TECHNICAL SUPPORT FOR CIM INTEGRATION

Birch & Davis Associates, Inc.
8905 FAIRVIEW ROAD
SUITE 300
SILVER SPRING, MARYLAND 20910
(301) 589-6760

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CORPORATE INFORMATION MANAGEMENT (CIM) LIFE CYCLE AIS INTEGRATION ISSUES MANAGEMENT

A. IDENTIFICATION

1. This document is concerned with integration activities that must occur during development of CIM Functional Requirements as outlined in the CIM Methodology and Process Guide.

2. Both vertical and horizontal integration are required. Vertical integration is defined in this context as interfaces that occur within the functional area of a specific CIM functional group. The phrase "within the functional area" is intended to include in its scope, interfaces with other external activities (eg. IRS or OMB) as well as with DoD functional proponent within their functional area.

3. Vertical integration areas are identified during the development of CIM Process Guide products as external relationships. New functional requirements may identify changes that need to occur in these arrangements, policies, regulations, etc. There are established procedures for making the necessary changes to policies, regulations, memorandums of agreement, etc. The appropriate timing and responsible agent to make these changes occur are also identified throughout the CIM Process Guide products.

4. The purpose of this document is to provide guidance for identifying, documenting, tracking, and resolving horizontal integration issues (both process and data) that are discovered during development of CIM functional requirements. Horizontal integration is defined in this context as integration between a specific CIM functional group and any other functional area, whether it is with another CIM functional group, an Executive Agent, or with the DoD proponent of a different functional area.

5. Integration issues will show up in several different ways. There are CIM procedures established to name and define data or processes, however, there may be cases where this process will result in an issue that must be resolved. Ownership of, or responsibility for, data or processes may also be an issue. Since most functions will be dependent on data or processes originating outside the scope of their own functional area, issues will show up in this area as well.

6. There are also issues that will come up during interaction with other functional groups or because of review of products produced by other functional groups. For example, visions, goals, objectives, strategies, business plans, etc., developed under the CIM methodology may show overlaps or gaps in the scope of functional groups. Proposed changes to policies or regulations could affect functional areas that the drafters of the changes may not have foreseen.

7. The examples in the prior paragraphs are not intended to be all inclusive. There are many opportunities to discover integration issues.

B. DEFINITION/DOCUMENTATION

1. Document relevant information directly into the Automated Integration Issues Tracking System (AIITS) found on the local area networks in each of the functional groups working areas. Instructions for the AIITS system may be found in the AIITS Operating Instructions.

2. As issues are entered into the data base, they will be provided weekly in the form of a new issues report to the integration team and all CIM Functional Groups/Executive Agencies. This allows the Integration Team and all Functional Groups/ Executive Agencies to be aware of issues being worked and provides them an opportunity to identify functional areas that will be affected which are not identified.

C. FORMULATION

1. Representatives of all affected CIM functional groups meet to refine the description and ensure agreement as to the key elements of the issue and its scope. A point of contact for the lead functional group and points of contact/spokespersons for each functional group should be identified. The lead functional group representative shall facilitate the resolution of this issue. Any stakeholders, constituencies and decision makers outside of the CIM functional groups should be identified and their role in the issue resolution established. Changes or additional information should be updated in the AIITS data base.

2. If the issue affects a functional area that has no current CIM functional group , functional representation may be requested through the CIM management structure from the DoD functional proponents or the Executive Agency.

D. RESOLUTION/COORDINATION

1. Meetings to resolve the issue shall be held with representatives of each of the affected functional groups, Executive Agencies and/or DoD functional proponents for functional areas that are not currently CIM Functional Groups. This shall be an iterative process and the results of these meetings will be documented. The AIITS will be used to record proposed solutions, notes or comments, actions that need to be taken, and the status of those actions.

2. Issues should be resolved at the lowest possible level. There are three basic levels to the resolution process. Many issues can and should be resolvable between members of the CIM Functional Groups. If IRM or CIM direction is desirable, the Deputy Functional Group Leaders are the appropriate persons to facilitate that resolution. The Functional Group Leaders would be responsible for facilitating the resolution of issues requiring DoD Functional direction. The Group Leader shall work the issue through the primary DoD functional proponent so that the Functional Steering Committee can be involved as appropriate.

3. If adequate input is not available from all affected functional areas for resolution, decisions will be made if possible to allow the existing affected functional groups to continue developing requirements. Document those decisions, but leave the issue open in the AIITS system for future functional groups. The AIITS record should reflect all affected groups, including ones that are not currently CIM functional groups.

4. At each stage in the resolution process, the AIITS must be kept current. If formal coordination is necessary, the coordination documents shall be filed with the Integration Team and the coordination dates will be entered into the AIITS data base. Final resolution shall be disseminated to each affected group.

5. A monthly meeting between the Integration Team and the Deputy Functional Group Leaders provides an opportunity to review, with the Integration Team, the resolution process.

E. PARTICIPANT ROLES AND RESPONSIBILITIES

1. CIM FUNCTIONAL GROUP MEMBERS/CIM CORE FUNCTIONAL GROUP MEMBERS AT AN EXECUTIVE AGENCY

a. When an issue affects your functional area, assist with selection of a point of contact and issue advocate(s) to represent your functional area on the Issue Resolution Team (IRT).

b. Assist in documenting the issue. CIM Functional Group members take all potential integration issues to the Deputy Functional Group Leader of the CIM Functional Group. Executive Agency Core Functional Group members take potential issues to the CIM Representative within the Core Group.

2. DoD FUNCTIONAL PROPONENTS/EXECUTIVE AGENTS

a. When requested by the CIM Integration Team, or a CIM Functional Group Leader to participate on a CIM Issue Resolution Team (IRT), identify a point of contact and/or issue advocates to represent your functional area.

b. Take any potential integration issue that you identify independently of the CIM Functional Groups to the Functional Group Leader of the CIM Functional Group if one exists, or to the CIM Integration Team. Assist in documenting and resolving the issue.

3. ISSUE RESOLUTION TEAM (IRT) MEMBERS

a. Represent their functional area position, negotiate and attempt to resolve the issue in the IRT meetings.

b. Assist with the preparation of documentation, including the AIITS updates.

c. Functional Group members will contact other group members through their Deputy Functional Group Leader.

d. Executive Agency members will contact other group members through the CIM Representative of the Core Functional Group.

4. DEPUTY GROUP LEADERS OF THE CIM FUNCTIONAL GROUPS/CIM REPRESENTATIVES OF EXECUTIVE AGENCIES

a. Ensure that issues are documented in the AIITS data base.

b. Monitor the new issues reports. If your function is affected, and the issue does not identify your group as being affected, notify the lead functional group Deputy Group Leader.

c. Additional responsibilities are outlined in paragraph F5, for Deputy Functional Group Leaders of the Lead Functional Group.

d. If Issues are unresolved, and the progress of the functional group is adversely affected, notify CIM Management.

5. ISSUE POC OF THE FUNCTIONAL GROUP/DEPUTY GROUP LEADER/FUNCTIONAL GROUP LEADER of the lead functional group, depending on the level the issue is being worked. (see paragraph D2.)

a. Identify the participant groups and the agenda of the IRT meetings.

b. Set the date and time of the meetings and notify all IRT participants.

c. Facilitate the discussions at the IRT meetings.

d. Maintain records of the IRT meetings, including any repercussions, impacts and the outcome.

e. Ensure updates to the data in the AIITS record for this issue.

f. Ensure preparation of any necessary documentation.

G. SUPPORT

1. The CIM Integration Team provides procedure oversight and support for the IRTs.

a. Establish an AIITS data base and provide programming and file housekeeping support.

b. Maintain an official log file of coordinated issues.

c. Provide support as required throughout the issue resolution process.

d. Point of Contact for issues generated outside the functional groups, such as the CIM Director or IRM.

e. For issues generated outside the functional groups designate an appropriate functional group to provide the lead.

f. Facilitate meetings with the Deputy Functional Group Leaders to discuss the integration issue resolution processes.

g. Monitor the overall integration issue resolution process and prepare periodic reports to CIM management, along with recommendations to improve the process if appropriate.

Date: 4-18-1991 5:06am
From: kevin
To: leong-hongb:irm:dodcompt
cc: kevin
Reply to: kevin
Subj: Activity Report - Functional Integration

- On 15 April, we facilitated a meeting of Civ Pay and Civ Personnel to resolve some old issues.

- On 16 April, we invited all Deputy Group Leaders to a meeting at Ballston III to meet the new members of the Integration Team, and to tell them of some specific initiatives now underway. We introduced Annette Ivy, Leslie Hight, Dawn Hughes, and Drew Obermeyer (Drew gave a short description of his project, based on the paper he wrote two weeks ago). Neither Phyllis Campbell nor Betty Pearson were able to attend, but Betty sent two representatives. We told them about these three initiatives:

  -- Peer Group Review Committee has started a project to establish a book of sample products for particularly difficult Process Guide Steps.

  -- We are forming the Functional Integration Group (FIG) to begin integration of groups' products at the process level

  -- We have a Beta version of the Integration Issues Tracking system installed, and are beginning final testing. We gave each CIM Rep our draft procedures for Issue Resolution for their comments.

- On 17 April I met with Joe Stormer, Schroeder Dodds, and Ed Grysavage to get their opinions as to which products most need samples. I will meet with a few other CIM Reps as soon as possible, and we will have our first Peer Group Review Committee meeting.

- On 17 April all Integration Team members (data and functional) worked in a group session to begin development of an outline to detail the methodology of integrating the data and functional processes of each functional group. The plan also includes integrating the data and functional processes to one corporate view. This plan will take into consideration that the total DoD business is yet to be defined and will have to be expanded as the future groups are formed.

- Karen has been researching products to convert IEW outputs into process guide outputs and briefing slides. If we can do this, it will greatly reduce manual effort in product creation.

Kevin Riddle

FUNCTIONAL INFORMATION MANAGEMENT
FUNCTIONAL INTEGRATION PLAN

(Initial Outline - 18 Apr 91)

I. Introduction.

A. Definition: (define functional integration)

B. FIM Functional Integration: (describe applicability of integration within FIM)

1. Purpose:

2. Scope:

a. Phase I
b. Phase II
c. Phase III

(brief overview of process guide phases to include identification of products to be integrated)

II. Background.

A. Current Environment (describe current conditions for each of the following:)

1. Functional Groups - parochial views
2. Separate models on separate CASE
3. Unrefined enterprise model
4. No central repository
5. No established standards

B. Target Environment (describe future conditions for each of the following:)

1. Functional Groups - shared data
2. Models developed locally, managed centrally
3. Mature enterprise model
4. Central repository
5. Standards compliance

III. Strategy.

A. Integration Team

1. Consolidate functional group models

a. Purpose:

b. Process:

2. Prepare documentation for integration analysis

B. Functional Groups
(corporate perspective achieved through FDA'S and FIG's)

1. Functional Data Administrators

a. Review information classes (2.1.5.4)
names
definitions
(1) Purpose:

(2) Process:

b. Identify common information

(1) Purpose:

(2) Process:

c. Standardize information classes for information sharing

(1) Purpose:

(2) Process:

d. Review entity relationship diagrams (2.1.7)
names
definitions
relationships

(1) Purpose:

(2) Process:

- General statement re: Phase III - iterative process of review through additional products.

2. Functional Integration Group

a. Review individual processes
names
definitions

(1) Purpose:

(2) Process:

b. Identify common processes

(1) Purpose:

(2) Process:

c. Identify corporate processes

(1) Purpose:

(2) Process:

d. Standardize common processes

(1) Purpose:

(2) Process:

e. Review Process Models
(link sources to external interfaces)
(identify future candidate functional areas)

(1) Purpose:

(2) Process:

f. Identify subject categories
(goals and objectives, CSF'S)

(1) Purpose:

(2) Process:

g. Categorize Vision Elements IAW Enterprise Model

(1) Purpose:

(2) Process:

3. Process/Data Integration

a. Facilitated by Functional Integration Team
b. Joint FDA/FIG meetings as required
c. Functional Integration Team assures topical integration between FDA's and FIG (coordinate process/data issues)
d. FDA's and FIG's represent Functional Groups on Issue Review Team re: data and process issues
(1) act upon data/process issues
(2) Provide corporate perspective

C. Issue Identification and Resolution

1. Identification

a. Classify issues by type
(i.e. policy, data, process, etc)

b. Identify issue subject

c. Document issue in Automated Integration Issue Tracking System (AIITS)

2. Resolution

a. Assign point-of-contact and lead organization for each issue

b. Track issue resolution status

c. Evaluate resolution for integration impact

D. Model Management

1. Prepare Cost/Benefit Analysis
(cost alternative methods of model consolidation)

2. Consolidate/Merge functional models
(i.e. process and data)

3. Institutionalize modeling standards
(establish FIM standards from B&D standards)

E. Evolve Enterprise Model

1. Solicit management support
(determine current vs. future EM or both)

2. Employ top-down methodology
(composite of "sub-enterprise models")
(optimum method of deriving DOD Enterprise Model)
(reflects what "business" does - relatively static - rather than how "business" does it - nonstatic)
(organizationally independent)

3. Reconcile Entity Relationship Model with process model

4. Iterative maintenance by Functional Integration Group and Functional Data Administrators

F. Develop logically centralized repository

1. Define functional requirements
(i.e. EM, Process model, Data model, data elements, text, application systems, data, source code, etc.)
(Evaluate Phase III functions)

2. Describe hardware and software constraints

3. Survey marketplace for qualifying tools

4. Conduct cost/benefit analysis

5. Define method of population

6. Establish maintenance/access controls

7. Execute initial population

G. Publish Standards

1. Determine and define required standards

a. Data

b. Process

c. Modeling

d. Procedures

e. DOD, FIPS, etc. conformance

2. Establish maintenance requirements

a. Process Guide

b. Models (i.e. Data, Process, Enterprise)

c. CIM generated standards

3. Prescribe coordination procedures

a. review process

b. approval process

4. Quality Assurance Measures
(enforcement mechanism)

5. Publication and distribution procedures

6. Maintain reference library of relevant, external standards
(pin-point distribution for receipt of non-CIM standards publications and changes)

IV. Support Mechanisms

A. Data standardization

B. Modeling conventions

C. Training

D. Documentation

E. Model management

F. Technical guidance

G. Quality assurance

H. Tool management

I. Planning
(Project management planning)

J. Performance measurement
(integration process)

V. Integration Resource requirements

A. Personnel

1. FIM Integration Team

2. Functional Groups

3. Skill requirements

B. Hardware

C. Software

D. Training Requirements
(curriculum, audience, timing addressed in training plan)

VI. Integration Roles and Responsibilities

A. CIM Representatives

B. Functional Integration Group

C. Functional Data Administration Exchange Group

D. FIM Integration Team

1. Functional Integration

2. Data Administration

E. CIM Council

F. Executive Agents

G. Functional Steering Committee

H. Functional Group Leaders

I. Functional Group Facilitators

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Terminology Definition

Intra-cellular integration
Business Case
Vertical/Horizontal integration
Migratory systems

Address consideration for future integration plan amendments

TECHNICAL SUPPORT FOR CIM INTEGRATION

This paper addresses technical support required to assist CIM's integration effort--specifically Computer-Aided Software Engineering (CASE) support for CIM's integration initiative. The paper is in two sections. The paper first presents technical characteristics of the mainframe version of CIM's current CASE tool, KnowledgeWare's Information Engineering Workbench, along with mainframe training requirements and cost information. Secondly, the paper presents considerations to assist CIM in obtaining the most appropriate CASE platform: (1) integration management decisions that affect technical support requirements and (2) alternative CASE tool capabilities available in the marketplace.

The paper does not recommend a specific CASE tool to support integration, but rather raises questions and provides information to help CIM assess integration CASE requirements.

1. KNOWLEDGEWARE MAINFRAME-SPECIFIC INFORMATION

Section one provides an overview of KnowledgeWare's mainframe environments, their hardware and software configurations and associated training requirements and costs.

1.1 Current Environment and Potential Effects of Integration

CIM is currently using KnowledgeWare's personal computer (PC)-based IEW-Planning and IEW-Analysis CASE tools to support eight CIM Functional Groups (FGs), storing each FG's information in a separate encyclopedia. Integration will require across-encyclopedia analysis and comparison of entities and the other FG products that CIM wishes to integrate. Consolidation in the current IEW PC environment has been quite slow, even when reintegrating a single FG's encyclopedia that was split to allow two analysts to work simultaneously. Encyclopedia management at the PC level is limited to a PC's storage and processing capabilities. KnowledgeWare recommends consolidating a maximum of 20 encyclopedia objects at any one time. Therefore, the current DOS-based product (IEW) is inadequate to support large-scale integration.

If, after considering the management issues raised in section 2 of this paper, KnowledgeWare's products are selected to support CIM integration, a mainframe will be required under the following circumstances:

- There is a requirement for coordination of a large number of widely dispersed FGs, or

- The volume of application development information becomes large.

If complete functional group models are to be integrated, we believe the mainframe solution will be required to support integration in the KnowledgeWare environment.

1.2 KnowledgeWare's Mainframe CASE Tools

KnowledgeWare's mainframe tools provide a robust platform for CASE support, but rely on PC-based workbenches for input and all graphic capabilities. KnowledgeWare's mainframe tools are the Information Engineering Workbench/Mainframe (IEW/MF), and the Application Development Workbench/MVS (ADW/MVS). ADW/MVS will be available in April, 1991.

Both of KnowledgeWare's mainframe tools are used to collect application development requirements and specifications from PC workbenches. Once collected, mainframe tools manage and control access to the information (encyclopedia) at the host (mainframe) level.

ADW/MVS has the functionality of IEW/MF and also provides enhanced change control, security, versioning, and encyclopedia comparison. ADW/MVS incorporates a DB2-based encyclopedia resident on an MVS/TSO host, taking advantage of many DB2 capabilities, and makes ADW/MVS more advanced and more powerful than the IEW/MF.

Staff members from Birch & Davis Associates, Inc., (B&D), visited the World Bank's IEW/MF installation and communicated at length with IEW/MF users at Johnson Space Flight Center who were very satisfied with the product. Since ADW/MVS has not been yet released, our findings on this product are based on vendor-supplied materials. These findings should be validated by hands-on review if CIM selects a KnowledgeWare mainframe product. For example, if CIM were interested in the ADW/MVS product, we would recommend a close look at its ability to interact with our DOS-based IEW products.

Both IEW/MF and ADW/MVS are configured as a set of CASE tools that support application development life-cycle activities. These tools cross life-cycle functions within IBM's AD/Cycle framework and are complementary to IBM's AD/Platform and Repository Manager/MVS. Both are used in conjunction with any of KnowledgeWare's PC-based CASE tools and take advantage of the additional power of the host environment to perform a wide variety of application development and data management functions. All functions and analysis capabilities that are found in the microcomputer-based workbenches are available on the mainframe tools as well. However, the mainframe tools are exclusively text-oriented, with all graphics capabilities provided by the PC tools working in harmony with the mainframe tools.

1.3 Software and Hardware Configurations

IEW/MF Hardware Configuration Requirements

- The IEW/MF runs on IBM- and plug-compatible mainframes. A minimum region size of 4 megabytes is required, although 6 megabytes is recommended to ensure proper handling of large consolidations.

- Two-hundred cylinders of DASD (3350 equivalent) is required. KnowledgeWare recommends IBM Personal Computer 3278/3279 Emulator Adaptor or Digital Computer Associates IRMA for the PC-to-host link file transfer software.

IEW/MF Software Configuration Requirements

- Both the IEW/MF and ADW/MVS are based upon an intelligent encyclopedia technology that requires the presence of the IBM MVS Programming Language in Logic (PROLOG) run time module. This module is incorporated in the microcomputer products; hence there is no need to buy a PC version of PROLOG.

- In order to install IEW/MF 5.01, the following prerequisite software are required:

PRODUCT	DESCRIPTION
5740-XYS	MVS/SP1.3.L or above, JES2, JES3, or above
5665-285	TSO Extensions, Release 2, or above
5665-317	ISPF Version 2, Release 2

5665-319	ISPF Version 2, Release 2
5798-DYL	MVS PROLOG

- IEW/MF also requires IBM Data Facility Product, Release 1.1 or above, which extends TSO/ISPF.

ADW/MVS Hardware Configuration Requirements

- ADW/MVS is centered around an intelligent DB2-based encyclopedia resident on a MVS/TSO host. The encyclopedia supports automatic transitions between various phases of the systems development life cycle, as well as automatic code generation from diagrammatic specifications. SQL reporting and query capabilities inherent in DB2 are exploited, allowing for the creation of customized reports and queries.

- ADW/MVS is available on IBM 30XX or plug-compatible mainframes under MVS and requires TSO/ISPF, DB2, and IBM PROLOG. Six megabytes of memory for each TSO Region is required. Seventy-five Cylinders of 3380 DASD is required for ADW/MVS System Application Libraries and Tables. Later versions of ADW/MVS will require IBM's Repository Manager/MVS.

- No unique work station or communications specifications are required, although the same 3278/3279 and IRMA links recommended for IEW/MF are recommended for ADW/MVS. ADW/MVS is designed to be run and controlled from the microcomputer hosting the IEW or ADW workbenches.

ADW/MVS Software Configuration Requirements

- In order to install ADW/MVS Release 1.5.01, the following prerequisite software is required:

PRODUCT	SOFTWARE DESCRIPTION
5740-XC6	MVS/SP2.1 JES2.2, or above, or MVS/SP2.1 JES3, or above
5665-291	MVS/SP2.1 JES3, or above
5665-285	TSO Extensions, Release 2, or above

5665-317	ISPF/PDF Version 2, Release 3, or above
5665-319	ISPF/Version 2, Release 3, or above
5665-DB2	DB2, Version 2, Release 1, or above
5798-DYL	MVS PROLOG

1.4 KnowledgeWare Mainframe Training Requirements and Cost

To successfully manage a mainframe base development encyclopedia several levels of skill are needed. These levels are at the mainframe operations level (MVS, VSAM, DB2), at the mainframe query level (SQL), and at the mainframe tool level (IEW/MF or ADW/MVS).

Mainframe operations skills should be provided by the time-share or host facility organization that is responsible for keeping the hardware up and running. Operations skills revolve around installation and maintenance of the CASE tool software. Expertise in TSO/MVS/ISPF/DB2 should already exist in the host facility organization. There is no need for personnel with these skills to be on site with the functional groups.

Mainframe query skills using SQL will be required since SQL is used to manipulate encyclopedia data, create ad hoc reports, and perform analyses. Although there is no need for every analyst supporting a FG to know SQL, every work site should have access to at least one proficient SQL programmer who is also proficient in the mainframe and microcomputer CASE tools.

Mainframe tool level skills, whether the tool is IEW/MF or ADW/MVS, will be required of all analysts currently working with the microcomputer workbenches. Every analyst supporting a FG and every senior analyst should receive training in the mainframe product.

KnowledgeWare provides training in IEW/MF and ADW/MVS. Part of this training includes an introduction to SQL, but this must be supplemented with further training. KnowledgeWare also provides DB2 training specific to ADW/MVS. The cost for 3 days of training covering the mainframe tools is $1,200 per person, or $7,500 on site, from KnowledgeWare. Five days of KnowledgeWare's DB2 training costs $2,000 per person, $12,500 on site.

The adoption of the mainframe environment may have other major staff training implications. The design and management of check-in and check-out process requires strict change control procedures. As B&D representatives discovered with two IEW/MF users (World Bank and

Johnson Space Flight Center), consolidation procedures requires staff with an in-depth as well as a broad view of the project.

1.5 Mainframe Tools Costs

Selection of either mainframe product requires a major commitment of resources both up front and over time. Due to the constantly changing tactical plans of KnowledgeWare, IBM, and other major players in the market, courses of action and costs are constantly changing. Timing of the purchase of the mainframe product can be critical. For example, purchase of the IEW/MF product now may be necessary to purchase or rent PROLOG software knowing that the software is dated. According to KnowledgeWare, purchasing an old version of PROLOG can cost $16,000. In another example, the cost of the mainframe product has varied widely. Discounts up to 50 percent have been given in the past on the purchase of the mainframe product based on the number of microcomputer work stations a user owns.

As of 11 February 1991, the cost of either mainframe product is $86,250. This cost includes the first year's maintenance. Maintenance for the mainframe product runs $12,935 per year.

2. MODEL INTEGRATION HARDWARE/SOFTWARE CONSIDERATIONS

To determine the most appropriate Computer-Aided Software Engineering (CASE) tool environment to support CIM integration, substantial thought must be given to integration management--how the integration will be organized, conducted, and supported. These decisions have a significant impact on the requirements for the CASE tool, including determination of mainframe support needs.

This discussion is not exhaustive but identifies key (1) integration management considerations that must be addressed, (2) CASE capabilities, (3) CASE tool alternatives, and (4) CASE training. Many management decisions must be made to ensure the most effective use of CASE technology to integrate CIM modeling efforts. In some of the areas addressed by this paper, activities are already underway at varying levels of effort. These include such areas as training and standards development. However, it is important to ensure that these areas be reconsidered in light of establishing the formal integration management function. This paper is intended to serve as a catalyst in identifying and resolving management decisions with respect to integration management and associated CASE tool support.

Once the technical platform has been selected and its actual capabilities are clear, many of these decisions should be reexamined to obtain maximum use of the CASE tool. The purpose of this reexamination is to strike a desirable balance between CIM's stated CASE requirements and the actual capabilities the selected tool provides. Reexamination of CIM's modeling and integration decisions provides the means to ensure that the best results are obtained, and that the capabilities of the CASE tool are fully exploited.

2.1 Integration Management Considerations

In order to identify CASE tool requirements CIM must determine how integration management will capture and provide models to users for analysis. Examples of management decisions include:

- What technical capabilities will be centralized versus those that will be made available at the FG level?
- How will data administration will be conducted?
- What quality assurance activities will be performed?

Different capabilities may be required from the CASE tool depending on the approach to conducting these integration activities. The following summarizes key integration management decisions.

What will be the responsibilities of each FG and the responsibilities of central integration?

Decisions must be made regarding the responsibilities of each FG, the responsibilities of the central integration function, and the interaction between the two. In addition, future program plans for CIM and their potential impact on integration must be considered. These decisions are important in determining what specific technical capabilities are required by central integration and each FG. Program plans also affect required common technical facilities across FGs. Further, CIM plans affect how repositories must be physically structured for each FG, as well as the central repository's structure for integration purposes.

What are CIM's plans for identifying future FGs and for integrating resulting models?

The scope of each FG has a significant impact on how models are integrated. For instance, current FGs are at different levels of detail in terms of their scope, and some FGs overlap in scope. Civilian Payroll has a narrow scope, while Civilian Human Resources is broader in scope. Financial Operations and Contract Payment overlap in scope to some degree. Where scopes overlap, analysis and integration of the various FG products must be examined from both FGs' perspectives, and decisions made regarding the approved integrated model. In fact, CIM must determine the extent to which different FG models will be integrated. Such decisions affect CASE tool requirements such as the ability to identify and analyze model leveling discrepancies and model overlap discrepancies.

What technical capabilities will be identified as common for CIM and what associated technical standards will be enforced?

CIM must consider which common technical facilities will be used, and use of common facilities must be coordinated across FGs. This means that how FGs are to use the CASE tool must be determined and standardized. For example, the objects to be incorporated in the integrated model must be identified, and how they are documented must be defined. Not all objects that CIM intends to document and maintain may be supported by the selected CASE tool, and there may be constraints on how certain objects may be documented. Decisions regarding the use of the CASE tool must be provided to the FGs.

How will models at different stages of development be coordinated?

Coordination among FGs with respect to models at different stages of development must be considered. Given that several FGs have related models, the ability to use previously developed FG products can facilitate improved model development. However, models are likely to be at different stages of development. Also, one FG may begin with a different version of the CASE product if upgrades are introduced. Thought must be given to who will decide (using what criteria) which CASE tool upgrades to incorporate, and which technical constraint "work arounds" to disseminate. Consideration must also be given to how upgrades should be introduced, and to the coordination among FGs in using and providing feedback on each other's models within the context of product upgrades.

Which modeling standards will be used throughout CIM?

Determination of standards for documenting objects in the integrated environment can also have an effect on CASE tool requirements. The type of objects, their characteristics, and limitations in naming and documenting them in the CASE tool can impact the ability of CIM to control model development. The capability of the CASE tool to document standard objects, the characteristics of the objects, and object naming standards must be examined. While B&D has documented modeling standards for FG operation in the CIM Standards and Procedures Manual (CSPM), integration requirements may affect these standards. Therefore, making standards decisions prior to evaluating CASE tool alternatives for integration support can greatly improve CIM's ability to match CASE alternatives to specific CIM integration needs.

How will the data administration function be organized?

Data administration poses a key set of concerns when using CASE technology. How CIM organizes the responsibilities of data administration can have a significant impact on CASE tool requirements. For instance, CASE tool requirements are different depending on whether data administration is purely centralized, or whether certain data administration responsibilities are given to FG data administrators. CIM must decide the most appropriate data administration organization, responsibilities, and authorities to determine specific functional capabilities required of a CASE tool.

For example, CIM's CASE requirements will be affected by CIM's provision of access to central integration repository contents. Certain CASE tools lock out development teams from using a model that is being used by another team, while other CASE tools provide subsets. Therefore, considerations such as access authority must be addressed from a management standpoint. That is, the CIM integration function must determine how it plans to provide and manage model update authority, as well as authority to view model components. Based on the way access will be managed, central repository capabilities of the CASE tool must be reviewed to ensure that proper support is available.

How will CIM conduct quality assurance of CIM products?

CIM's plans to manage and conduct quality assurance of the models must be considered to determine specific CASE tool requirements. Standards regarding how the CASE tool is to be

used must be determined as mentioned earlier, and means for ensuring proper adherence to these standards must be established.

For instance, how will CIM ensure that FG efforts conform with established models? Will each FG develop a separate decomposition of common staff functions such as Provide Human Resources and Provide Facilities, or will central integration identify standard models of common functions for review and comment? Will future FGs develop fresh models of areas previously modeled, or will they review existing models and provide input? These decisions effect CASE model subsetting, access and update authority, consistency checking, and other requirements.

How the CIM integration function plans to conduct audits also implies different types of CASE tool audit capabilities. The more closely the CASE tool audit facilities match CIM needs, the more effective the audit function can be. This includes such things as consistency checking and model content report capabilities, as well as model update audit trails.

2.2 CASE Tool Capabilities

The management decisions identified above lead to developing specific functional requirements for a CASE tool. CASE tool capabilities to meet those requirements can be grouped into five categories: General Features, Life Cycle Support, Business Policy/Planning Support, Technique Support, and Repository Capabilities. Each of these is briefly summarized below. B&D will develop more detailed information on CASE capabilities if requested. The CIM integration function must determine which CASE tool capabilities in each of these categories are appropriate to the CIM environment. Not all will be relevant, nor will all be of equal importance. However, by examining the management decisions identified in section 2.1, CASE tool selection criteria relevant to CIM requirements can be further developed.

General Features: What overall features does CIM require of the selected CASE tool?

General Features identify those capabilities that are provided throughout the CASE tool platform. If the CASE tool is comprised of more than one product, these features should be consistent throughout. Examples include:

- Automatic redrawing--if a new object is entered in a diagram, the system automatically redesigns the presentation of the diagram to minimize crossed lines and generally make the diagram more readable

- Cross diagram linking--ensures that related diagrams reflect one another's content, such as an action diagram only including data and processes reflected in the data model and the process decomposition

- User definable documentation capabilities

- Color control

- Cross stage integration--provides the capability to readily access and use models of one stage of analysis in a subsequent stage

- Graphics and text input capabilities

- Change control

- Model audit trails

Life-Cycle Support Coverage: What stages and components of the system life cycle must be supported by the CASE tool?

Life-Cycle Support Coverage refers to CASE tool's support for various stages and elements of model development and usage, as well as development management in the systems development life cycle from planning through system maintenance. Examples of capabilities potentially applicable to CIM include planning, analysis, prototyping capabilities, and hardware planning, joint requirements planning support, work plan creation, and project expenditure estimation.

Business Policy/Planning Support: What business policy architecture and information planning capabilities and support are required of the CASE tool?

These include capabilities to facilitate management decisions regarding current system evaluation, model development, model usage, planning transition to the target environment, and measuring baselines and progress towards stated goals. Examples include the capability to:

- Evaluate the functional and technical quality of current systems

- Simulate information environments as defined by vision elements
- Perform cost/risk/benefit analysis
- Compare proposed design alternatives
- Set priorities, measurement of proposed solution to meeting critical success factors and objectives

Technique Support: What specific planning, analysis, and other modeling techniques must be supported by the CASE tool?

Specific modeling techniques used the CIM project that must be supported. Examples of case technique support capabilities that may be of interest include entity-relationship modeling, dependency modeling, data navigation, matrix manipulation, process/data interaction modeling, cluster analysis, normalization, and action diagramming.

Repository Support: What specific repository capabilities are necessary to support model development, maintenance, and quality assurance?

Repository support refers to specific capabilities associated with controlling, analyzing, and maintaining models and other objects that are being analyzed and documented. Examples of repository capabilities that might be required include: model synthesis control, completeness checking, level and view error checking, storing object relationships with other objects, access control, ad hoc reporting, up/downloading to work stations, automatically maintaining consistency between diagrams, automatic population from outside repositories, model partitioning/subsetting, version control, redundancy control, and object cross referencing.

2.3 Tool Alternatives

After developing requirements based on integration management decisions and reviewing CASE product capabilities, we recommend that CIM evaluate products that may meet its needs. This evaluation may find that, to support CIM integration:

- o The current IEW PC platform is satisfactory (we consider this unlikely);

- The IEW mainframe product is satisfactory;
- Additional tools are required to complement either of the two above; or
- An alternative platform to the IEW is most appropriate.

It is possible that more than one alternative product may satisfy CIM's needs. Equally possible is that critical capabilities may not be provided by a single product. In this case, management and technical considerations regarding the use of more than one tool must be examined. Managed properly, use of more than one tool may be preferable to attempting to force a CASE tool to document or manipulate objects in ways that it was not designed. For example, few if any CASE tools are designed to support documenting, analyzing, and managing certain policy-oriented objects currently being identified by FGs.

It is preferable if a single CASE tool can satisfactorily meet CIM's needs. However, CIM may find that a combination of CASE tools more closely satisfies its needs than does one specific CASE tool. Cost-effectiveness and compatibility among software must be considered over the life of the CIM program. Should CIM consider a platform to replace the IEW, or a central repository different from the IEW, the cost of migrating current models must be compared with the benefits of migration.

2.4 Training Considerations

Training is a critical factor in determining the success of integration management and the use of CASE technology in support the CIM effort. Two considerations are important--technique training, and tool capability/limitation orientation. CIM participants are likely to have varying levels of experience with the techniques and methods being supported, and with the CASE tool. While a variety of training efforts are currently underway in these two areas, modifications to these efforts and additional training may be necessary based on the integration management decisions that are made.

Analysis and Technique Training: What training, guidance, and facilitation will be provided to CIM participants in the techniques and methods being used?

The single most important critical success factor in using CASE technology has been shown to be skill in using the specific methods and techniques that are merely automated by the CASE tool. CASE tools do not replace analysis or the need to understand the analytical techniques

being used. CASE tools automate or support components of the technique, they do not replace the analysis required to properly use the technique. If CASE technology is to successfully support CIM integration needs, the FGs must be provided training in the overall process being applied to create a context for the tasks and techniques that they will accomplish. Further, the FG members must understand the methods and techniques being used sufficiently to produce the desired products. Most often, this training requires both formal as well as informal guidance in proper use of the techniques. Without this training, the CASE tool provides no benefit to CIM.

Therefore, to ensure the ability to effectively integrate CIM products, training and guidance support must address specific techniques, how they relate to each other, what they can and cannot do, when they should and should not be used, and the context within which they are to be applied.

CASE Tool Capabilities and Limitations: What level of orientation and guidance regarding the selected CASE tool capabilities and limitations will be provided to the various CIM participants?

After tool selection is completed, users must be trained in how the specific tool can and cannot support the specific techniques and methods that are being applied. There are currently many misconceptions among CIM participants regarding what CASE is and is not; what it can and cannot do. Beyond the common misconception that much of the analysis will be conducted by the CASE tool, certain types of documentation and reporting that are not supported by CASE are often requested by current FG members. Training must be provided on an ongoing basis to clarify the specific support capabilities that the selected CASE environment will provide to the FGs.

3. CONCLUSION

While the first section of this paper presents specific technical information about the IEW mainframe platform, the second section identifies considerations key to ensuring that the most appropriate CASE platform is selected and implemented by CIM. Only if these considerations are addressed will CIM be certain to select software with the required capabilities to support integration, and the appropriate hardware platform. We suggest that before pursuing a specific technical solution, CIM develop an integration plan that addresses the considerations raised in the second section. B&D staff are prepared to assist in this effort if requested.