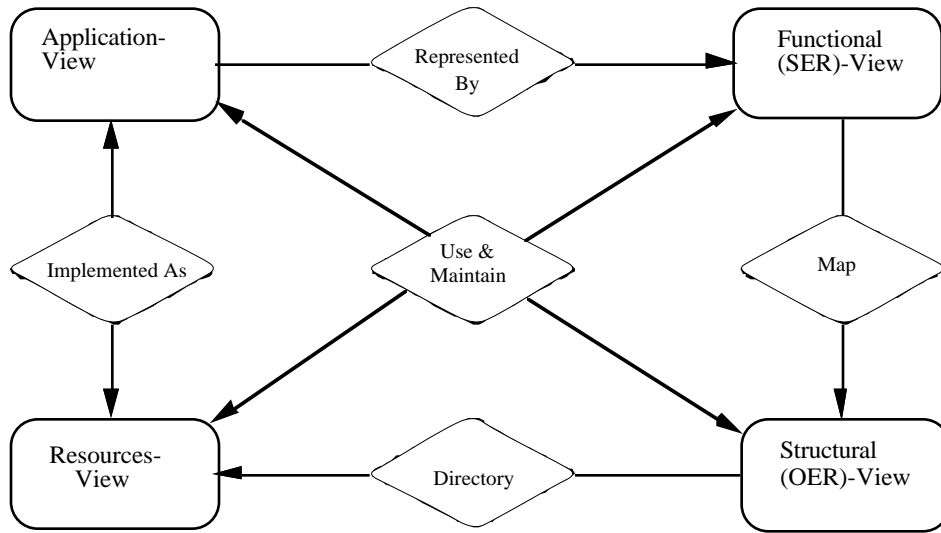


Concurrent Systems Integrator Architecture

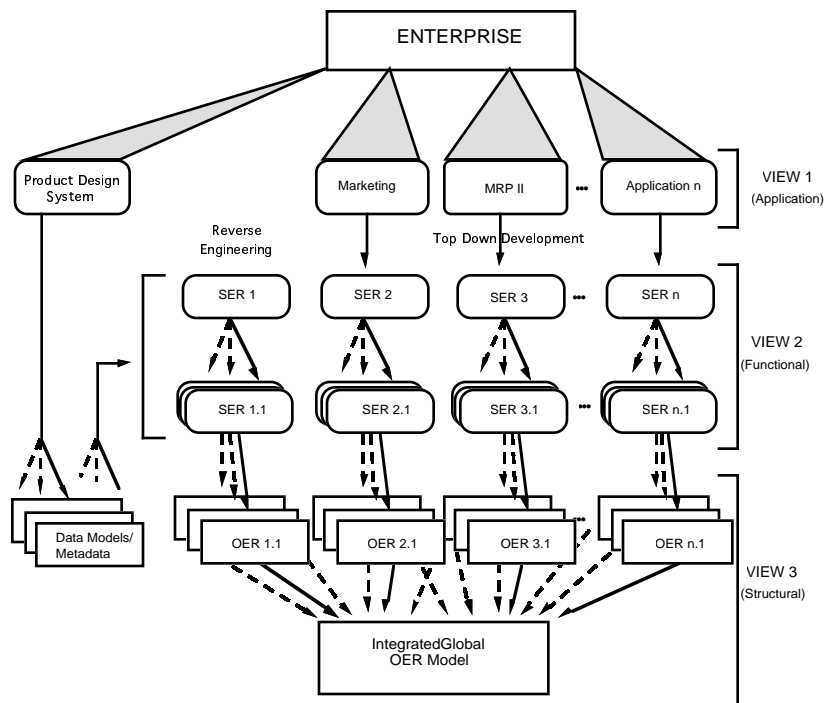
Figure 1



Contents and Organization of Metadatabase

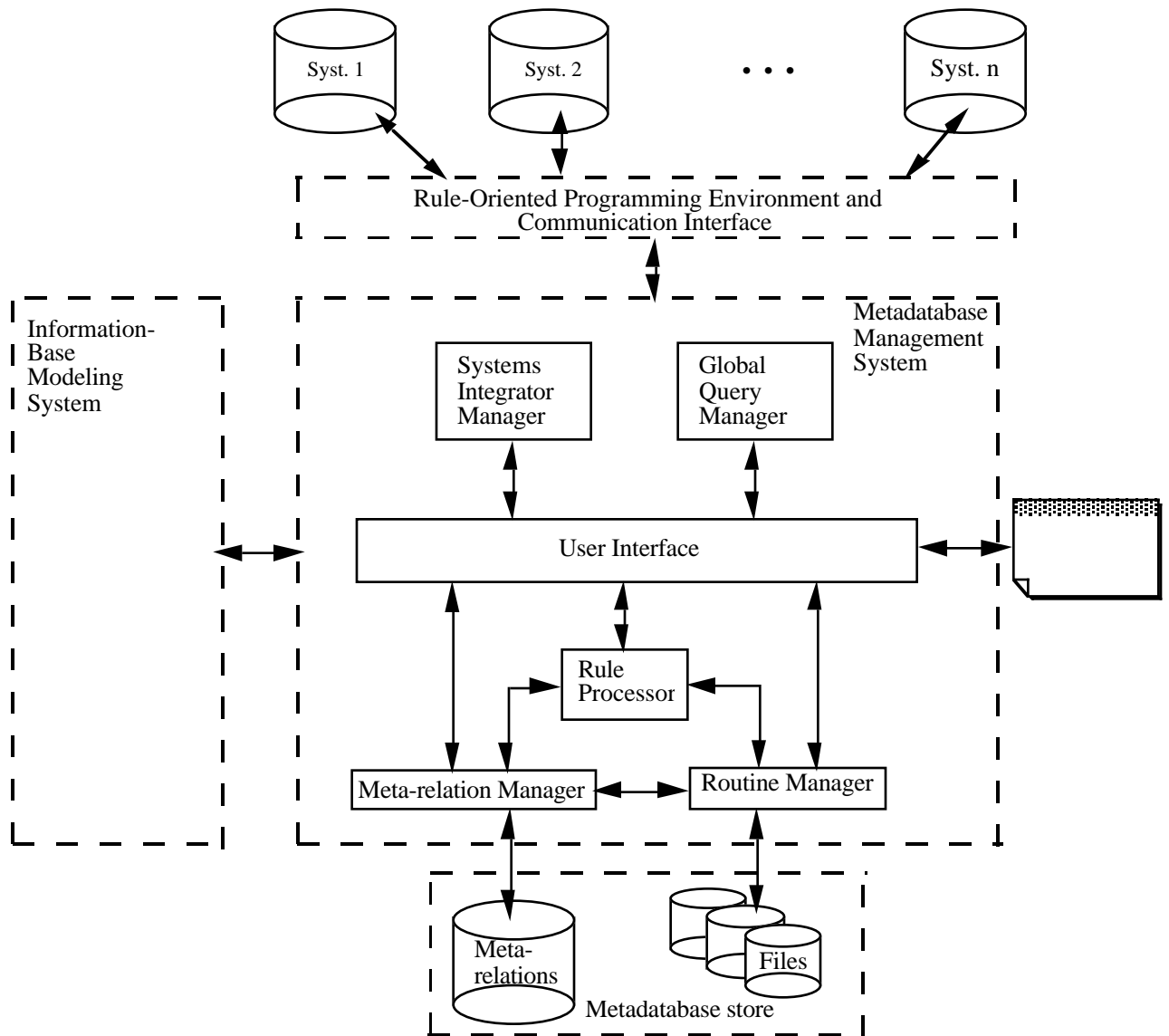
A TSER Functional Model for the Global Information Resources Dictionary (GIRD)

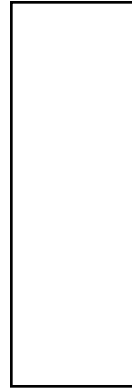
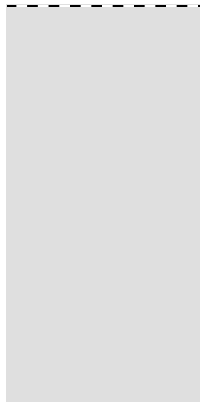
Figure 2

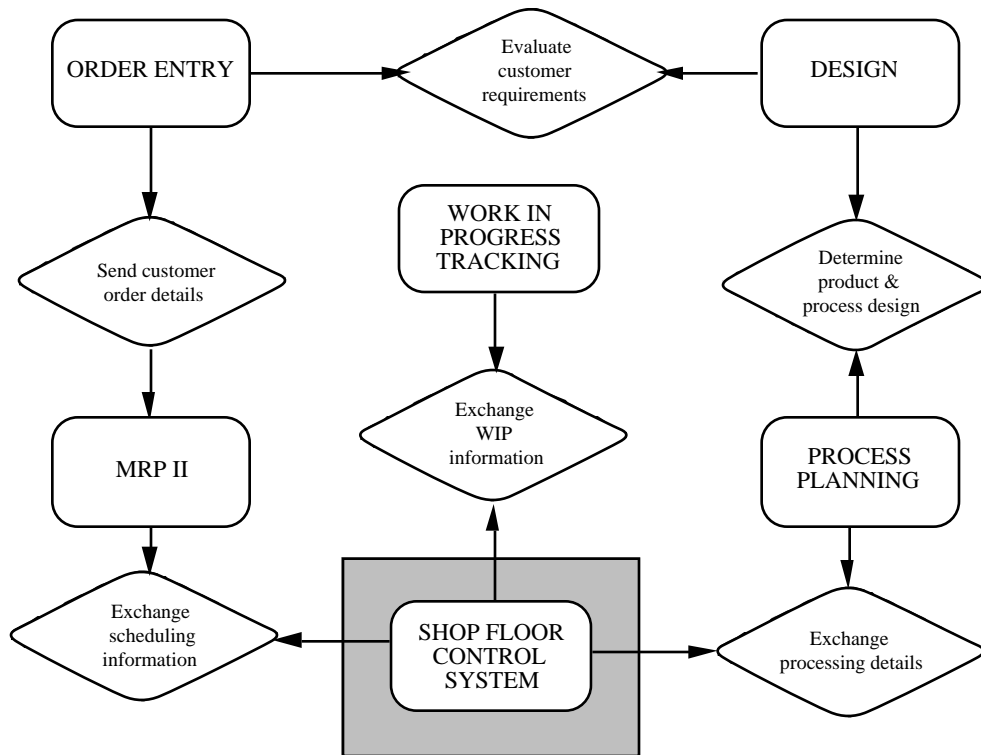


Enterprise Views

Figure 3

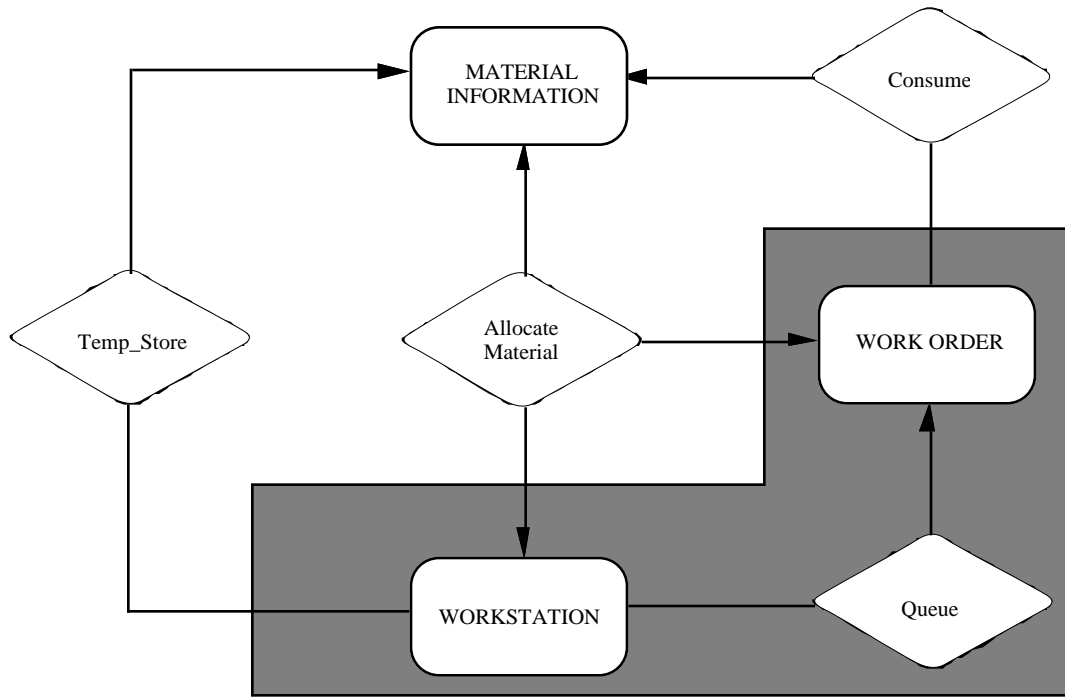






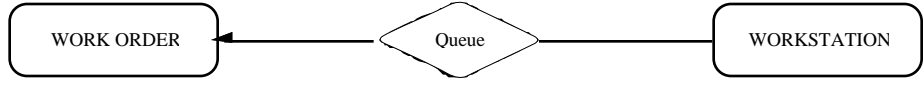
SER Diagram: A CIM Factory System (Top Level)

Figure 7a



SER Diagram: A CIM Factory System (Middle Level)

Figure 7b



FUNCTIONAL DEPENDENCIES:  
 WO\_ID → ORDER\_ID, NUM\_SCRAPPED,  
 NUM\_COMPLETED, WO\_QUAN,  
 PART\_ID, WS\_Q\_ORDER, TYPE

WO\_ID, SEQ\_ID → END\_TIME,  
 END\_DATE, START\_TIME,  
 START\_DATE, STATUS, WS\_ID

RULES:

Rule #3  
 if MWOID = NIL  
 then MALLOC =  
 ALLOCATE\_MILLING(MWOID),

Rule #36  
 if AWOID = NIL  
 then AALOC =  
 ALLOCATE\_ASSEMBLY(AWOID),

Rule #37  
 if ALLOC = 1  
 then UPDATE\_WO\_SEQ(MWOID,10,  
 STARTED,DATE, TIME)  
 UPDATE\_ALL\_COMP\_OF(AWOID)  
 START\_ASSEM\_JOB = FALSE

...

RULES:

Rule #2  
 if CWSID = 1000  
 then CPARTID = GET\_PART\_FOR(MWOID)  
 MWOID = NEXT\_MILL\_JOB(MILL\_Q\_WO)

Rule #32  
 if MILL\_JOB\_STATUS = FAILURE  
 then MALLOC = FALSE  
 MWOID = NIL  
 PARTID = NIL  
 UPDATE\_WO\_SEQ  
 (MWOID,10,ALLOC,NIL,NIL)

Rule #34  
 if MILL\_JOB\_STATUS = SUCCESS  
 NUM\_COMPLETED = WO\_QUAN  
 then FINISH\_WO\_SEQ  
 (MWOID,10,ENDED,DATE,TIME)  
 UPDATE\_ALL\_MILL\_WO(WS\_Q\_ORDER)  
 WS\_Q\_ORDER = 0

...

FUNCTIONAL DEPENDENCIES:  
 WS\_ID → WS\_NAME

RULES:

Rule #1  
 if START\_SFC = TRUE  
 then MILL\_Q\_WO = 0  
 ASSEM\_Q\_WO = 0  
 CWSID = SELECT\_STATION()

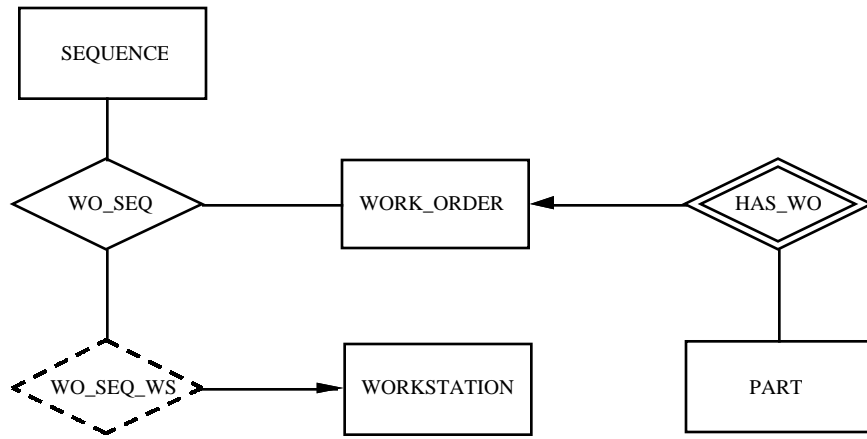
Rule #31  
 if PROG8\_STATUS = TRUE  
 then UPDATE\_WO\_SEQ(MWOID,10, ALLOC,  
 NIL, NIL)  
 MALLOC = FALSE  
 MWOID = NIL  
 PARTID = NIL

Rule #39  
 if START\_ASSEM\_JOB = TRUE  
 then ASSEM\_JOB\_STATUS = RUN  
 ASSEM\_PROGRAM  
 START\_ASSEM\_JOB = FALSE

...

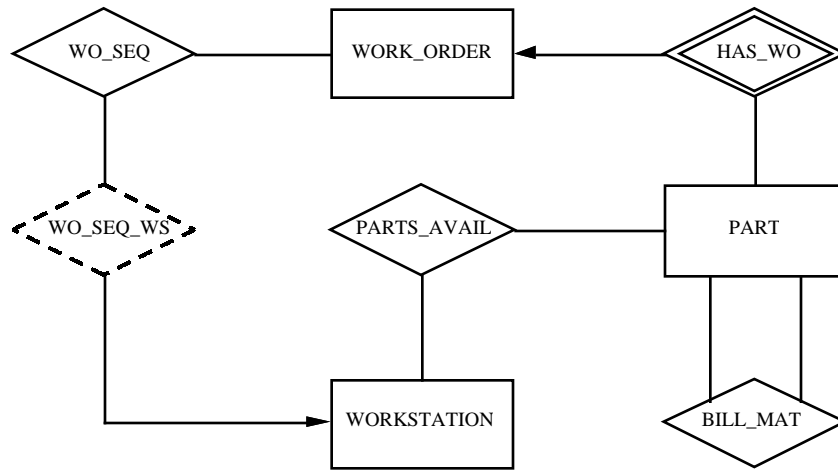
SER Diagram: A CIM Factory System (Detailed Description)

Figure 7c



Structural Model for the "Work Order" Submodel

Figure 8

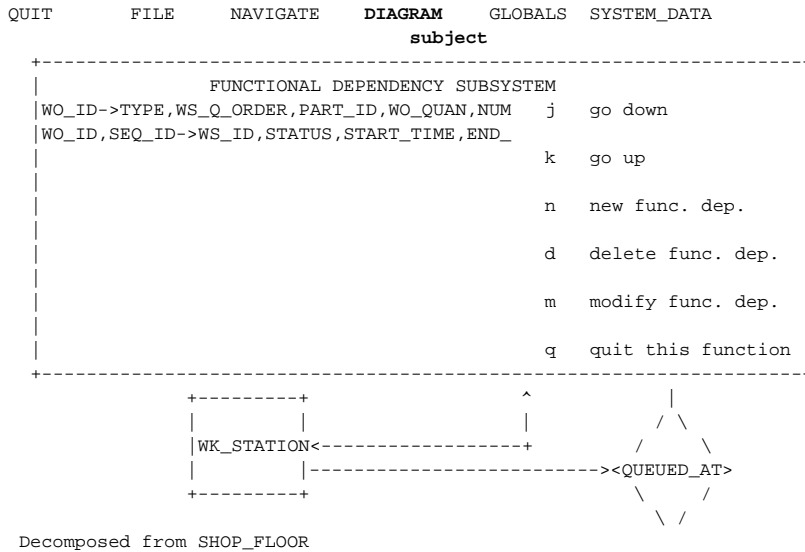


Structural Model for the SFC Subsystem

Figure 9







Functional Model Definition: Define Functional Dependencies

Figure 12

```

* DO YOU WANT TO CONTINUE CHECKING KEYS FOR THE
  REMAINING SUBJECTs? (Y/N) : > Y
SE-Name : WORK_ORDER
Primary-key : (WO_ID SEQ_ID)
Alternative-Keys : NIL
Non-Key Atts : (WS_ID STATUS START_TIME END_TIME WS_Q_ORDER PART_ID WO_QUAN NUM_SCRAPP ORDER_ID START_DATE
END_DATE TYPE NUM_COMPLE PART_DESC)
FDS:
(WO_ID SEQ_ID) ---> (WS_ID STATUS START_DATE END_DATE)
(WO_ID SEQ_ID) ---> (START_TIME END_TIME)
(WO_ID ) ---> (TYPE WS_Q_ORDER PART_ID ORDER_ID)
(WO_ID ) ---> (WO_QUAN NUM_COMPL)
(PART_ID) ---> (PART_DESC)

* DO YOU WANT TO CHANGE THE PK OF THIS SE? (Y/N) : >
  N
* DO YOU WANT TO CONTINUE CHECKING KEYS FOR THE
  REMAINING SUBJECTs? (Y/N) : > Y

```

Mapping Functional to Structural Model: Screen 1

Figure 13a

```

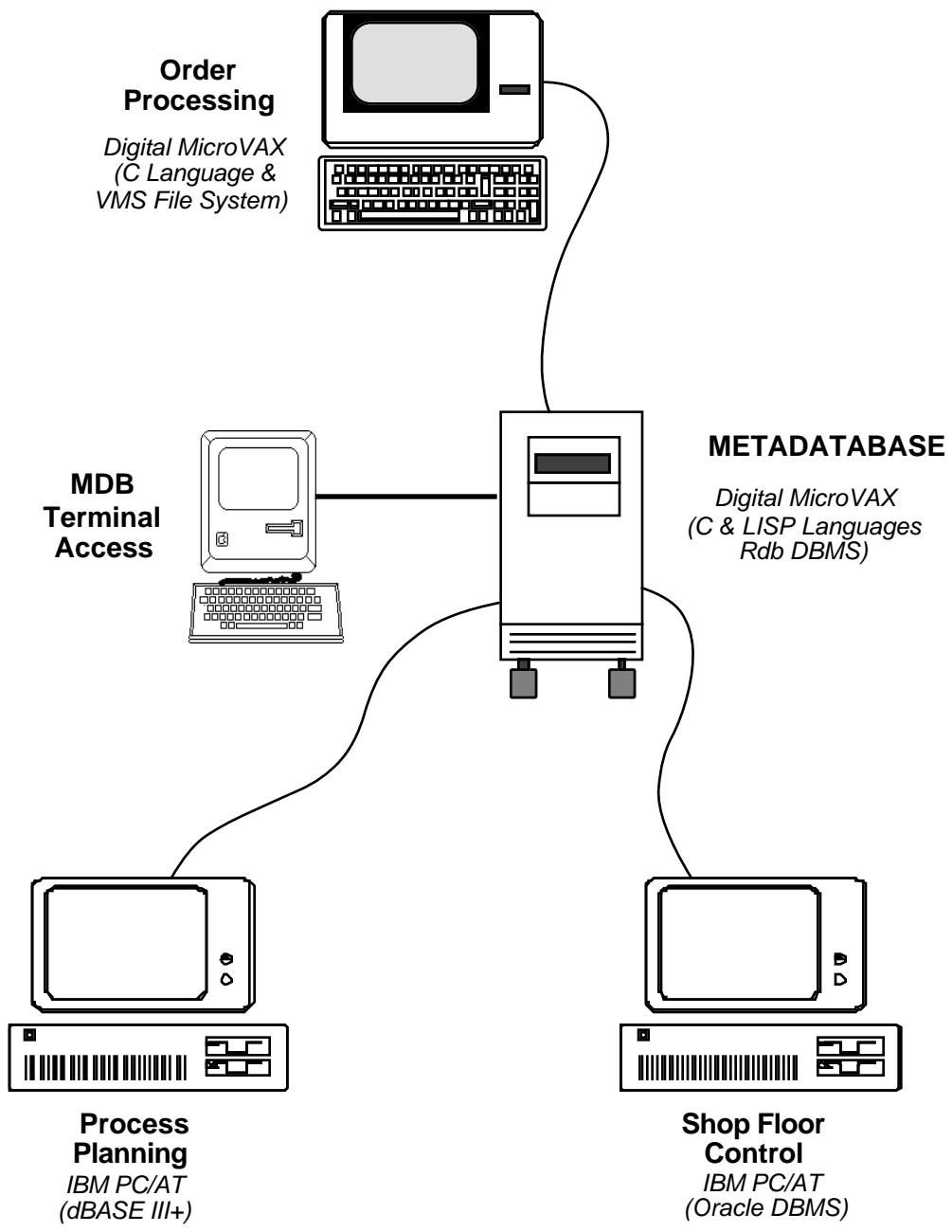
DECOMPOSITION OF SE : WORK_ORDER
... DOES THE FOLLOWING ASSOCIATION :
      (PART_ID) -----> (WO_ID)
... REPRESENT A FIXED ASSOCIATION? (Y/N) : > Y

..... PLEASE GIVE A NAME FOR THIS RELATION : > HAS_WO

```

Mapping Functional to Structural Model: Screen 2

Figure 13b



RPI CIM System Layout

Figure 14

- Item Code : ITEM\_25
  - Item Name : PARTID
  - Description : PART IDENTIFIER
  - Format : CHARACTER
  - Length : 10
  - Domain : PARTID
  - Added by : CHEUNG, WAI MAN
  - Date Added : 4/30/1990
  - Used in Application : PROCESS\_PLAN
  
- Common to Applications: SHOP\_FLOOR, ORDER\_ENTRY, PROCESS\_PLAN
  
- Stored in File(s) : DETITEMS, DETAIL, OPERATIO, PLAN, PART
  
- Belongs to Ent/Rel(s) : WORK\_ORDER, PARTS\_AVAIL, BILL\_MAT, ORDER\_ITEM, PARTREV, PART
  
- Describes Subject(s) : DETAIL, DETITEMS, OPERATIO, PART, PLAN
  
- Has Equivalent Data-items

Data-Item Name	Format	Application System
-----	-----	-----
PART_ID	CHAR(10)	ORDER_ENTRY
PART_ID_COMP	CHAR(12)	SHOP_FLOOR
PART_ID_ASSEM	CHAR(12)	SHOP_FLOOR
PART_ID	CHAR(12)	SHOP_FLOOR

Detailed Metadata About an Item (PARTID)

Figure 15

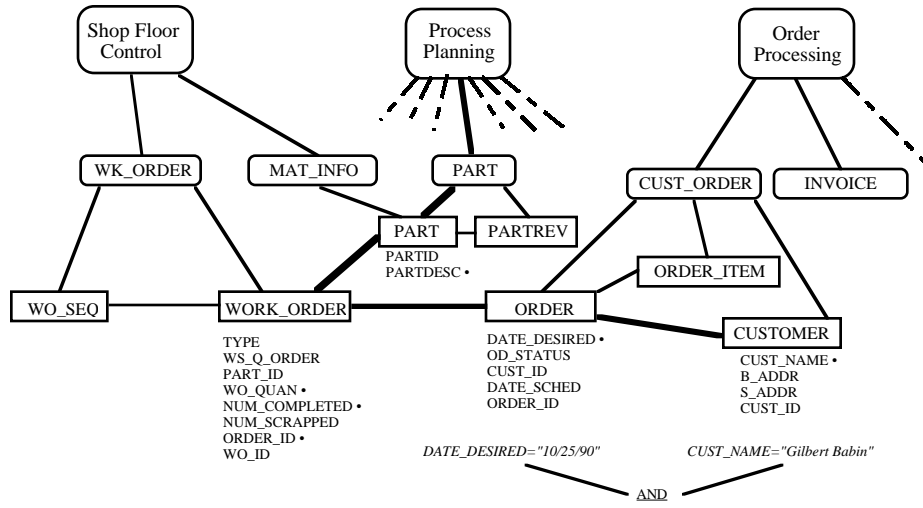
\*\*\*\*\* Any Changes to this Item may affect :

```
-- Application(s) :  
  --- SHOP_FLOOR  
  --- ORDER_ENTRY  
  --- PROCESS_PLAN  
  
-- Subjects :  
  --- DETAIL  
  --- DETITEMS  
  --- OPERATIO  
  --- PART  
  --- PLAN  
  
-- Entity/Relationships :  
  --- WORK_ORDER          --- PARTS_AVAIL  
  --- BILL_MAT            --- ORDER_ITEM  
  --- PARTREV             --- PART  
  
-- Rules :  
  --- RULE_9              --- RULE_8  
  --- RULE_7              --- RULE_6  
  --- RULE_30             --- RULE_29  
  --- RULE_28             --- RULE_27  
  --- RULE_26             --- RULE_25  
  --- RULE_24             --- RULE_23  
  --- RULE_22             --- RULE_21  
  --- RULE_20             --- RULE_19  
  --- RULE_18             --- RULE_17  
  --- RULE_16             --- RULE_15  
  --- RULE_14             --- RULE_13  
  --- RULE_12             --- RULE_11  
  --- RULE_10  
  
-- Data Files :  
  --- DETITEMS  
  --- DETAIL  
  --- OPERATIO  
  --- PLAN  
  --- PART  
  
-- Other Data Items :  
  --- PART_ID              ==> of Application : ORDER_ENTRY  
  --- PART_ID_COMP         ==> of Application : SHOP_FLOOR  
  --- PART_ID_ASSEM        ==> of Application : SHOP_FLOOR  
  --- PART_ID              ==> of Application : SHOP_FLOOR
```

What-If Analysis

Figure 16

Query: " Find the customer order ID, part ID, part description, quantity, and quantity completed for Gilbert Babin's customer order which has a desired date of 10/25/90."



Query Example: Model Traversal Tree

Figure 17