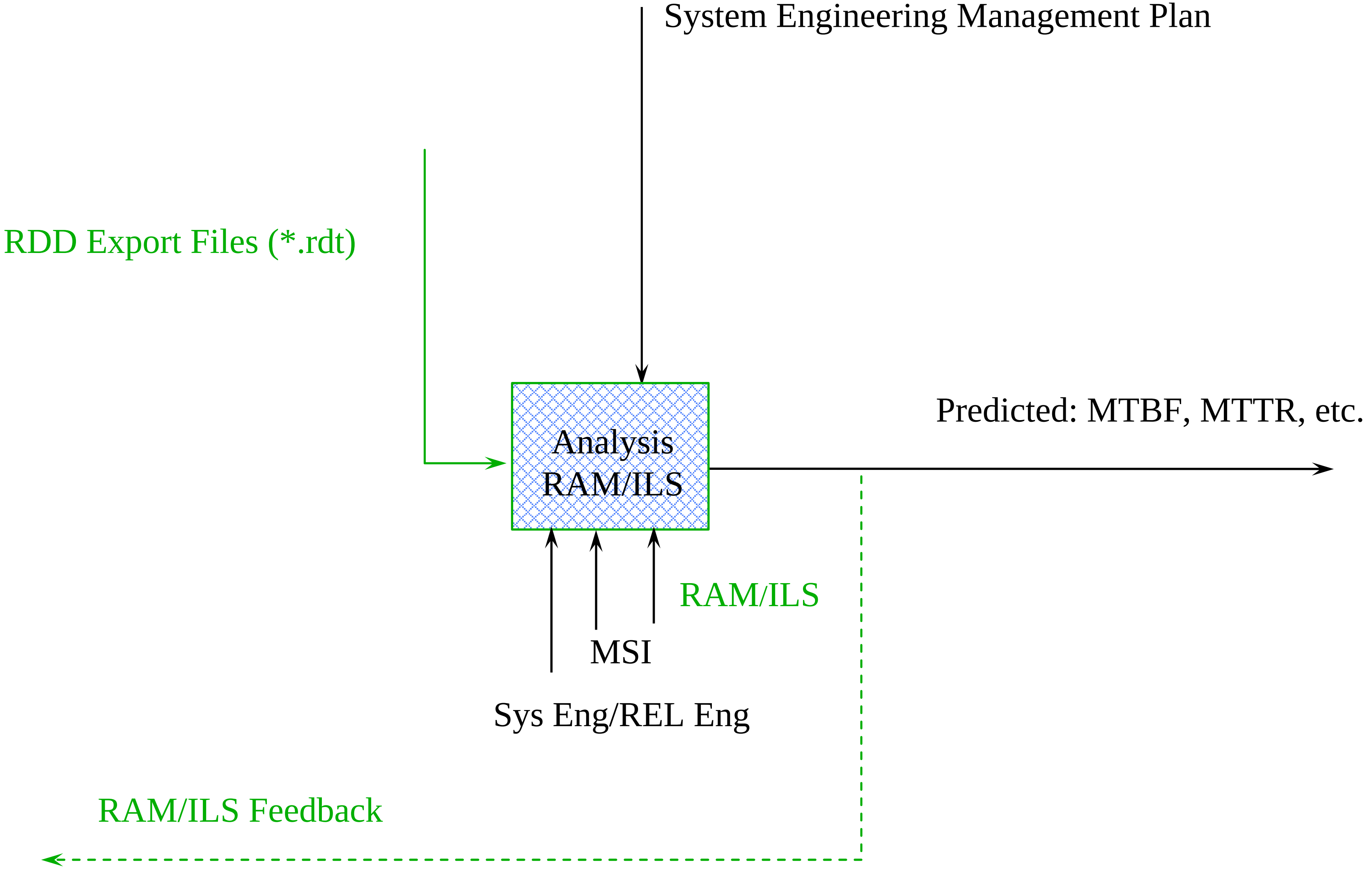
DTC as part of Engineering Process



Requirements Process



Reliability Process



System Engineering Management Plan

RDD Export Files (*.rdt)

Analysis RAM/ILS

Predicted: MTBF, MTTR, etc.

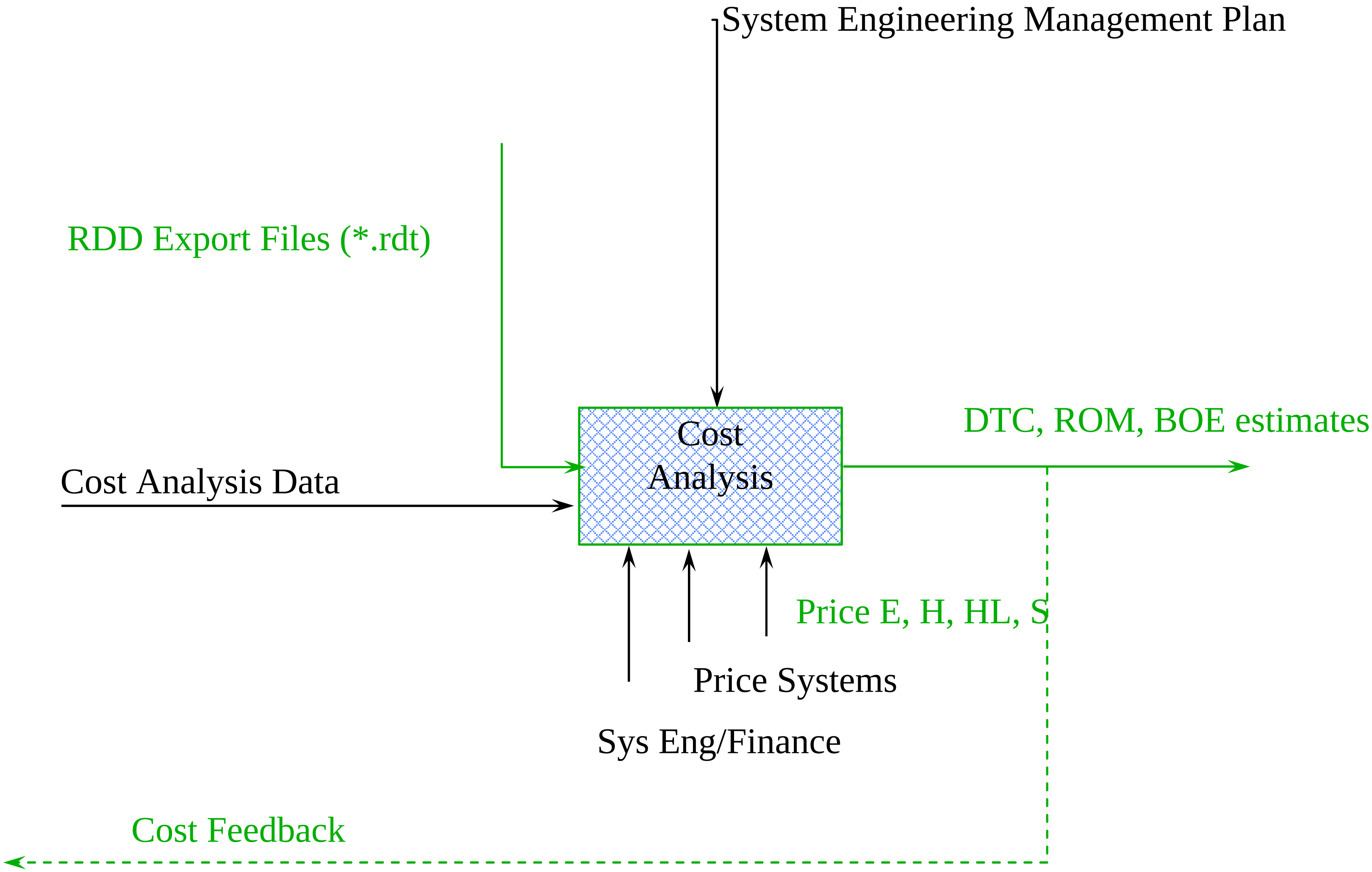
RAM/ILS

MSI

Sys Eng/REL Eng

RAM/ILS Feedback

Design to Cost Process



System Engineering Management Plan

RDD Export Files (*.rdt)

Cost Analysis Data

Cost Analysis

DTC, ROM, BOE estimates

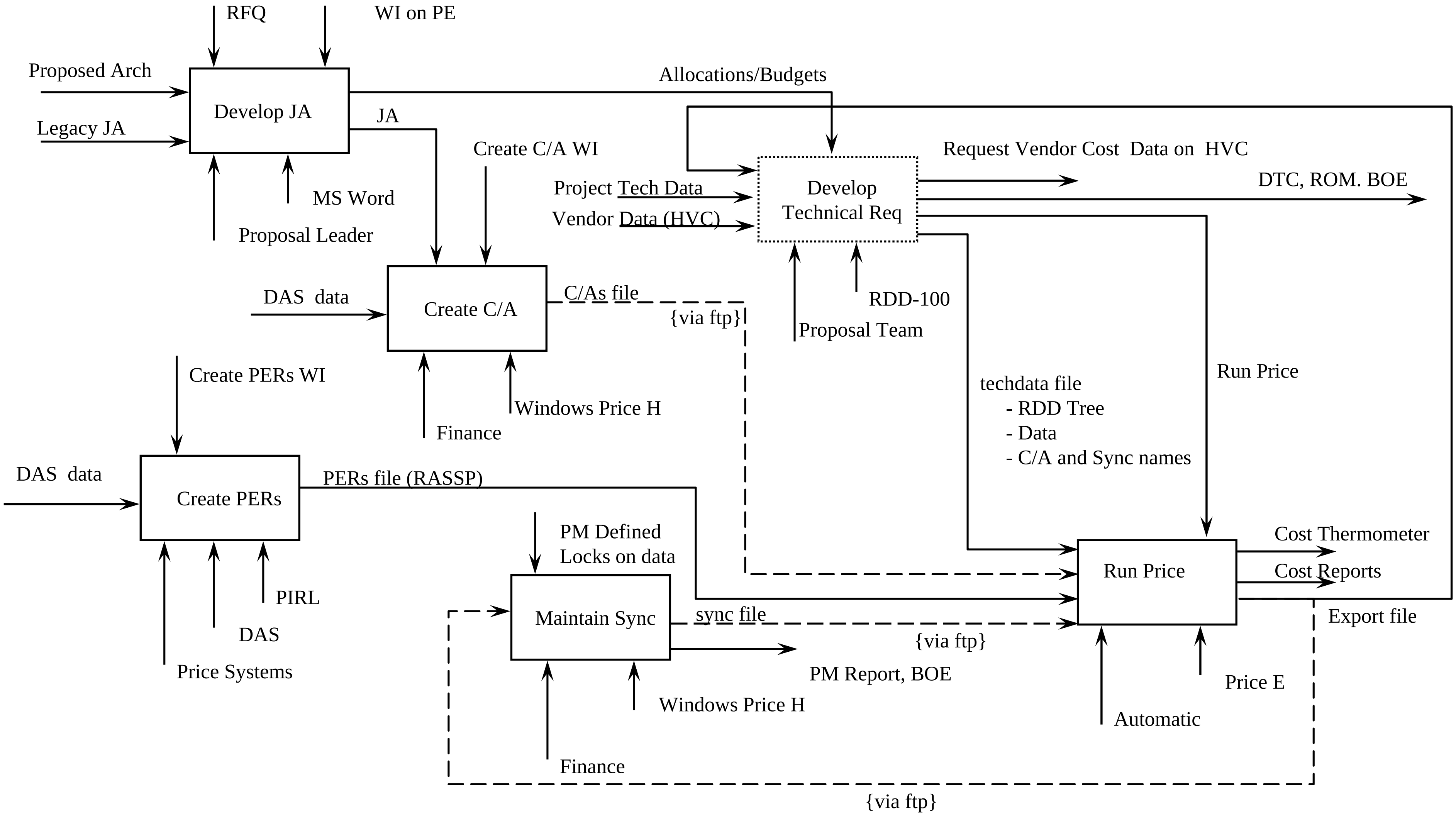
Price E, H, HL, S

Price Systems

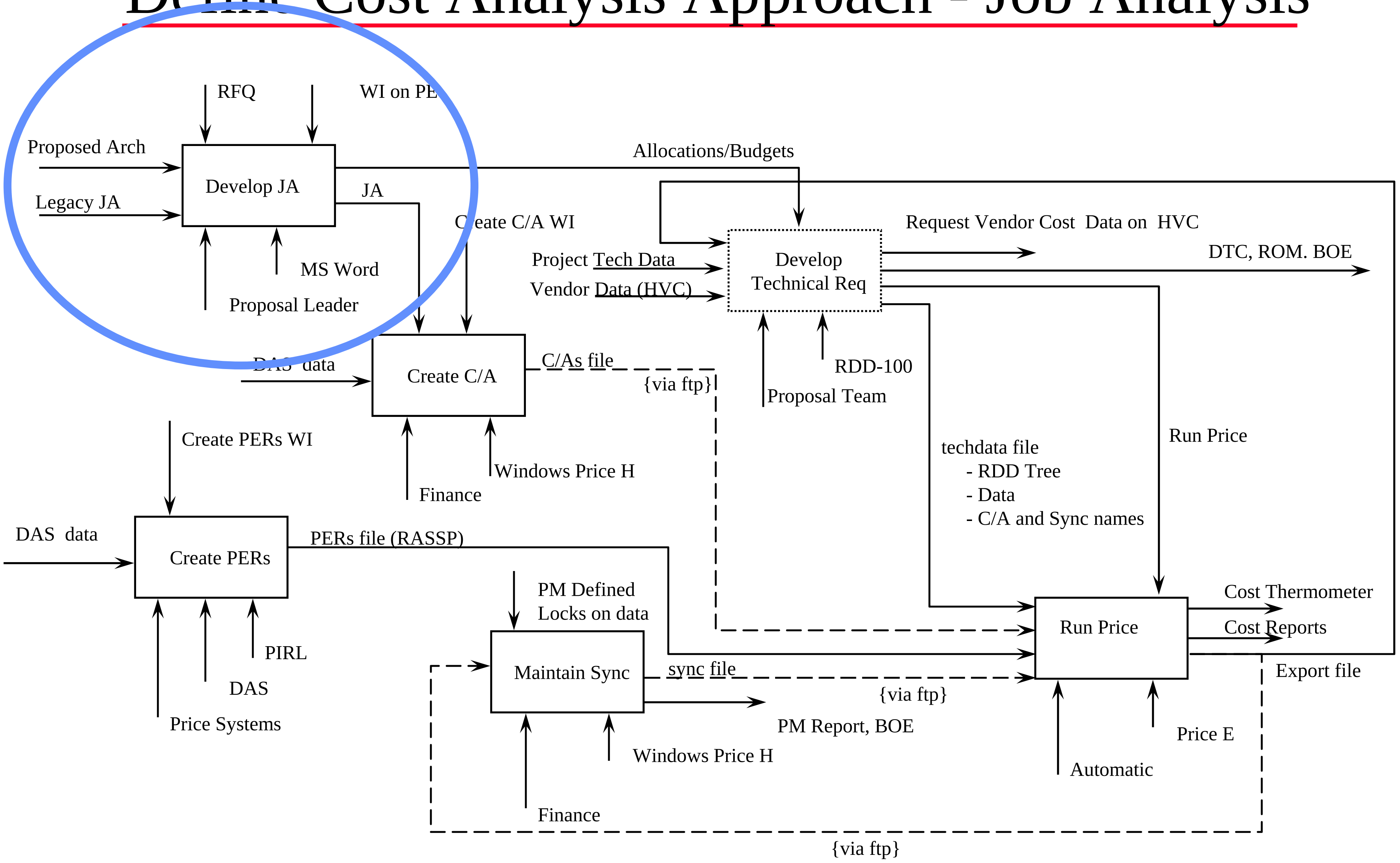
Sys Eng/Finance

Cost Feedback

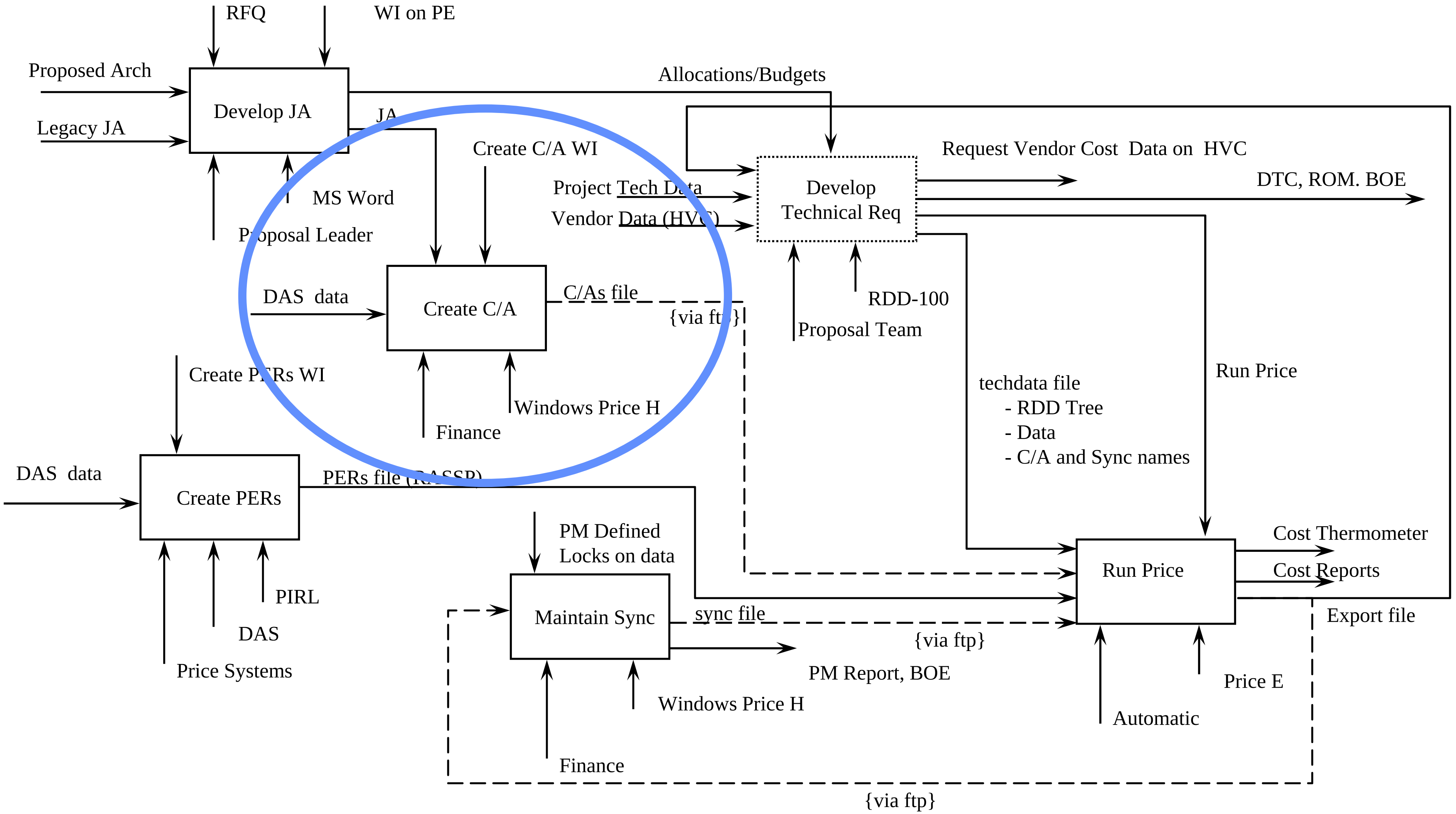
How Price E produces DTC/ROM/BOE



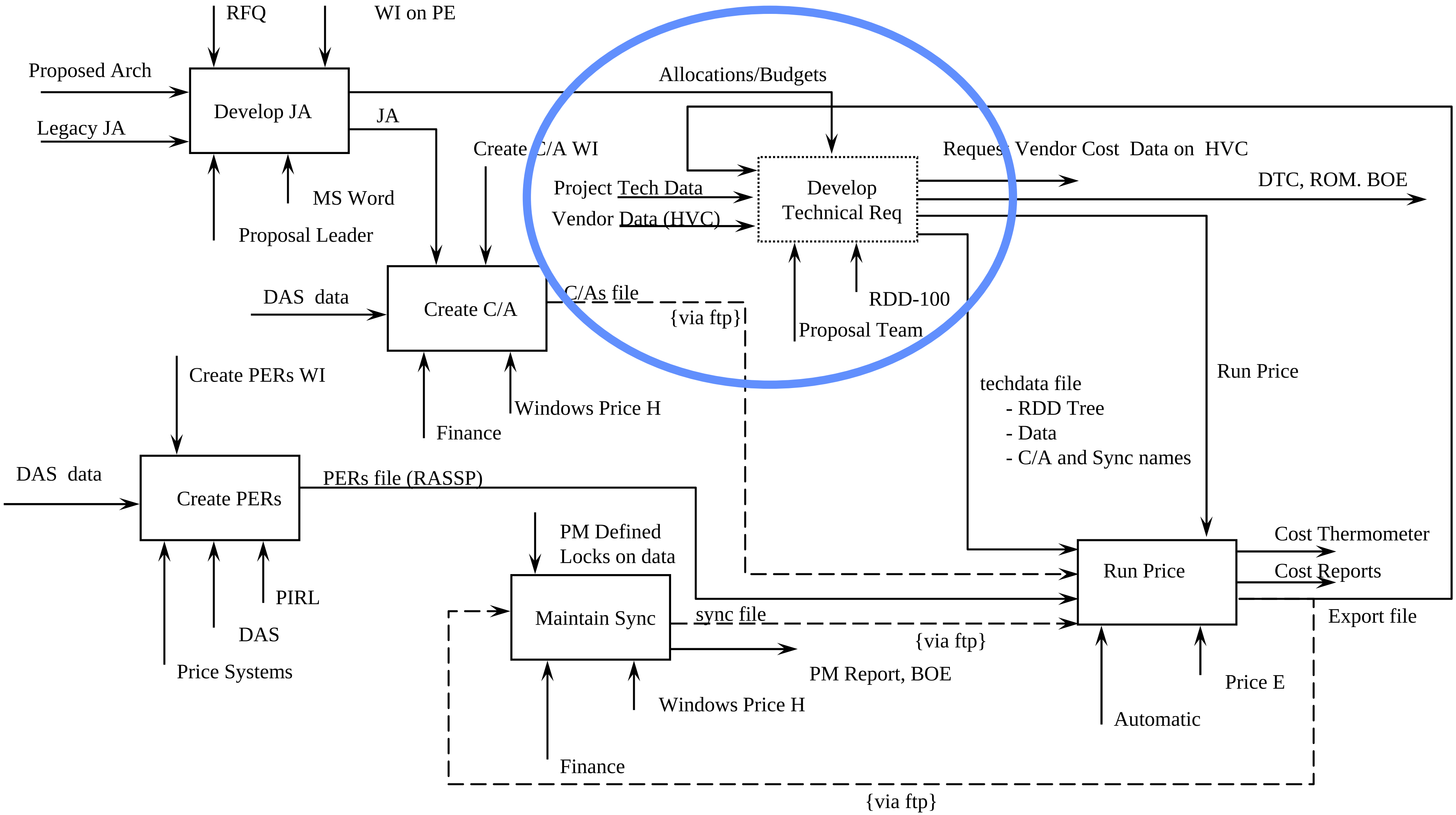
Define Cost Analysis Approach - Job Analysis



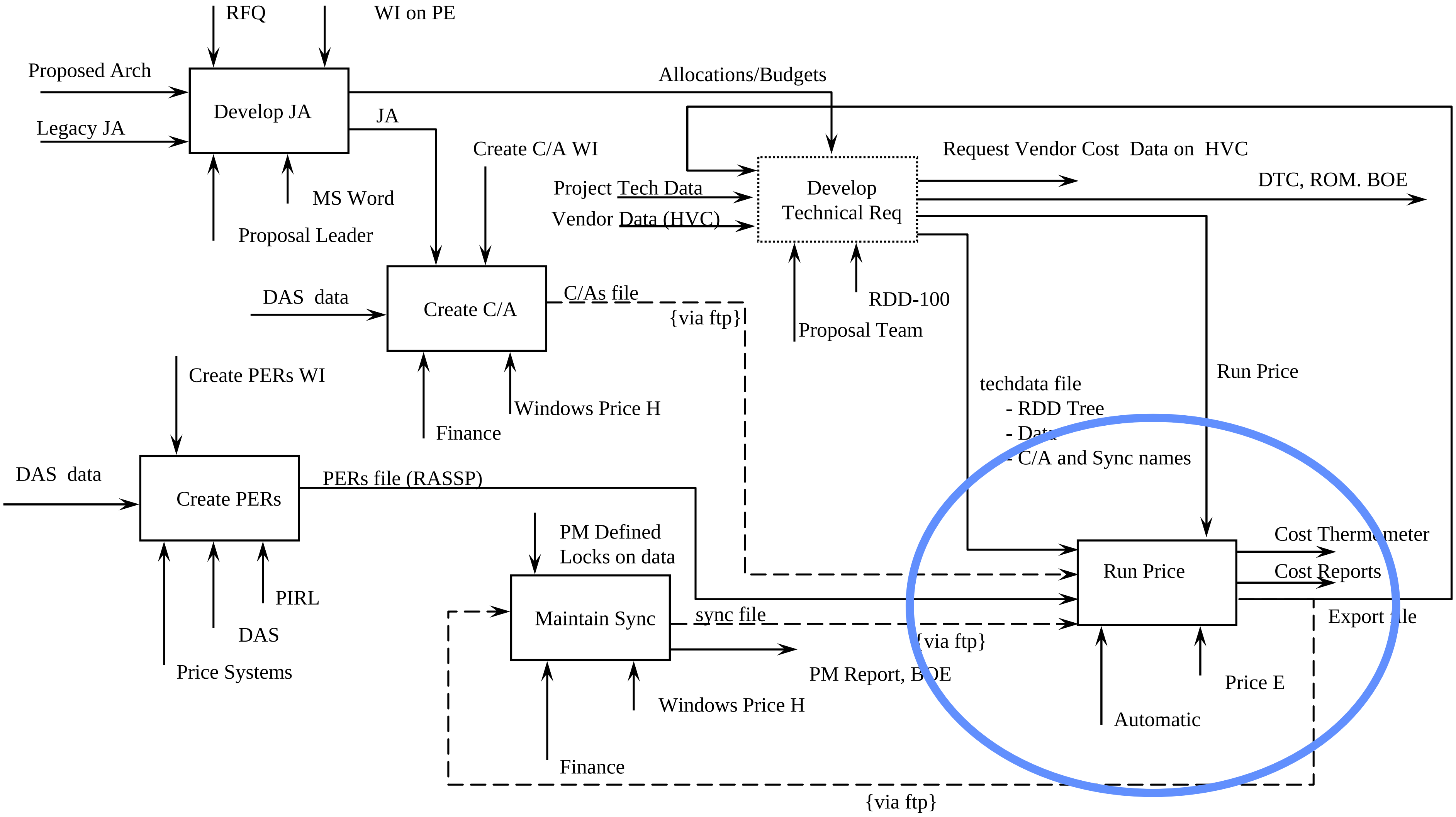
Create Cost Analysis File - Programmatic Data



Develop Technical Data from RDD



Produce Price E Export file



RFQ

WI on PE

Proposed Arch

Legacy JA

Develop JA

Allocations/Budgets

JA

MS Word

Proposal Leader

Create C/A WI

Project Tech Data

Vendor Data (HVC)

Develop Technical Req

Request Vendor Cost Data on HVC

DTC, ROM. BOE

RDD-100

Proposal Team

DAS data

Create C/A

C/As file

{via ftp}

Windows Price H

Finance

Create PERs WI

techdata file
- RDD Tree
- Data
- C/A and Sync names

Run Price

DAS data

Create PERs

PERs file (RASSP)

PIRL

DAS

Price Systems

PM Defined Locks on data

Maintain Sync

sync file

{via ftp}

PM Report, BOE

Windows Price H

Finance

Run Price

Cost Thermometer

Cost Reports

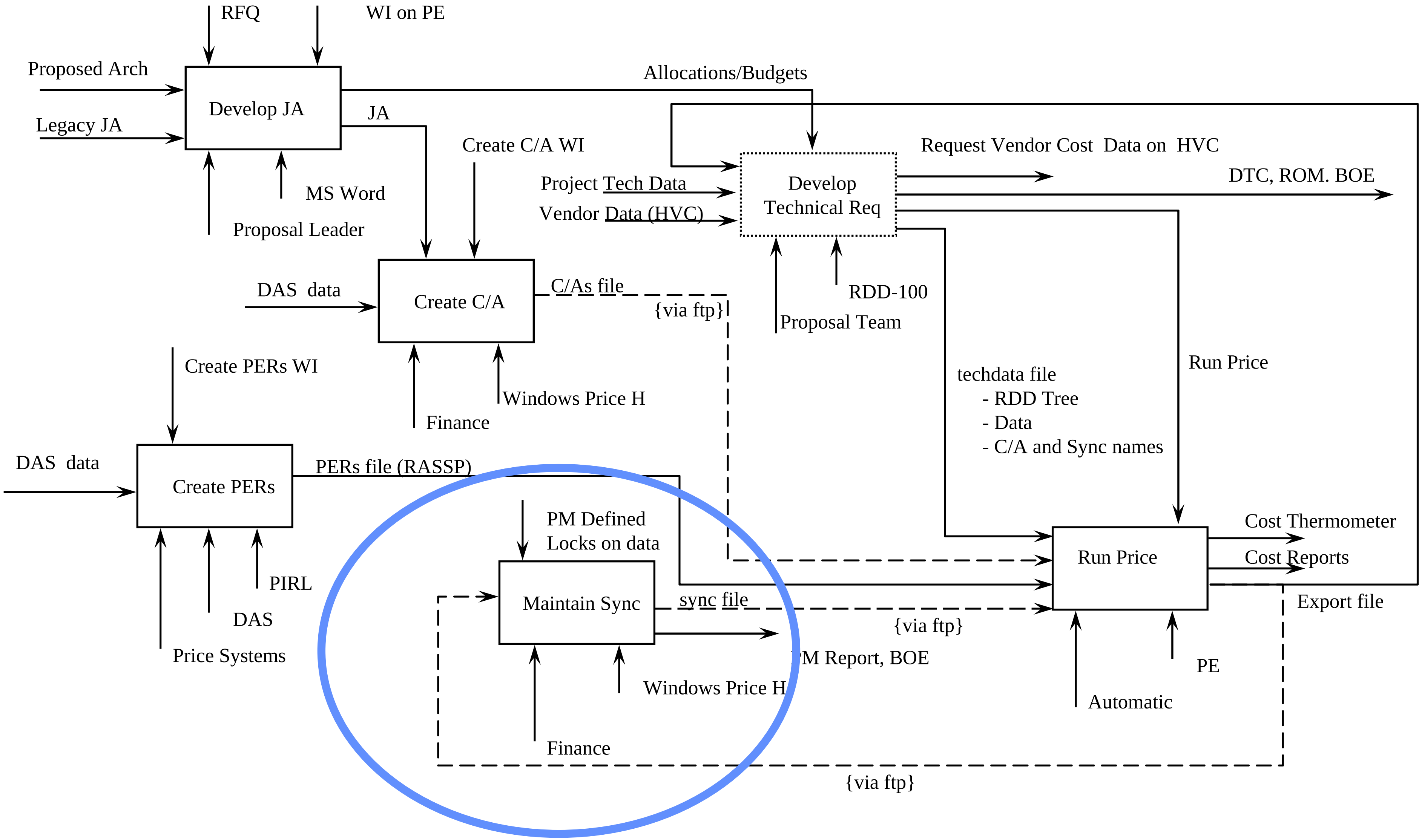
Export file

Automatic

Price E

{via ftp}

Lock out unwanted RDD changes (Sync File)



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Develop JA

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RDD-100

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{via ftp}

Windows Price H

Finance

Create PERs WI

techdata file
- RDD Tree
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DAS data

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PERs file (RASSP)

PIRL

DAS

Price Systems

PM Defined Locks on data

Maintain Sync

sync file

{via ftp}

PM Report, BOE

Windows Price H

Finance

{via ftp}

Run Price

Cost Thermometer

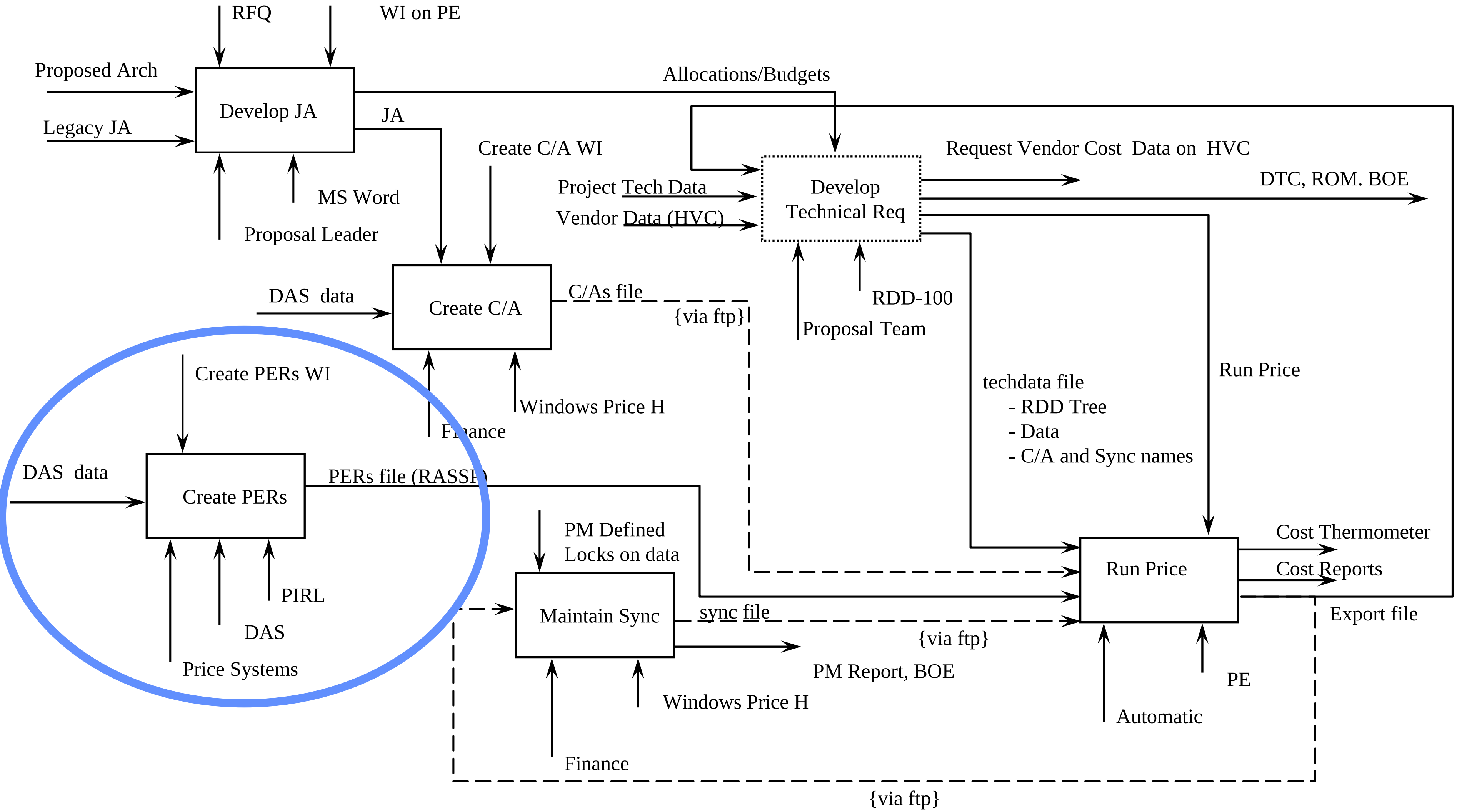
Cost Reports

Export file

PE

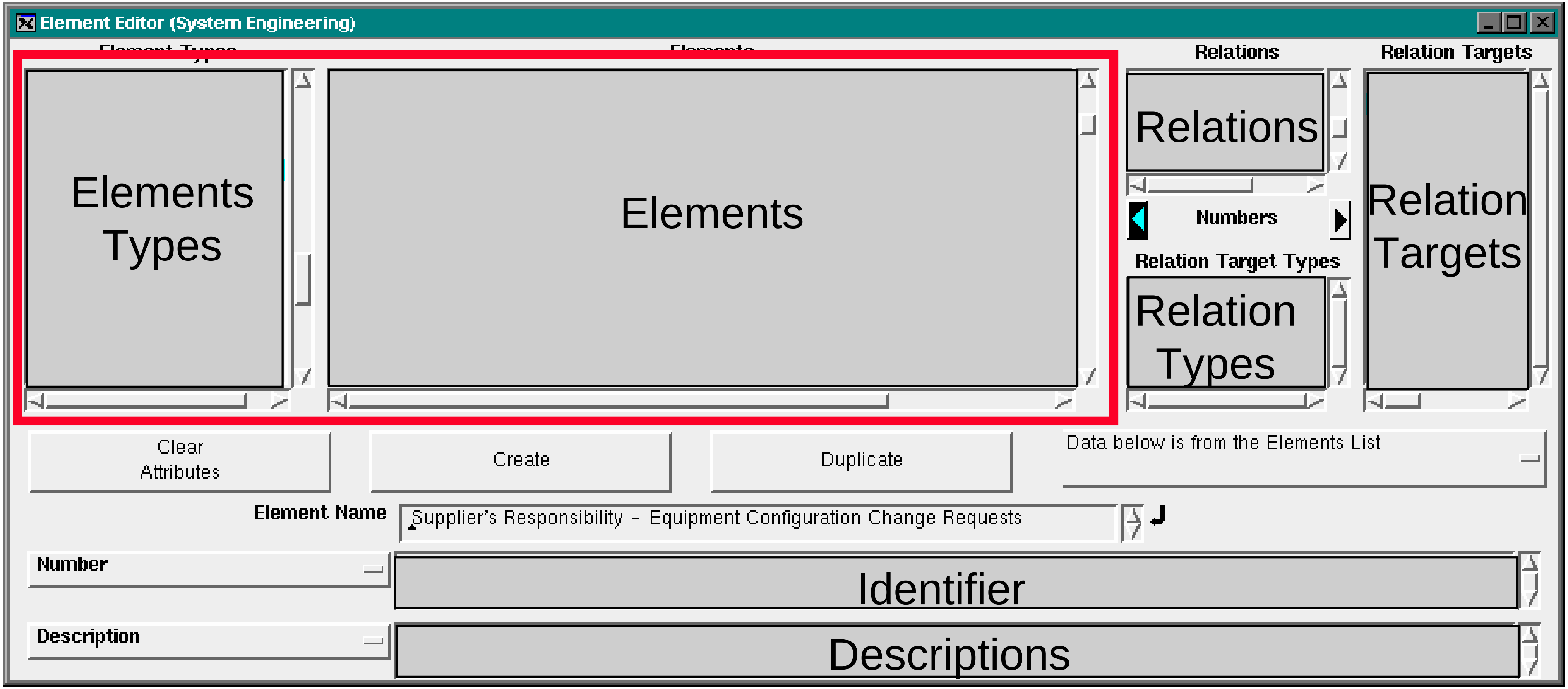
Automatic

Calibrate Price E for ROM/BOE



Examples From a Major Pursuit

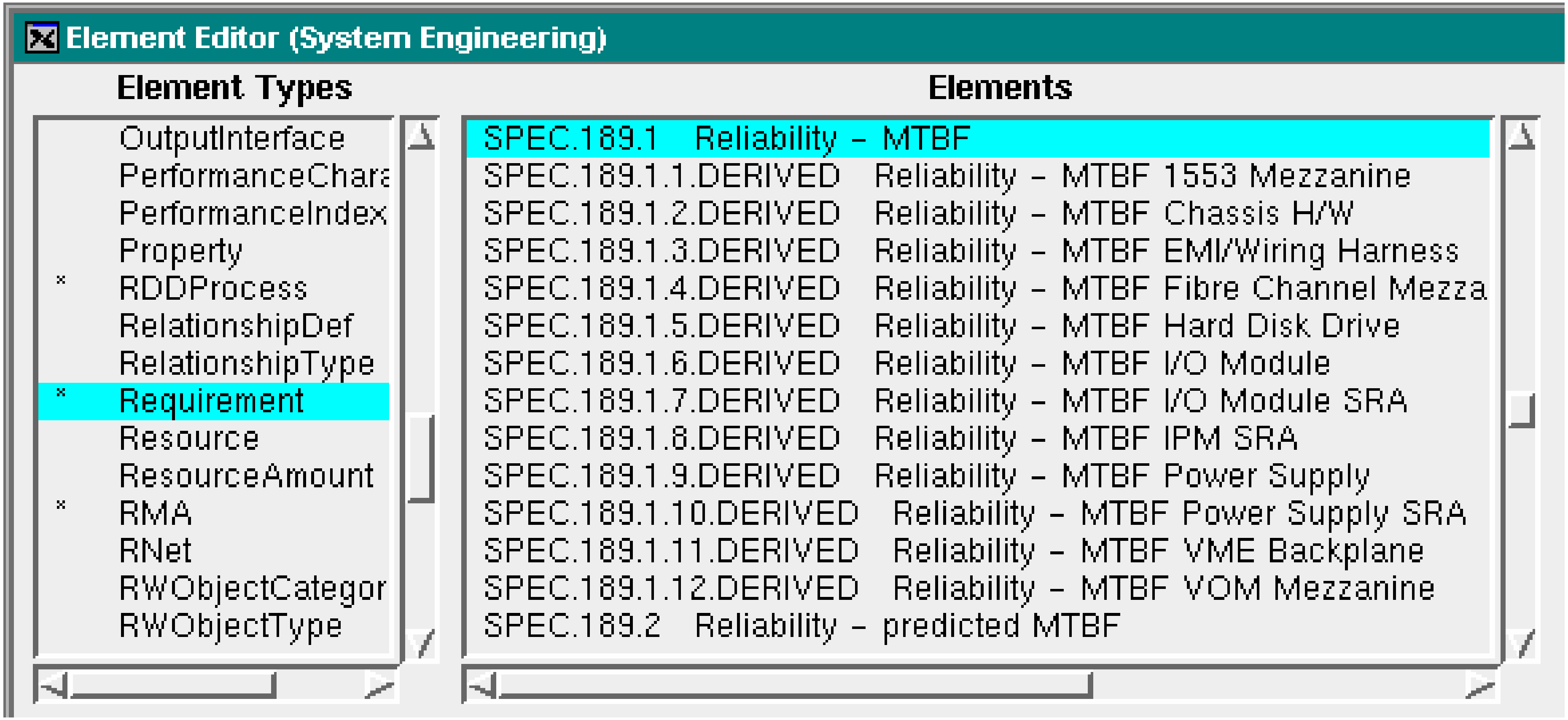
RDD: Element Editor Screen shot overview



Data below is from the Elements List

Element Name Supplier's Responsibility – Equipment Configuration Change Requests

RDD: Derived Requirements - MTBF Allocation



Element Editor (System Engineering)

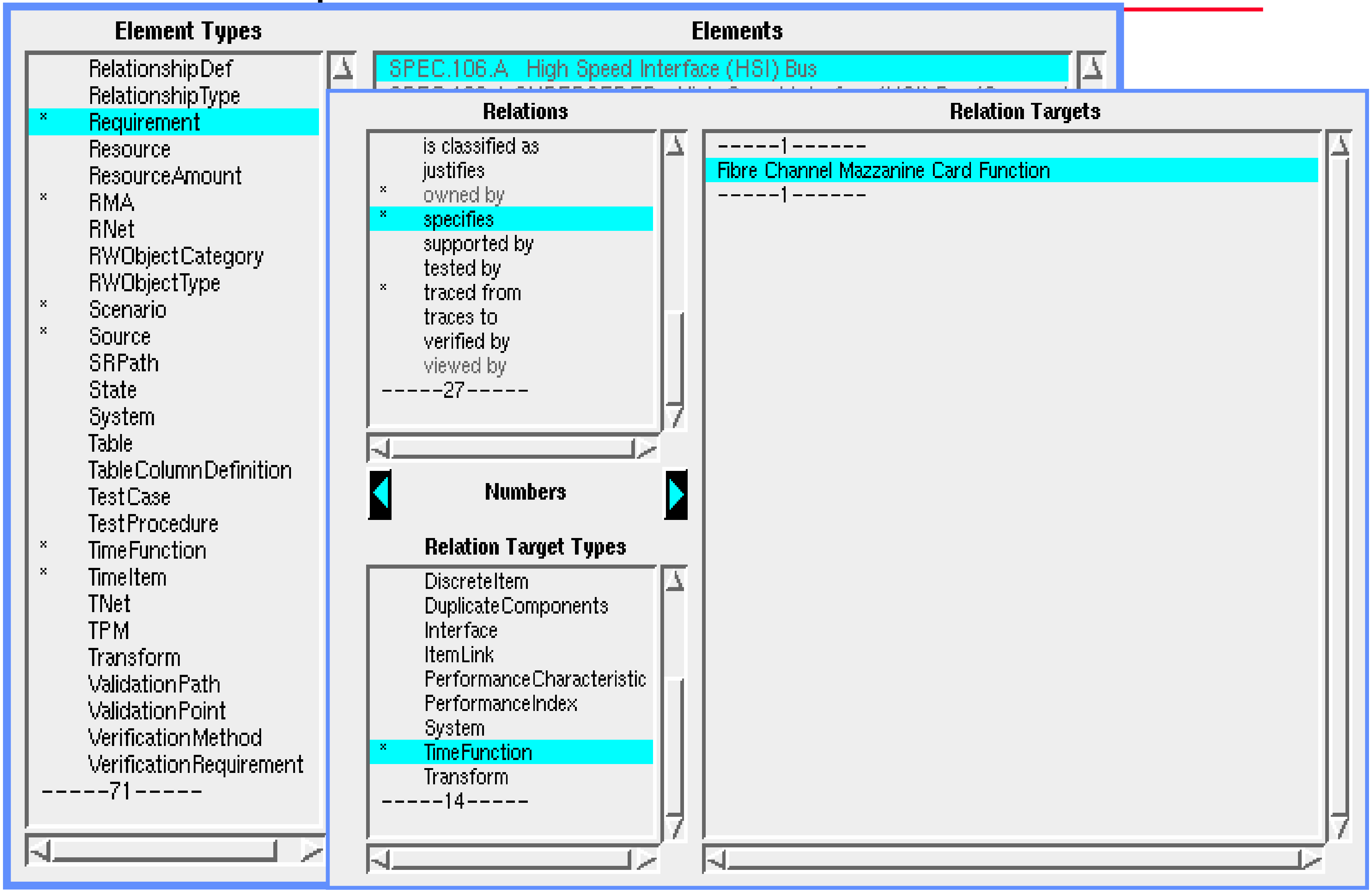
Element Types

OutputInterface
PerformanceChar
PerformanceIndex
Property
* RDDProcess
RelationshipDef
RelationshipType
* Requirement
Resource
ResourceAmount
* RMA
RNet
RWObjectCategor
RWObjectType

Elements

SPEC.189.1 Reliability - MTBF
SPEC.189.1.1.DERIVED Reliability - MTBF 1553 Mezzanine
SPEC.189.1.2.DERIVED Reliability - MTBF Chassis H/W
SPEC.189.1.3.DERIVED Reliability - MTBF EMI/Wiring Harness
SPEC.189.1.4.DERIVED Reliability - MTBF Fibre Channel Mezza
SPEC.189.1.5.DERIVED Reliability - MTBF Hard Disk Drive
SPEC.189.1.6.DERIVED Reliability - MTBF I/O Module
SPEC.189.1.7.DERIVED Reliability - MTBF I/O Module SRA
SPEC.189.1.8.DERIVED Reliability - MTBF IPM SRA
SPEC.189.1.9.DERIVED Reliability - MTBF Power Supply
SPEC.189.1.10.DERIVED Reliability - MTBF Power Supply SRA
SPEC.189.1.11.DERIVED Reliability - MTBF VME Backplane
SPEC.189.1.12.DERIVED Reliability - MTBF VOM Mezzanine
SPEC.189.2 Reliability - predicted MTBF

RDD: Requirements Allocated To Functions



Element Types

RelationshipDef
RelationshipType
× Requirement
Resource
ResourceAmount
× RMA
RNet
RWObjectCategory
RWObjectType
× Scenario
× Source
SRPath
State
System
Table
TableColumnDefinition
TestCase
TestProcedure
× TimeFunction
× TimeItem
TNet
TPM
Transform
ValidationPath
ValidationPoint
VerificationMethod
VerificationRequirement
-----71-----

Elements

SPEC.106.A High Speed Interface (HSI) Bus

Relations

is classified as
justifies
× owned by
× specifies
supported by
tested by
× traced from
traces to
verified by
viewed by
-----27-----

Numbers

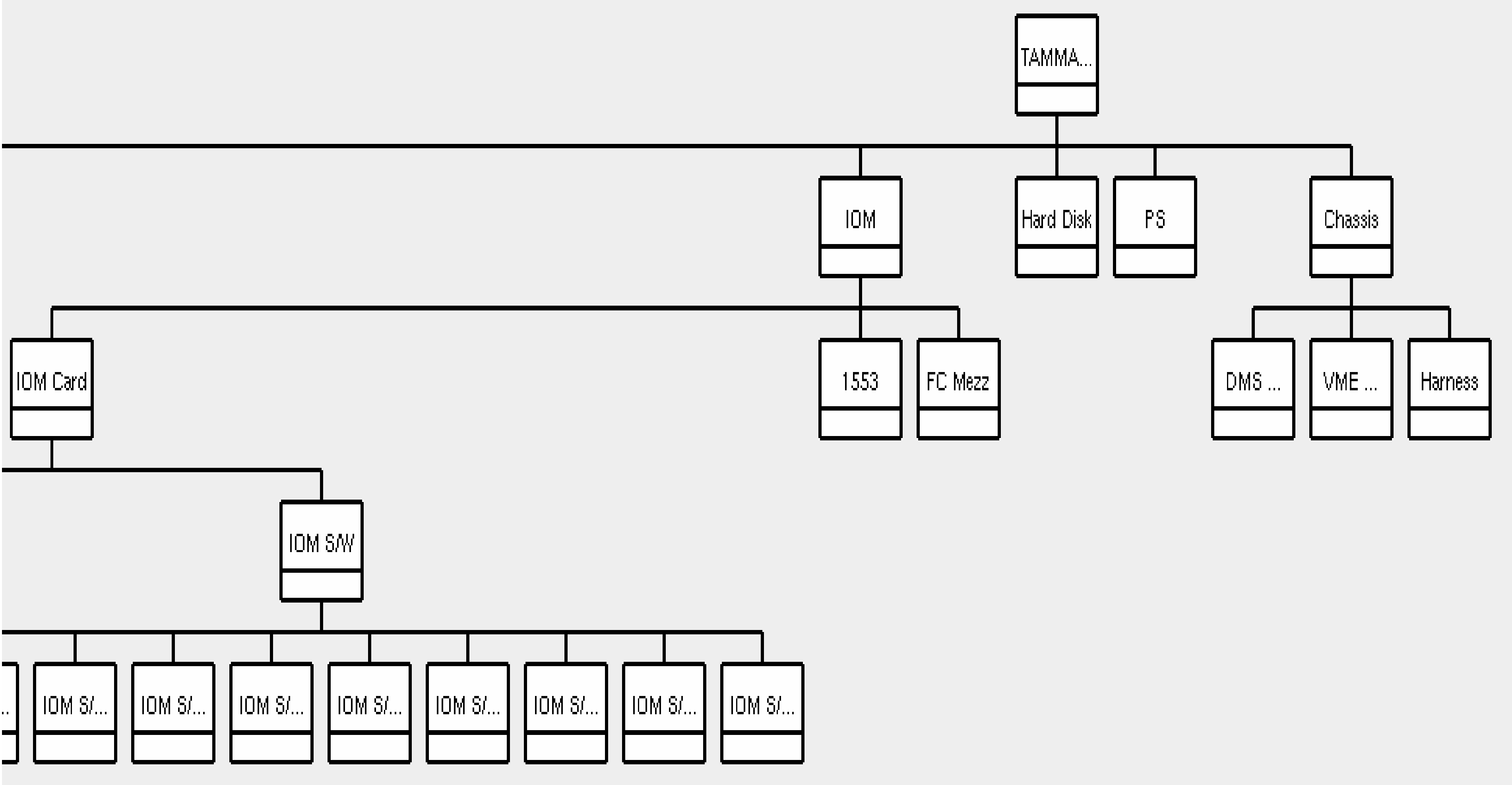
Relation Target Types

DiscreteItem
DuplicateComponents
Interface
ItemLink
PerformanceCharacteristic
PerformanceIndex
System
× TimeFunction
Transform
-----14-----

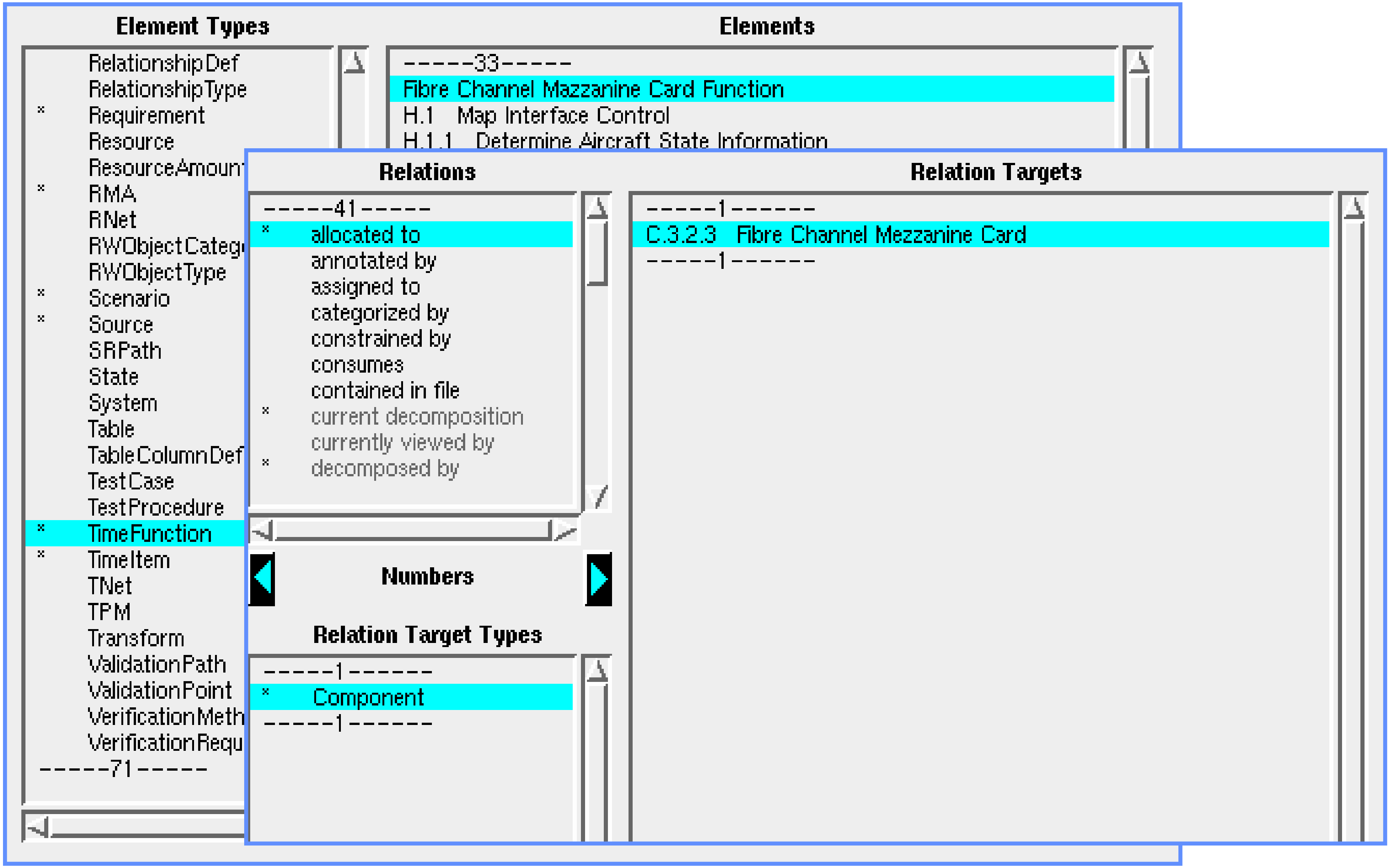
Relation Targets

-----1------
Fibre Channel Mazzanine Card Function
-----1------

RDD: Component Hierarchy Model



RDD: Allocating Functions To Components



Element Types

RelationshipDef
RelationshipType
× Requirement
Resource
ResourceAmoun
× RMA
RNet
RWObjectCateg
RWObjectType
× Scenario
× Source
SRPath
State
System
Table
TableColumnDef
TestCase
TestProcedure
× TimeFunction
× TimeItem
TNet
TPM
Transform
ValidationPath
ValidationPoint
VerificationMeth
VerificationRequ
-----71-----

Elements

-----33-----
Fibre Channel Mazzanine Card Function
H.1 Map Interface Control
H.1.1 Determine Aircraft State Information

Relations

-----41-----
× allocated to
annotated by
assigned to
categorized by
constrained by
consumes
contained in file
× current decomposition
currently viewed by
× decomposed by

Numbers

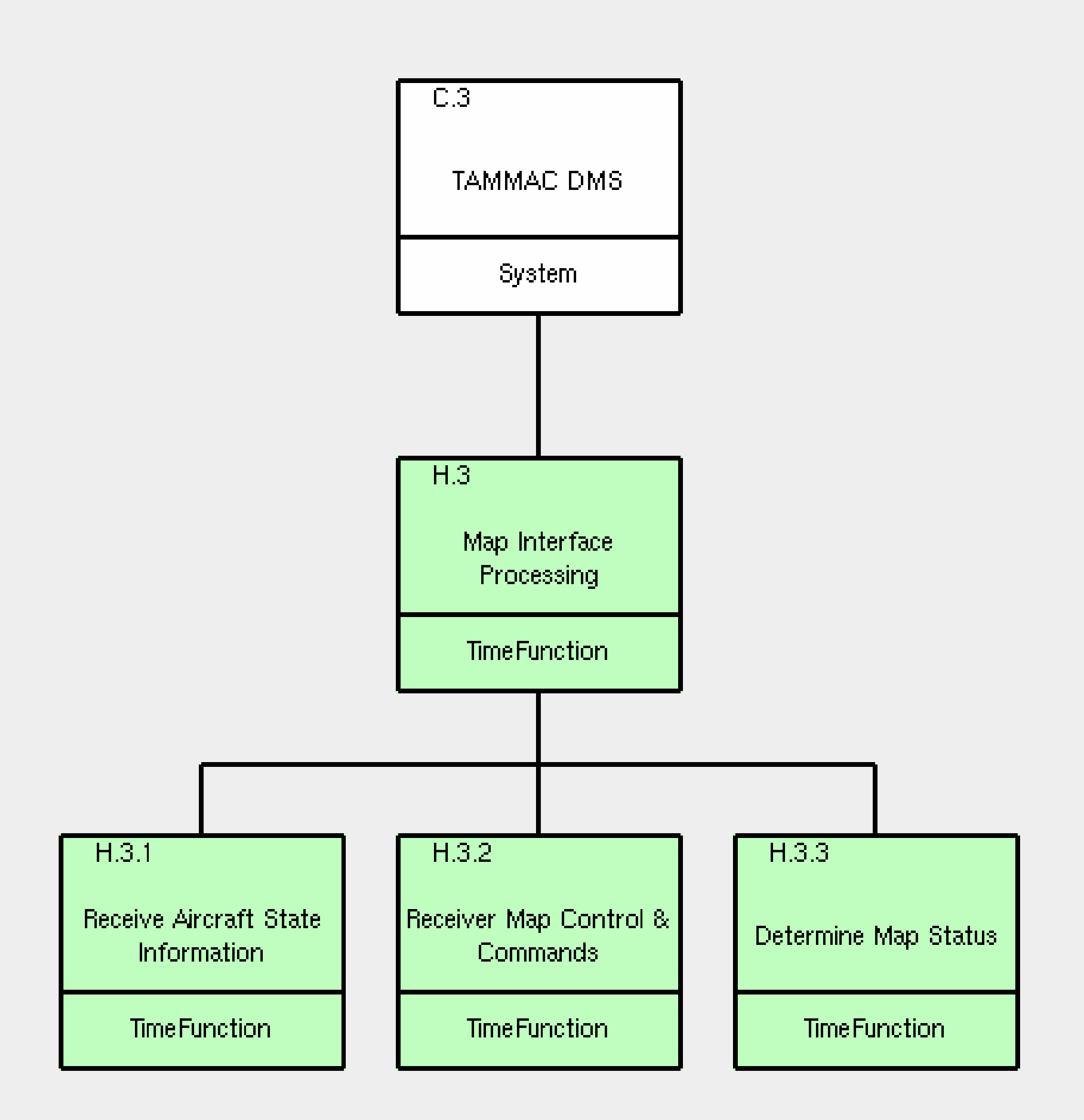
Relation Target Types

-----1------
× Component
-----1------

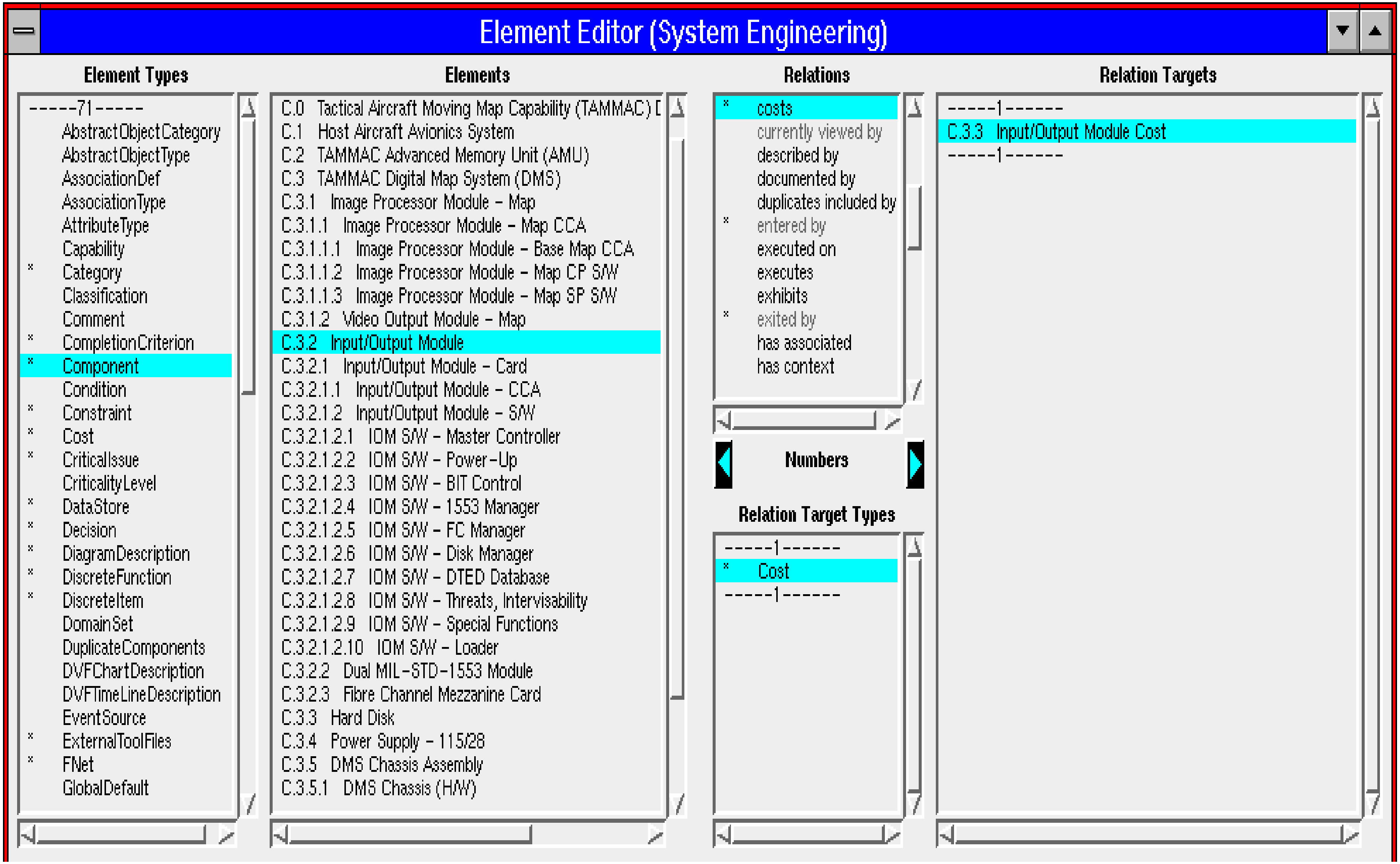
Relation Targets

-----1------
C.3.2.3 Fibre Channel Mezzanine Card
-----1------

RDD: Allocate Function To Component



Example of Cost Estimating Relationships (CERs)



Element Types

- -----71-----
- AbstractObjectCategory
- AbstractObjectType
- AssociationDef
- AssociationType
- AttributeType
- Capability
- Category
- Classification
- Comment
- CompletionCriterion
- Component
- Condition
- Constraint
- Cost
- CriticalIssue
- CriticalityLevel
- DataStore
- Decision
- DiagramDescription
- DiscreteFunction
- DiscreteItem
- DomainSet
- DuplicateComponents
- DVFChartDescription
- DVFTimeLineDescription
- EventSource
- ExternalToolFiles
- FNet
- GlobalDefault

Elements

- C.0 Tactical Aircraft Moving Map Capability (TAMMAC) D
- C.1 Host Aircraft Avionics System
- C.2 TAMMAC Advanced Memory Unit (AMU)
- C.3 TAMMAC Digital Map System (DMS)
- C.3.1 Image Processor Module - Map
- C.3.1.1 Image Processor Module - Map CCA
- C.3.1.1.1 Image Processor Module - Base Map CCA
- C.3.1.1.2 Image Processor Module - Map CP S/W
- C.3.1.1.3 Image Processor Module - Map SP S/W
- C.3.1.2 Video Output Module - Map
- C.3.2 Input/Output Module
- C.3.2.1 Input/Output Module - Card
- C.3.2.1.1 Input/Output Module - CCA
- C.3.2.1.2 Input/Output Module - S/W
- C.3.2.1.2.1 IOM S/W - Master Controller
- C.3.2.1.2.2 IOM S/W - Power-Up
- C.3.2.1.2.3 IOM S/W - BIT Control
- C.3.2.1.2.4 IOM S/W - 1553 Manager
- C.3.2.1.2.5 IOM S/W - FC Manager
- C.3.2.1.2.6 IOM S/W - Disk Manager
- C.3.2.1.2.7 IOM S/W - DTED Database
- C.3.2.1.2.8 IOM S/W - Threats, Intervisability
- C.3.2.1.2.9 IOM S/W - Special Functions
- C.3.2.1.2.10 IOM S/W - Loader
- C.3.2.2 Dual MIL-STD-1553 Module
- C.3.2.3 Fibre Channel Mezzanine Card
- C.3.3 Hard Disk
- C.3.4 Power Supply - 115/28
- C.3.5 DMS Chassis Assembly
- C.3.5.1 DMS Chassis (H/W)

Relations

- costs
- currently viewed by
- described by
- documented by
- duplicates included by
- entered by
- executed on
- executes
- exhibits
- exited by
- has associated
- has context

Numbers

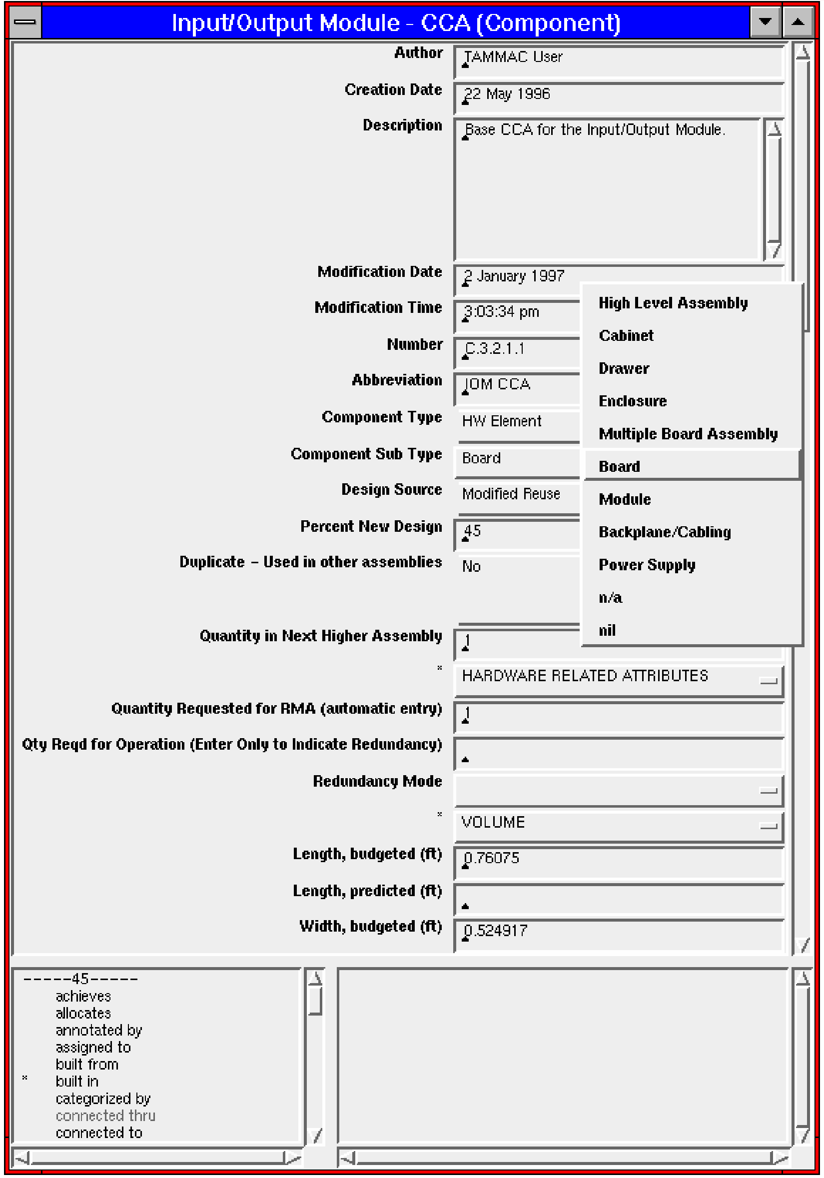
Relation Target Types

- -----1------
- Cost
- -----1------

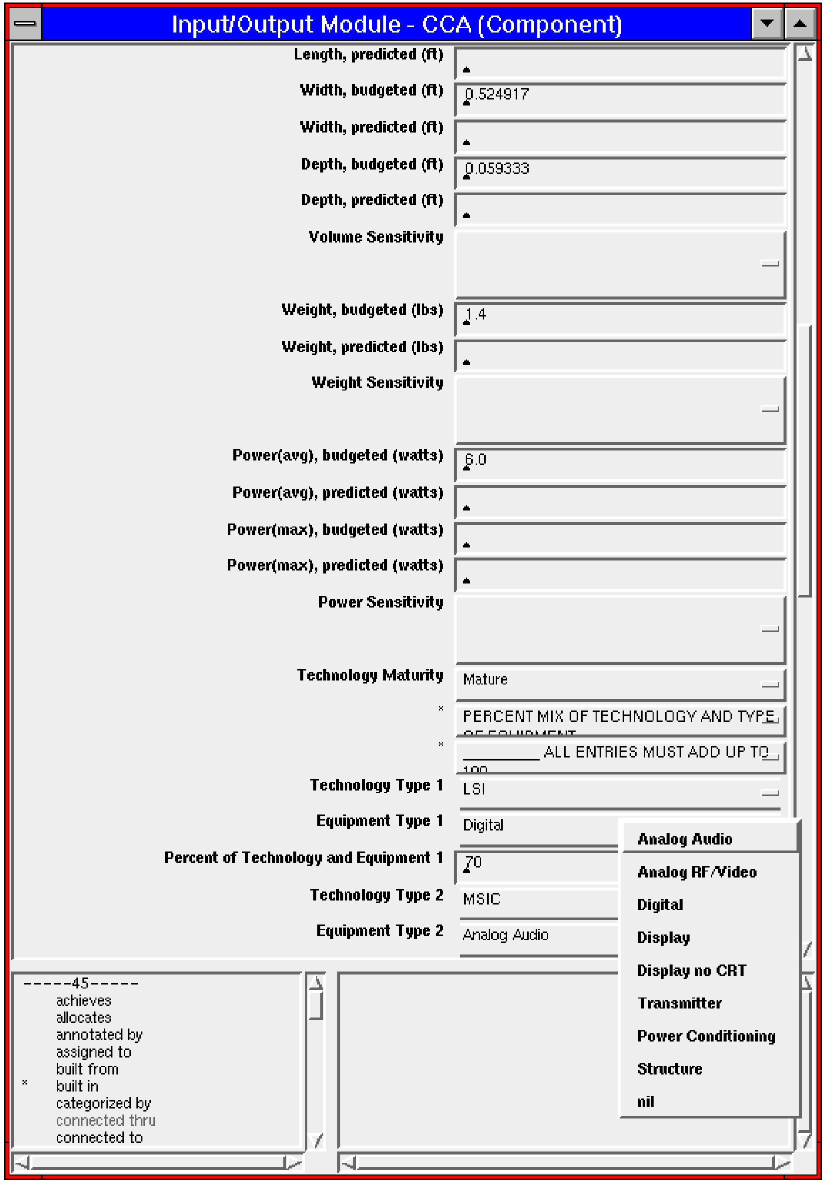
Relation Targets

- -----1------
- C.3.3 Input/Output Module Cost
- -----1------

Hardware CER

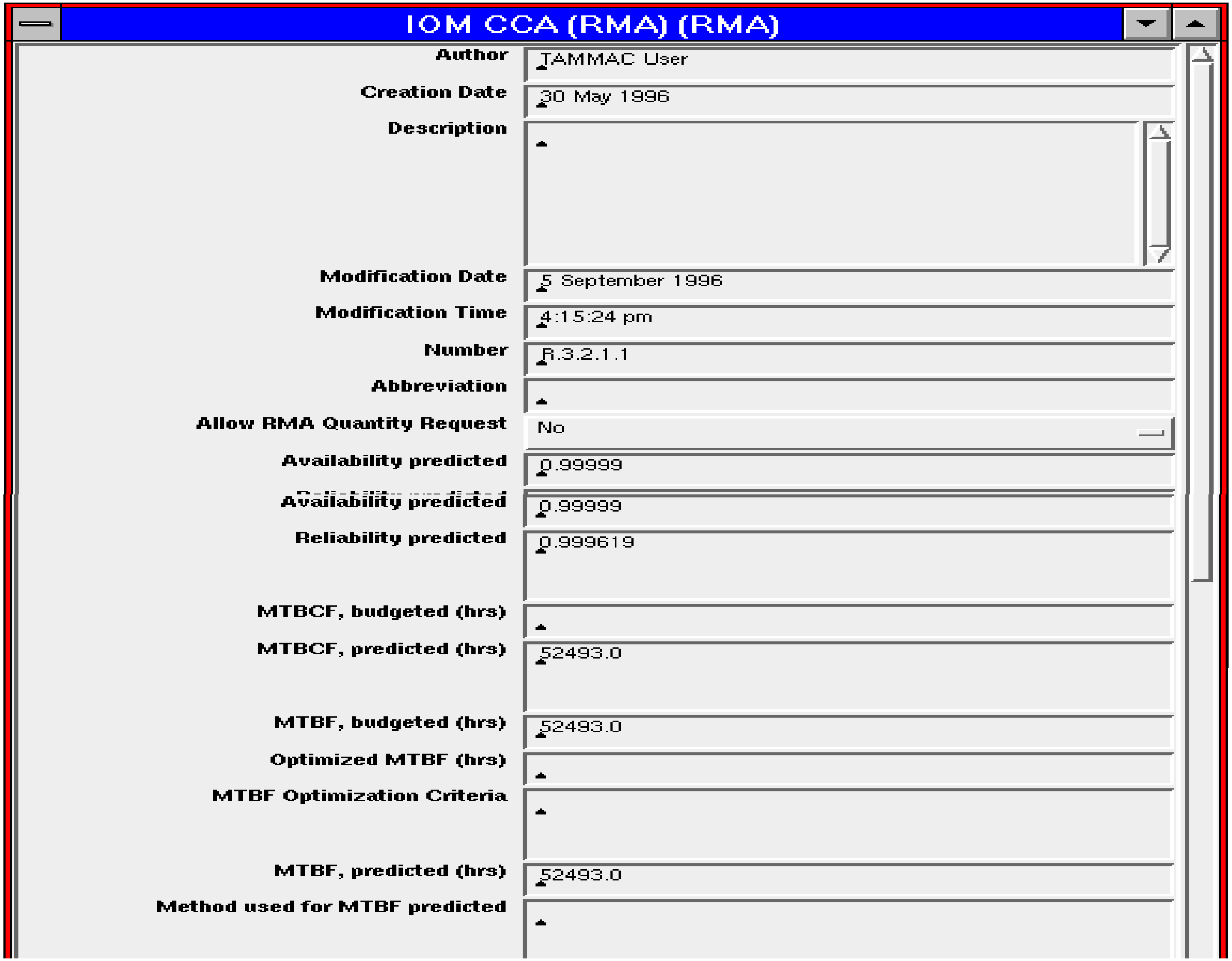


Author	TAMMAC User
Creation Date	22 May 1996
Description	Base CCA for the Input/Output Module.
Modification Date	2 January 1997
Modification Time	3:03:34 pm
Number	C.3.2.1.1
Abbreviation	IOM CCA
Component Type	HW Element
Component Sub Type	Board
Design Source	Modified Reuse
Percent New Design	45
Duplicate – Used in other assemblies	No
Quantity in Next Higher Assembly	1
*	HARDWARE RELATED ATTRIBUTES
Quantity Requested for RMA (automatic entry)	1
Qty Reqd for Operation (Enter Only to Indicate Redundancy)	
Redundancy Mode	
*	VOLUME
Length, budgeted (ft)	0.76075
Length, predicted (ft)	
Width, budgeted (ft)	0.524917



Length, predicted (ft)	
Width, budgeted (ft)	0.524917
Width, predicted (ft)	
Depth, budgeted (ft)	0.059333
Depth, predicted (ft)	
Volume Sensitivity	
Weight, budgeted (lbs)	1.4
Weight, predicted (lbs)	
Weight Sensitivity	
Power(avg), budgeted (watts)	6.0
Power(avg), predicted (watts)	
Power(max), budgeted (watts)	
Power(max), predicted (watts)	
Power Sensitivity	
Technology Maturity	Mature
*	PERCENT MIX OF TECHNOLOGY AND TYPE OF EQUIPMENT
*	________ ALL ENTRIES MUST ADD UP TO 100
Technology Type 1	LSI
Equipment Type 1	Digital
Percent of Technology and Equipment 1	70
Technology Type 2	MSIC
Equipment Type 2	Analog Audio

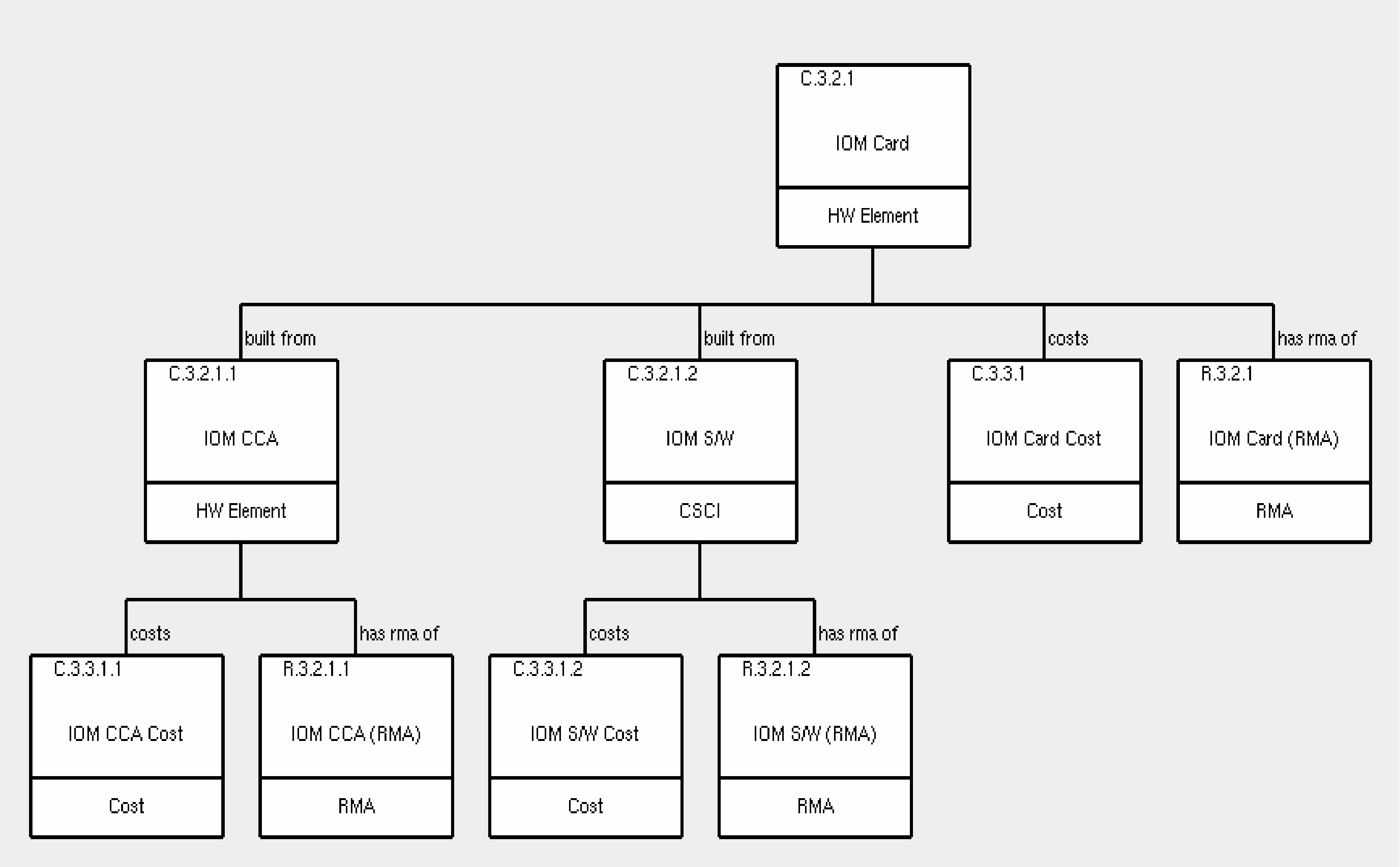
Hardware Reliability Data



IOM CCA (RMA) (RMA)

Author	JAMMAC User
Creation Date	30 May 1996
Description	
Modification Date	5 September 1996
Modification Time	4:15:24 pm
Number	R.3.2.1.1
Abbreviation	
Allow RMA Quantity Request	No
Availability predicted	0.99999
Availability predicted	0.99999
Reliability predicted	0.999619
MTBCF, budgeted (hrs)	
MTBCF, predicted (hrs)	52493.0
MTBF, budgeted (hrs)	52493.0
Optimized MTBF (hrs)	
MTBF Optimization Criteria	
MTBF, predicted (hrs)	52493.0
Method used for MTBF predicted	

Custom Hierarchy for Cost and RMA



Software CER

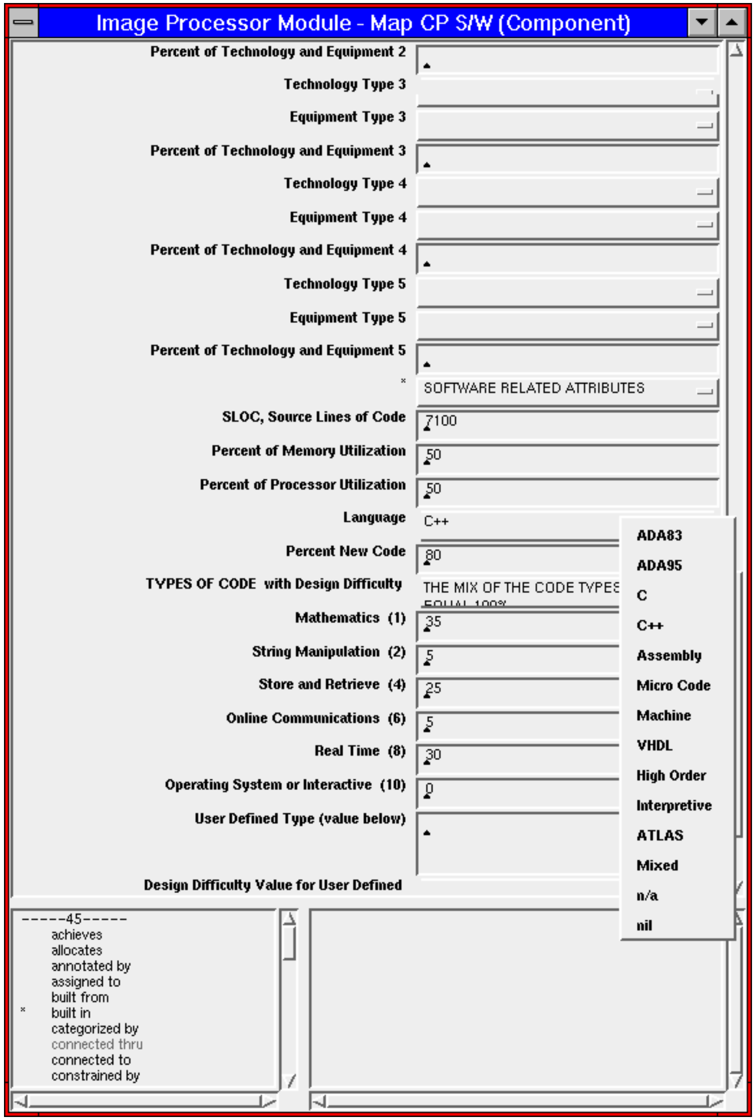
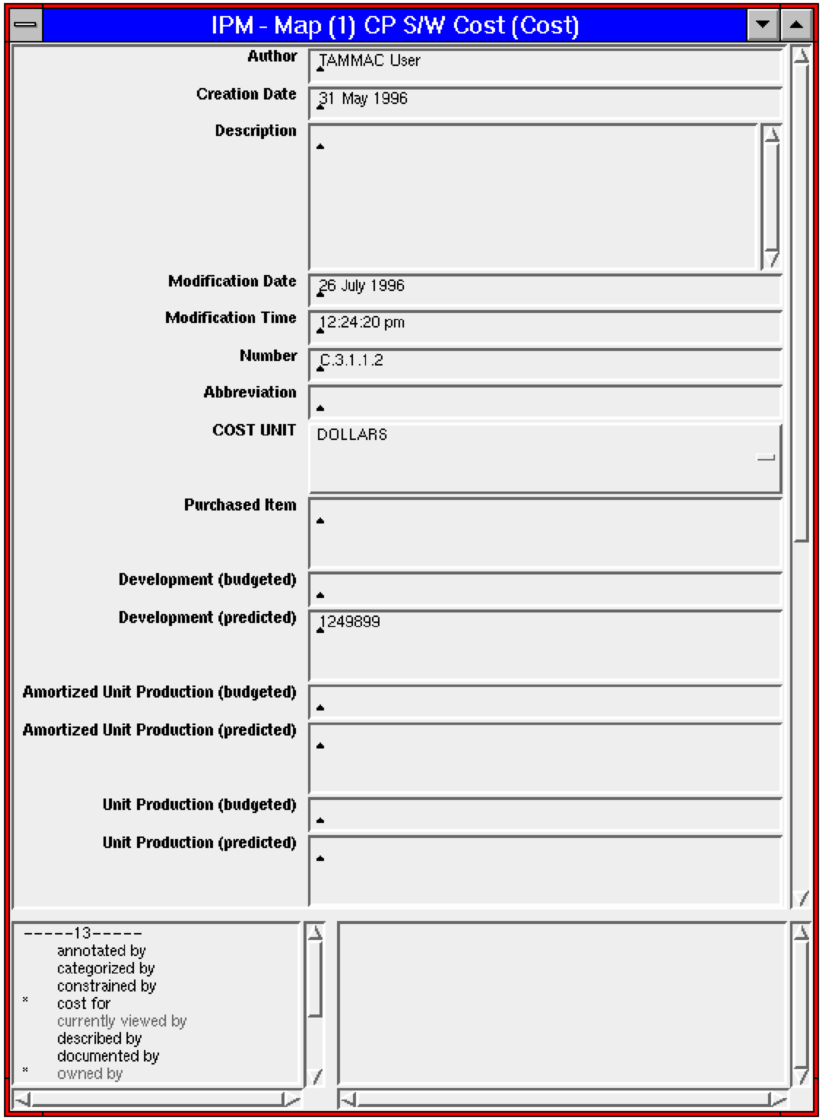


Image Processor Module - Map CP S/W (Component)

Percent of Technology and Equipment 2:
Technology Type 3:
Equipment Type 3:
Percent of Technology and Equipment 3:
Technology Type 4:
Equipment Type 4:
Percent of Technology and Equipment 4:
Technology Type 5:
Equipment Type 5:
Percent of Technology and Equipment 5:
SOFTWARE RELATED ATTRIBUTES
SLOC, Source Lines of Code: 7100
Percent of Memory Utilization: 50
Percent of Processor Utilization: 50
Language: C++
Percent New Code: 80
TYPES OF CODE with Design Difficulty: THE MIX OF THE CODE TYPES
Mathematics (1): 35
String Manipulation (2): 5
Store and Retrieve (4): 25
Online Communications (6): 5
Real Time (8): 30
Operating System or Interactive (10): 0
User Defined Type (value below):
Design Difficulty Value for User Defined

-----45-----
- achieves
- allocates
- annotated by
- assigned to
- built from
- built in
- categorized by
- connected thru
- connected to
- constrained by



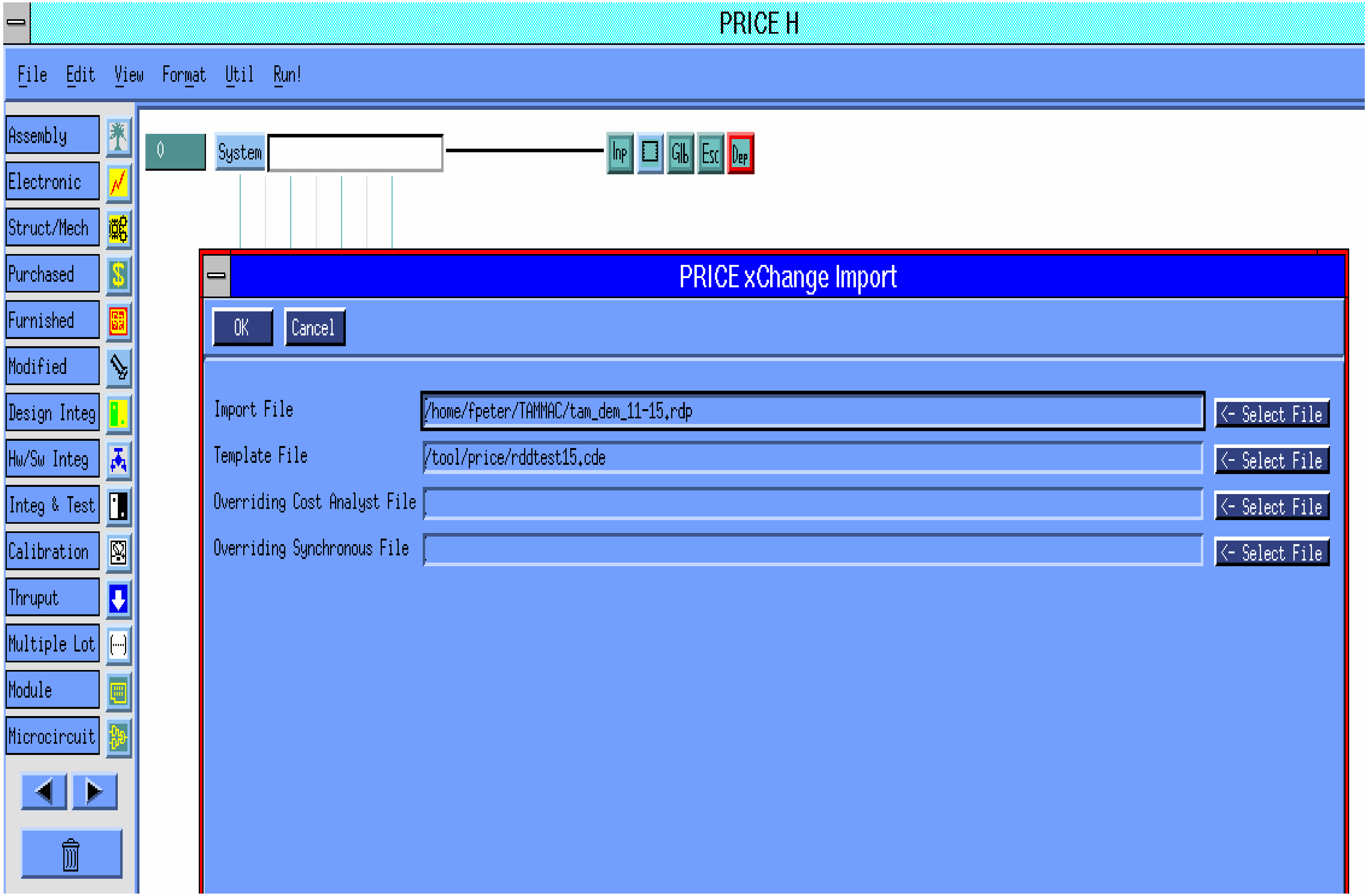
IPM - Map (1) CP S/W Cost (Cost)

Author: TAMMAC User
Creation Date: 31 May 1996
Description:
Modification Date: 26 July 1996
Modification Time: 12:24:20 pm
Number: C.3.1.1.2
Abbreviation:
COST UNIT: DOLLARS
Purchased Item:
Development (budgeted):
Development (predicted): 1249899
Amortized Unit Production (budgeted):
Amortized Unit Production (predicted):
Unit Production (budgeted):
Unit Production (predicted):

-----13-----
- annotated by
- categorized by
- constrained by
- cost for
- currently viewed by
- described by
- documented by
- owned by

Price E

Price: Import from RDD



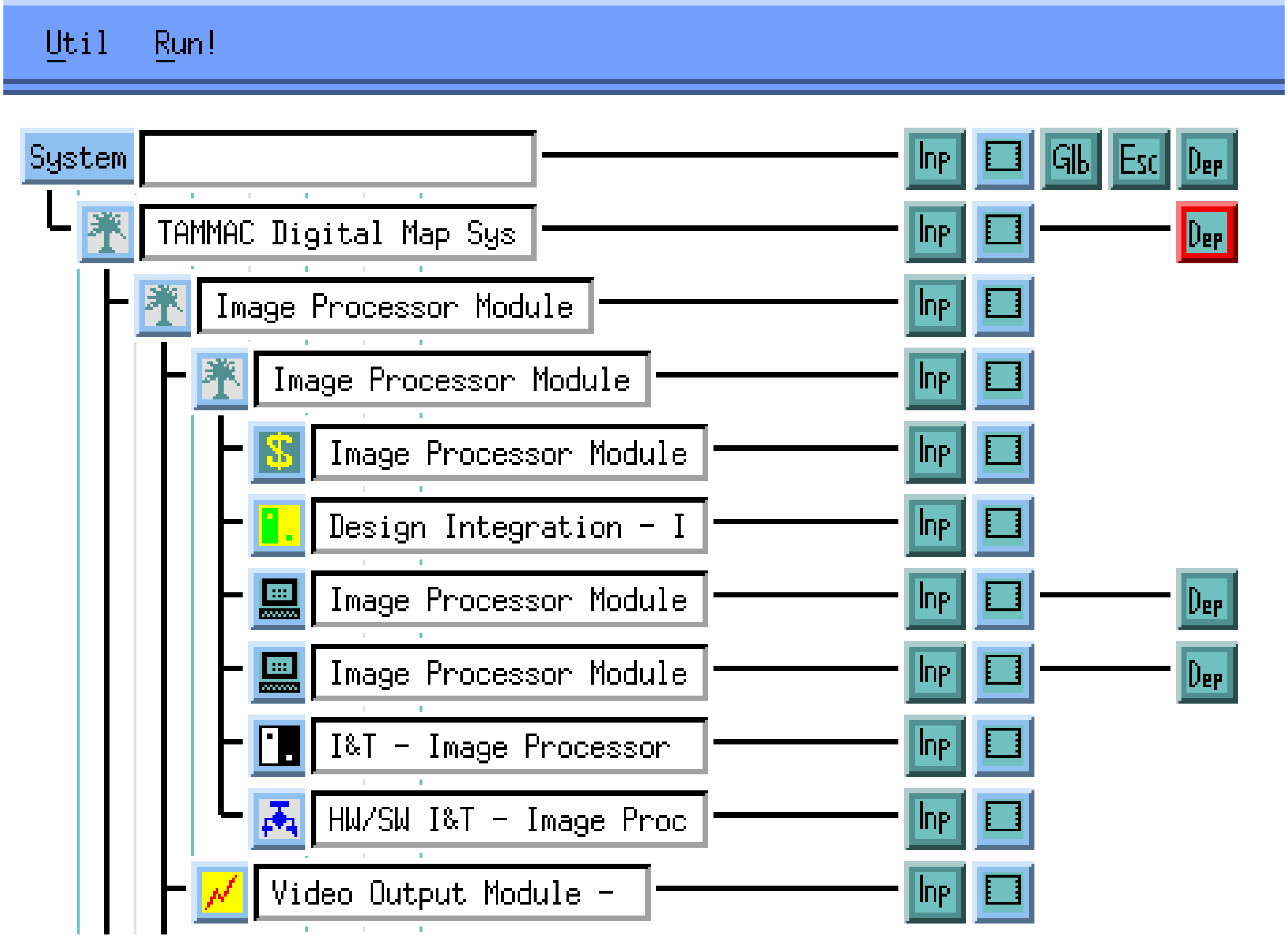
Import File /home/fpeter/TAMMAC/tam_dem_11-15.rdp

Template File /tool/price/rddtest15.cde

Overriding Cost Analyst File

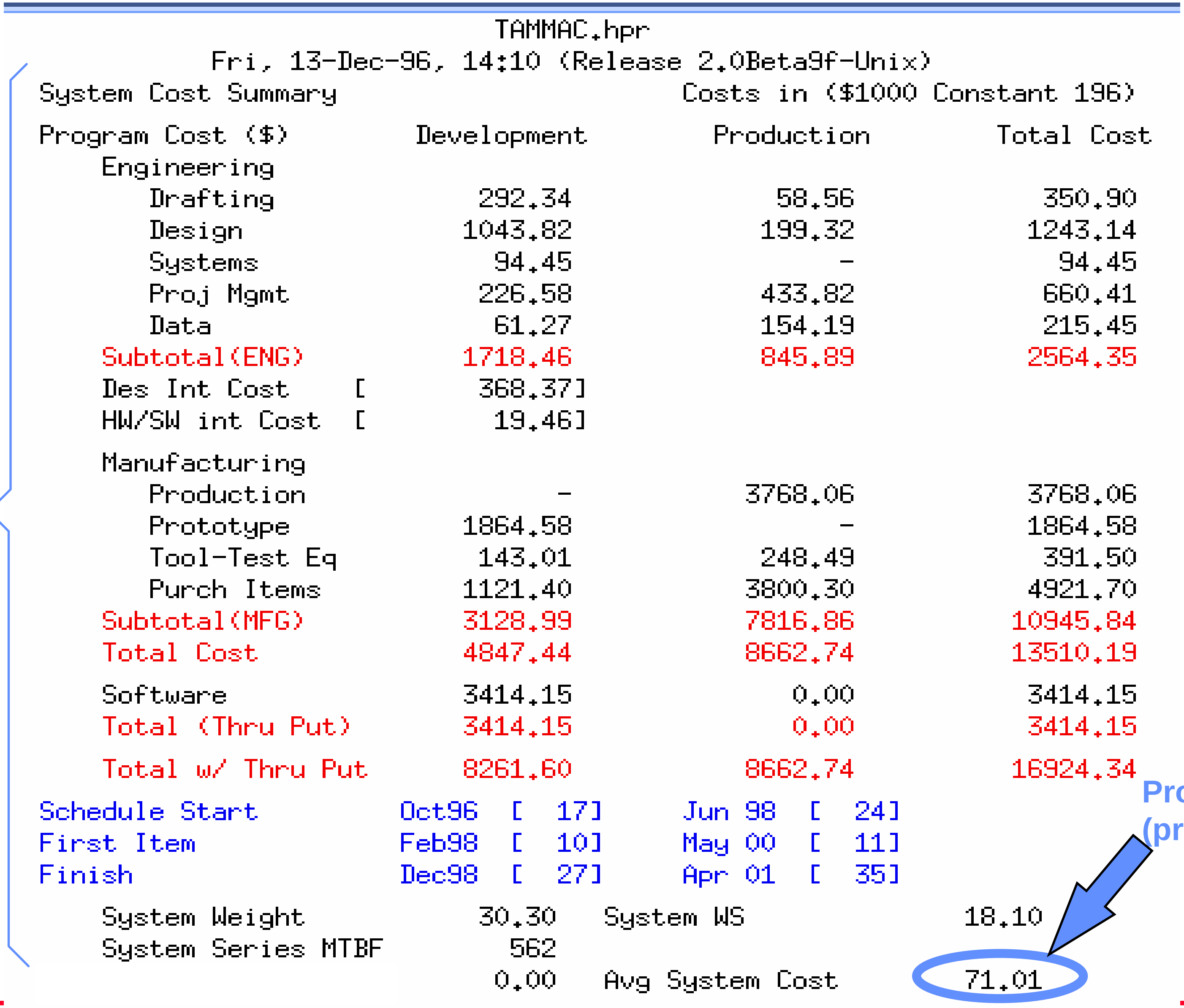
Overriding Synchronous File

Price: Equipment Breakdown Structure



- System
  - TAMMAC Digital Map Sys
    - Image Processor Module
      - Image Processor Module
        - Image Processor Module
        - Design Integration - I
        - Image Processor Module
        - Image Processor Module
        - I&T - Image Processor
        - HW/SW I&T - Image Proc
      - Video Output Module -

Price: Basic Estimate Report



```
                                TAMMAC.hpr
                  Fri, 13-Dec-96, 14:10 (Release 2.0Beta9f-Unix)
System Cost Summary                              Costs in ($1000 Constant 196)

Program Cost ($)          Development         Production          Total Cost
    Engineering
       Drafting               292.34              58.56              350.90
       Design                1043.82             199.32             1243.14
       Systems                 94.45                 -                94.45
       Proj Mgmt              226.58             433.82              660.41
       Data                    61.27             154.19              215.45
    Subtotal(ENG)            1718.46             845.89             2564.35
    Des Int Cost     [        368.37]
    HW/SW int Cost   [         19.46]

    Manufacturing
       Production                  -            3768.06             3768.06
       Prototype             1864.58                 -              1864.58
       Tool-Test Eq           143.01             248.49              391.50
       Purch Items           1121.40            3800.30             4921.70
    Subtotal(MFG)            3128.99            7816.86            10945.84
    Total Cost               4847.44            8662.74            13510.19

    Software                 3414.15               0.00             3414.15
    Total (Thru Put)         3414.15               0.00             3414.15

    Total w/ Thru Put        8261.60            8662.74            16924.34
Schedule Start          Oct96  [   17]     Jun 98  [   24]
First Item              Feb98  [   10]     May 00  [   11]
Finish                  Dec98  [   27]     Apr 01  [   35]

    System Weight             30.30    System WS                 18.10
    System Series MTBF          562
                               0.00    Avg System Cost           71.01
```

Hardware and Software Estimate

Production Unit (predicted)

RAM-ILS

RAM: MTBF Allocation

BDE Allocation (Example)

Modules

Ref	**Name**	**MTBF**	**Failure Rate**	**Redundancy**	**Reliability**
5	System	11000			
116	Dig Map System				
117	Power Supply	45000			
119	Hard Disk	75000			
121	I/O Module				
122	MIL-STD-1553				
124	I/O Card				
125	I/O CCA				
127	I/O Software				
148	Fibre Channel				
140	Image Processor				
142	Chassis Assembly				
144	EMI Harness	200000			
160	Chassis				
165	VME Backplane	50000			
	Note:	=Assigned; otherwise allocated by tool			

RAM: MTBF Allocation

BDE Allocation (Example)

Modules

Ref	**Name**	**MTBF**	**Failure Rate**	**Redundancy**	**Reliability**
5	System	11000	90.90909	02/02	0.99818
116	Dig Map System	10997	90.93389	05/05	0.99818
117	Power Supply	45000	22.22222	01/01	0.99956
119	Hard Disk	75000	13.33333	01/01	0.99973
121	I/O Module	34879	28.67055	03/03	0.99943
122	MIL-STD-1553	210084	4.76000	01/01	0.99990
124	I/O Card	52218	19.15048	02/02	0.99962
125	I/O CCA	52492	19.05052	01/01	0.99962
127	I/O Software	1.00E+07	0.10000	01/01	1.00000
148	Fibre Channel	210084	4.76000	01/01	0.99990
140	Image Processor	264600	3.77929	01/01	1.00000
142	Chassis Assembly	37495	26.67022	01/01	0.99947
144	EMI Harness	200000	5.00000	01/01	0.99990
160	Chassis	598798	1.67001	01/01	0.99997
165	VME Backplane	50000	20.00000	01/01	0.99960
	Note:	=Assigned; otherwise allocated by tool			

RAM: Failure Modes Effects Analysis

TAMMAC

Input/Output Module

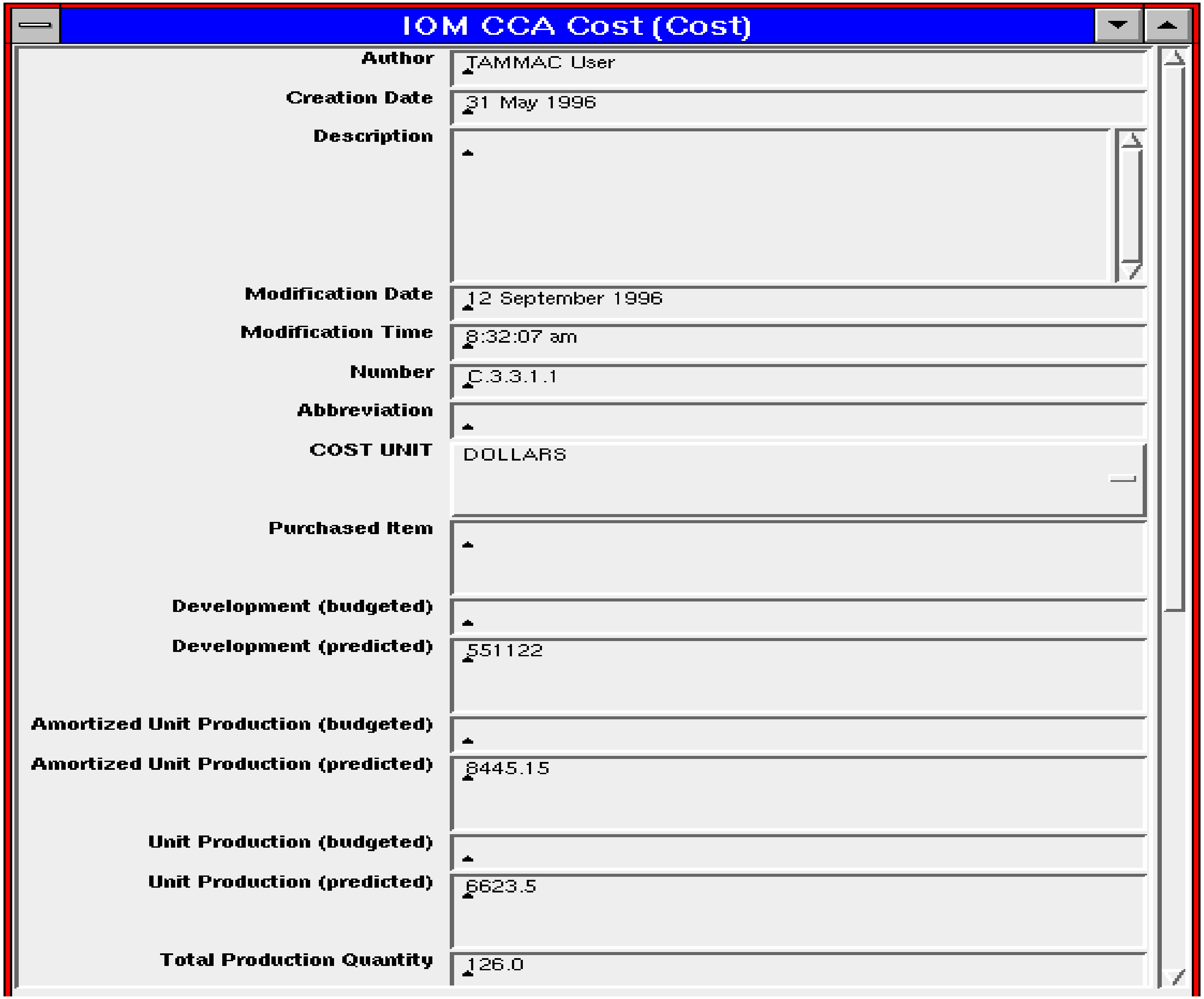
Item No	Item Nomenclature	Function	Fail Prob	Mode Name	Cause	Local Effect	Next Higher Level	End Effects	Detection Method	Compensating Provision
	Fibre Channel Mezzanine Card	Fibre Channel Mazzanine Card Function	0.5	Incorrect Fibre Channel Mezzanine Card		Incorrect Fibre Channel Mazzanine Card Function	Incorrect Fibre Channel AMU Control at TAMMAC Advanced Memory Unit (AMU)			
	Fibre Channel Mezzanine Card	Fibre Channel Mazzanine Card Function	0.5	Failed Fibre Channel Mezzanine Card		No Fibre Channel Mazzanine Card Function	No Fibre Channel AMU Control at TAMMAC Advanced Memory Unit (AMU)			
	Input/Output Module - Card		0.5	Incorrect Input/Output Module - Card		Incorrect SCSI Control at Hard Disk				
	Input/Output Module - Card		0.5	Failed Input/Output Module - Card		No SCSI Control at Hard Disk				

RAM: MTBF Prediction Report

Video Output Module - Map	1	14.49002	1.00	14.49002	1	14.49002	30.00		auc	4 -	
Image Processor Module - Map CCA	3	28.99963	1.00	28.99963	1	28.99963	30.00		auc	4 - 4	
											0.0 0.5 1.0 1.5
				Total	2	43.48965					
				Usage Factor		1.0000					
				Total Failure Rate		86.9793	Required MTBF 23000.000				
				MTBF		11496.988	Ratio				
							09/16/96 12:57:32 Page R - 6				
Undefined											
TAMMAC Digital Map System (DMS)											
Undefined											
Undefined											
Undefined	Number	Base				Total					
Undefined	of	Failure	Duty	Failure		Failure					MTBF
	Parts	Rate	Cycle	Rate	Qty	Rate	OpTemp	DT	Env	Pages	Ratio
Input/Output Module	3	28.58016	1.00	28.58016	1	28.58016	30.00		auc	2 - 2	
DMS Chassis Assembly	3	26.67001	1.00	26.67001	1	26.67001	30.00		auc	3 - 3	
Image Processor Module - M	2	43.48965	1.00	43.48965	2	86.9793	30.00		auc	5 - 5	
Power Supply - 115/28	1	22.22222	1.00	22.22222	1	22.22222	30.00		auc	6 -	
Hard Sick	1	13.33333	1.00	13.33333	1	13.33333	30.00		auc	6 -	
											0.0 0.5 1.0 1.5
				Total	6	177.78502					
				Usage Factor		1.0000					
				Total Failure Rate		177.785	Required MTBF 4500.000				
				MTBF		5624.771	Ratio				
							09/16/96 12"57:32 Page R - 7				
Undefined											
Equipment Breakdown											
Undefined											
Undefined											
Undefined	Number	Base				Total					
Undefined	of	Failure	Duty	Failure		Failure					MTBF
	Parts	Rate	Cycle	Rate	Qty	Rate	OpTemp	DT	Env	Pages	Ratio
TAMMAC Digital Map System (DMS)	6	177.78502	1.00	177.78502	1	177.78502	30.00		auc	6 - 6	
											0.0 0.5 1.0 1.5

RDD

Back Populate RDD with RAM and Price



Author	TAMMAC User
Creation Date	31 May 1996
Description	
Modification Date	12 September 1996
Modification Time	8:32:07 am
Number	C.3.3.1.1
Abbreviation	
COST UNIT	DOLLARS
Purchased Item	
Development (budgeted)	
Development (predicted)	551122
Amortized Unit Production (budgeted)	
Amortized Unit Production (predicted)	8445.15
Unit Production (budgeted)	
Unit Production (predicted)	6623.5
Total Production Quantity	126.0

RDD: Three Element Report

TABLE 1 Component: C.3 Digital Map System (DMS)

COMPONENT	
Author	**TAMMAC User**
Creation Date	**24 April 1996**
Modification Date	**12 September 1996**
Modification Time	**7:52:08 am**
Number	**C.3**
Abbreviation	**TAMMAC DMS**
Component Type	**System**
Component Sub Type	**High Level Assembly**
SLOC, Source Lines of Code	
SW, Percent of Memory Utilization	
SW, Percent of Processor Utilization	
Duplicate - Used in other assemblies	**No**
Quantity in Next Higher Assembly	**1**
Quantity Requested for RMA	
Quantity Required for Operation	**1**
Redundancy Mode	
Size: Length, budgeted (ft)	**1.208**
Size: Length, predicted (ft)	
Size: Length Sensitivity	
Size: Width, budgeted (ft)	**0.875**
Size: Width, predicted (ft)	
Size: Width Sensitivity	
Size: Depth, budgeted (ft)	**0.916**
Size: Depth, predicted (ft)	
Size: Depth Sensitivity	
Weight, budgeted (lbs)	**23.0**
Weight, predicted (lbs)	
Weight Sensitivity	
Power(avg), budgeted (watts)	**120.0**
Power(avg), predicted (watts)	
Power(avg) Sensitivity	
Power(max), budgeted (watts)	**675.0**
Power(max), predicted (watts)	
Power(max) Sensitivity	
Technology	**Digital LSI**
Technology Maturity	**Leading Edge**
Design Source	**Modified Reuse**
Project Unique ID	
Title	

COST	
Author	**TAMMAC User**
Creation Date	**31 May 1996**
Modification Date	**12 September 1996**
Modification Time	**8:31:39 am**
Number	**C.3**
Abbreviation	
COST UNIT	**DOLLARS**
Purchased Item	
Development (budgeted)	
Development (predicted)	**8261599**
Development Sensitivity	
Amortized Production Unit (budgeted)	
Amortized Production Unit (predicted)	**125278.0**
Production Unit (budgeted)	
Production Unit (predicted)	**71006.1**
Total Production Quantity	**122.0**
Production (budgeted)	
Production (predicted)	**157642[illegible]9**
Production Cost Sensitivity	
Operational (budgeted)	
Operational (predicted)	
Operational Cost Sensitivity	
Support (budgeted)	
Support (predicted)	**418591**
Support Cost Sensitivity	
SW Language	**n/a**
SW Percent New Code	
SW Percent New Design	
TYPES OF CODE with Design Difficulty (1-10 most)	**THE MIX OF THE CODE TYPES SHOULD EQUAL 100%**
Mathematics (1)	
String Manipulation (2)	
Store and Retrieve (4)	
Online Communications (6)	
Real Time (8)	
Interactive (10)	
Operating System (10)	
User Defined Type (value below)	
Design Difficulty Value for User Defined Type (above)	
Title	

RMA	
Author	**TAMMAC User**
Creation Date	**21 May 1996**
Modification Date	**5 September 1996**
Modification Time	**4:13:41 pm**
Number	**R.3**
Abbreviation	
RMA Fault Tolerance Capability	**No**
Availability predicted	**0.999937**
Reliability predicted	**0.998183**
MTBCF, budgeted (hrs)	
MTBCF, predicted (hrs)	**10997.0**
MTBF, budgeted (hrs)	**4500.0**
MTBF, predicted (hrs)	**5621.92**
LRU, Line Replaceable Unit	**Yes**
Maintenance Procedure	**Replace mods at ORG. Repair mods at DPT.**
Maintenance Concept for Costing	
MTTR, line, budgeted (hrs)	**0.6**
MTTR, line, predicted (hrs)	**0.691479**
Project Unique ID	
Title	

Production Unit (predicted)

Summary

- Engineers specify the requirements of the system
- Engineers specifiy the architecture of the system
- Engineers get automatic RAM/ILS analysis
- Engineers get automatic Cost analysis
    - Finance provides added data to calibrate engineering factors to site specific costs

DAS has used the RASSP capability of RDD-RAM/ILS-Price for performing DTC

Questions?