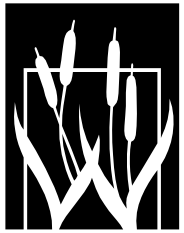

Whitemarsh
Information Systems Corporation

Data Management Program: Components, Descriptions, and Costs

Whitemarsh Information Systems Corporation
2008 Althea Lane
Bowie, Maryland 20716
Tele: 301-249-1142
Email: Whitemarsh@wiscorp.com
Web: www.wiscorp.com

Table of Contents

Acknowledgments

This material is an evolution of documents that were updated during the time frame: September 2003 through December 2004. The primary contributors were Bruce Haberkamp, James Blalock, and Michael Gorman of the Office of the CIO, United States Army. The foundational components of this work has been favorably reviewed by subject matter experts within the U.S. Department of Defense.

1.0 Data Management Program Components and Descriptions

Data Management Program Components	
Data Management Component	**Description**
Achieving Data Standardization	This material presents an analysis of the problems that undercut data standardization with respect to standard values and standard metadata. This material presents an approach, meta models, and a work breakdown structure that can be used to implement data standardization projects within the enterprise.
Data Model Evaluation	This material presents a workplan for evaluating data models that may exist in previous efforts or that may be under evaluation during a software package procurement effort.
Data Integrity Rules Definition and Management	The data integrity rules materials identifies a set of rules that govern the transformation of database data across seven distinct classes.
Data Management	This material contains a comprehensive set of material on data management. Covered are basic terms, data as executed policy, enterprise database principles, the Knowledge Worker Framework, Missions, database objects, business information systems, business organizations, business functions, database management systems, data architecture types, data standardization, database projects, metadata repositories, information systems planning and project management.
Data Architecture Classes	This material presents the five classes of data architecture that are commonly found in large organizations. Provided also are examples and characteristics of each.

Data Management Program Components	
Data Management Component	**Description**
Database Project Estimation	This material presents the first critical steps in any database project: work plan development and project estimation. This material uses the methodology work breakdown structure coupled with unit effort estimates, work environment factors and product type quantity estimates (for example, average number of columns per table) to arrive a highly accurate project plan, estimate, schedule, and resource assignments.
Database Project Management	This material teaches database project management. Key to project management is its orientation towards deliverables and earned-value reporting. Included is the approach, is the underlying project management database that must be present to effectively manage projects across the enterprise.
Database Objects	This material teaches database objects and shows how they are constructed in database environments. Database objects are set within the context of the Knowledge Worker Framework and are related to the other columns such as mission and business information systems. Finally, the material provides workshops for employing database objects.
Data Interoperability Workshop	This material proceeds through the concepts of integrated database, the creation of the vital meta models such as mission, organization, function, information needs analysis, and then the physical, logical, conceptual, and data element models to identify the requirements for shared data and to create a logical and physical data model that represents the shared data.

Data Management Program Components	
Data Management Component	**Description**
Database Project Methodology	This material, collectively referred to as the Business Model Specification, teaches the first two phases of the database project methodology Work Breakdown Structure. Included is an in-depth presentation of mission, database domain, and data model development. Included in the data model development chapter is a presentation of the most commonly seen data model techniques for the various types of databases, that is, original, transition data, subject area, warehouses, and reference data.
Database Four Critical Factors	This material addresses the four critical factors that must be successfully accomplished to have enterprise database. That is, database technology, DBMS, database projects, and staffing.
Database Client Server Environment	This material teaches the process of defining, specifying, and building databases in a client/server environment. The topics include rationale, metadata, repository, the critical meta models (mission, data, process, information system, business event, business function, and organization), implemented data model distribution, implemented process model distribution, security, tool selection, and database principles.
Database Principles	This material contains a set of principles that are essential to achieving success in enterprise database through database objects.
Database Project Work Plan Development	This material presents the process of developing work plans that involve one or more hardware, software, and application class disciplines. At the foundation of the process is the ability to manage work plans for multiple efforts using standard work metrics and work environment factors.

Data Management Program Components	
Data Management Component	**Description**
DBMS Selection & Evaluation	This material contains a very detailed questionnaire that can be used to select and evaluate network, hierarchical, independent logical file and ANSI/SQL based DBMSs. The questionnaire is about 150 pages long and is organized into a yes/no answer format. Supplementing the questionnaire are weighting factors for the various levels of questions within the hierarchically organized questionnaire.
Enterprise Data Modeling	This material introduces the architecture and concept of operations basis for the Data Modeler. The data modeler module "lives" within the Database and Database Objects component of the Metabase. Persons through their role within an organization perform functions in the accomplishment of enterprise missions, they have information needs. These information needs reflect the state of certain enterprise resources such as finance, people, and products that are known to the enterprises. The states are created through business information systems and databases. Databases in turn are known to the enterprise through database objects and data models. This material is all about the architecture of the data models within and among databases and database objects.

Data Management Program Components	
Data Management Component	**Description**
Information Systems Plan	This material presents a very effective technique for creating enterprise wide information system plans. Compared to traditional techniques by Martin, Finkelstein, and IBM, this technique is from 5 to 10 times faster. Additionally, the end product of the ISP is "live" because it is designed to be contained within a project management system like Microsoft/Project. The information system plan is able to be modified and can be subjected to "what-if" analyses for alternative plans. The Information Systems Planning Material shows how to create the information systems plan. That is, the plan by which information systems are depicted as their interactions and are scheduled for accomplishment. During the material, the metabase is employed to show how the data is collected, stored, and then employed to create an actual information systems plan.
Information Systems Development	This represents the overall approach to achieve Successful Information Systems. That is, a melding of Upper CASE, Lower CASE, Information Systems Planning, and Project Management. The material contains five sections. Section 1 presents the results of studies into Information Systems failures. Section 2 presents a description of the essential prerequisites for IT success and states why having this environment returns many times its cost. Section 3 of the material then presents a nine-step process to achieve successful information systems. Section 4 presents an overview of the Information Systems Plan process. And finally, Section 5, presents an overview of the approach to project management.

Data Management Program Components	
Data Management Component	**Description**
Iterations of DB Design	This material presents step-wise refinement techniques for creating a quality database design. The material assumes that database designs are first hypothesized and then both iterated into higher quality forms and also bound to underlying DBMS and physical environments so they can be implemented quickly and easily with the highest return on investment possible.
Management Challenge	This material teaches management how to understand the needs, obligations, and challenges they must face to produce successful database efforts. Management is not just a bystander. Rather, management is essential, critical, and often THE reason for either success or failure.
Migrating Legacy Systems	This material presents and compares two different approaches to converting legacy systems: "big bang," or "plan and parts" approach.
Reference Data Management	This material presents the reference-data data model and proceeds through several examples of how to gather, enter, and manage reference data. The material then illustrates how reference data is included in specific databases within projects.
Repository Selection and Evaluation	This material contains a very detailed questionnaire that can be used to select and evaluation repository software systems. Examined are the features and facilities critical to the creation of the meta models essential to enterprise database. The questionnaire is about 50 pages long and is organized into a yes/no answer format. Supplementing the questionnaire are weighting actors for the various levels of questions within the hierarchically organized questionnaire.

2.0 Data Management Program Component Development and Delivery

Legend	DM = Data Modelers DA = Data Administrators DBA = Database Administrators Managers = Immediate to two levels above PM = Systems Engineers, Systems Analysts, and Programmers

Estimates to Create Data Management Program Component							
Data Management Component	**Target Audience**	**Type**	**Length (hours)**	**Development**		**Commercial Delivery (per)**	**In-house Delivery (per)**
				Hours	**Cost ($)**		
Achieving Data Standardization	DM, DA, DBA	Course	4	160	$16,000	$1,500	$400
Data Model Evaluation	DM, DA, DBA	Course	4	160	$16,000	$1,500	$400
Data Integrity Rules Definition and Management	DM, PM	Course	8	320	$32,000	$2,000	$800
Data Management	DM, PM	Course	40	1600	$160,000	$10,000	$4,000
Data Architecture Classes	DM, DA, DBA	Course	4	160	$16,000	$1,500	$400
Database Project Estimation	DM, PM	Workshop	40	1600	$160,000	$10,000	$4,000

Estimates to Create Data Management Program Component							
Data Management Component	**Target Audience**	**Type**	**Length (hours)**	**Development**		**Commercial Delivery (per)**	**In-house Delivery (per)**
				Hours	**Cost ($)**		
Database Project Management	DM, PM	Workshop	16	640	$64,000	$4,000	$1,600
Database Objects	DM, PM	Workshop	24	960	$96,000	$6,000	$2,400
Data Interoperability Workshop	DM, PM	Workshop	40	1600	$160,000	$10,000	$4,000
Database Project Methodology	DM, PM	Course	40	1600	$160,000	$10,000	$4,000
Database Four Critical Factors	Managers	Course	8	320	$32,000	$2,000	$800
Database Client Server Environment	DM, PM	Course	40	1600	$160,000	$10,000	$4,000
Database Principles	DM	Course	4	160	$16,000	$1,500	$400
Database Project Work Plan Development	DM, PM	Workshop	24	960	$96,000	$6,000	$2,400
DBMS Selection & Evaluation	DBA	Workshop	40	1600	$160,000	$10,000	$4,000
Enterprise Data Modeling	DA, DM	Workshop	40	1600	$160,000	$10,000	$4,000
Information Systems Plan	Managers	Workshop	40	1600	$160,000	$10,000	$4,000
Information Systems Development	DM, PM	Course	8	320	$32,000	$2,000	$800
Iterations of DB Design	DM, DA	Course	4	160	$16,000	$1,500	$400

Estimates to Create Data Management Program Component							
Data Management Component	**Target Audience**	**Type**	**Length (hours)**	**Development**		**Commercial Delivery (per)**	**In-house Delivery (per)**
				Hours	**Cost ($)**		
Management Challenge	Managers	Course	8	320	$32,000	$2,000	$800
Migrating Legacy Systems	DBA, PM	Workshop	24	960	$96,000	$6,000	$2,400
Reference Data Management	DM, PM	Workshop	16	640	$64,000	$4,000	$1,600
Repository Selection and Evaluation	DA, DBA, DM, and PM	Workshop	40	1600	$160,000	$10,000	$4,000

3.0 Data Management Component Delivery Costs

3.1 Specific Course Costs, Target Audience, Duration, and Quantity of Students

Estimates to Deliver Materials to a Specific Project							
Data Management Component	**Target Audience**	**Type**	**Length (hours)**	**Nbr Students**	**Nbr Deliv-eries per 100 Staff**	**Com-mercial Delivery (per)**	**In-house Delivery (per)**
Achieving Data Standardization	DM, DA, DBA	Course	4	24	4	$1,500	$400
Data Model Evaluation	DM, DA, DBA	Course	4	24	4	$1,500	$400
Data Integrity Rules Definition and Management	DM, PM	Course	8	24	4	$2,000	$800
Data Management	DM, PM	Course	40	24	4	$10,000	$4,000
Data Architecture Classes	DM, DA, DBA	Course	4	24	4	$1,500	$400
Database Project Estimation	DM, PM	Workshop	40	12	8	$10,000	$4,000
Database Project Management	DM, PM	Workshop	16	12	8	$4,000	$1,600
Database Objects	DM, PM	Workshop	24	12	8	$6,000	$2,400
Data Interoperability Workshop	DM, PM	Workshop	40	12	8	$10,000	$4,000
Database Project Methodology	DM, PM	Course	40	24	4	$10,000	$4,000
Database Four Critical Factors	Managers	Course	8	24	4	$2,000	$800
Database Client Server Environment	DM, PM	Course	40	24	4	$10,000	$4,000

Estimates to Deliver Materials to a Specific Project							
Data Management Component	**Target Audience**	**Type**	**Length (hours)**	**Nbr Students**	**Nbr Deliv-eries per 100 Staff**	**Com-mercial Delivery (per)**	**In-house Delivery (per)**
Database Principles	DM	Course	4	24	4	$1,500	$400
Database Project Work Plan Development	DM, PM	Workshop	24	12	8	$6,000	$2,400
DBMS Selection & Evaluation	DBA	Workshop	40	12	8	$10,000	$4,000
Enterprise Data Modeling	DA, DM	Workshop	40	12	8	$10,000	$4,000
Information Systems Plan	Managers	Workshop	40	12	8	$10,000	$4,000
Information Systems Development	DM, PM	Course	8	24	4	$2,000	$800
Iterations of DB Design	DM, DA	Course	4	24	4	$1,500	$400
Management Challenge	Managers	Course	8	24	4	$2,000	$800
Migrating Legacy Systems	DBA, PM	Workshop	24	12	8	$6,000	$2,400
Reference Data Management	DM, PM	Workshop	16	12	8	$4,000	$1,600
Repository Selection and Evaluation	DA, DBA, DM, and PM	Workshop	40	12	1	$10,000	$4,000

3.2 Prototypical Database Project (400 Tables)

3.2.1 Staff Requirements

Data Administrator (1)

Data Modeler/Analyst (3)

Database Administrator (1)

3.2.2 Data Management Component Delivery

1 each of the following to the data administrator, data modelers/analysts, and database administrator at the start of the project.

- Database Project Estimation
- Database Project Management

1 each of the following to the data administrator, data modelers/analysts, and database administrator after the project is underway.

- Achieving Data Standardization
- Data Integrity Rules Definition and Management
- Data Architecture Classes
- Database Objects
- Database Project Methodology
- Enterprise Data Modeling
- Iterations of DB Design
- Reference Data Management

1 each of the following to sets of project team members to acquaint them with the data driven approach and their roles.

- Database Four Critical Factors
- Management Challenge

"n" occurrences of the following until the database is fully designed with respect to all DPP artifacts, that is, mission, organization, function, ISO 11179 data elements, database objects, data models (conceptual, logical, physical, and view), resource life cycle analysis, business event, and business information systems

- Enterprise Data Modeling

4.0 Metadata Repository Development

Key Statistic	Value
Quantity of Function Points per Database Table	80
Quantity of Metadata Repository Tables	200
Total Function Points	16,000
Cost per Function Point (Information ($375)):	$6,000,000

5.0 Contrast: Data Driven Vs Process Driven

Critical quantities	Government Project "A"		Government Project "B"	
	Process First	Data First	Process First	Data First
SQL Views	125	20	146	59
Tables	110	20	150	59
Processes (BIS units)	29	29	66	47
Data Elements (really columns)	172	84	245	118

6. Applicability to Prototypical System

6.1 Cost of Data Model Development

Quantity of Tables From estimate of the XYZ System data architect (Via <person name>)	Average Columns per Table	Total Columns	Process Driven Approach (2 hours per)	Data Driven Approach (2 hours per table, and 1/30th 11179 Data Elements	Cost Difference at $100 per hour
400	15	6,000	5.75 staff years	0.7 Staff years	
		Cost	$1,200,000	$120,000	$1,180,000 in favor of data driven.

6.2 Cost of Prototypical System Software

Quantity of Tables	Function Points Per Table	Cost Per Function Point	Type of Software	Total Cost	Cost Difference (in favor of data driven)
400 (If Data Driven)	80	$400	Information	$12,800,000	$43,008,000
1744 (If Process Driven (400 * 4.36)				$55,808,000	
400 (If Data Driven)	80	$1,000	Military	$32,000,000	$107,520,000
1744 (If Process Driven (400 * 4.36)				$139,520,000	

Estimates exclude hardware, computing infrastructure, travel, testing, documentation, evolution and maintenance.