

Title: Organizing IT Project Information

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ABSTRACT

This paper describes a methodology for estimating IT projects. The span of knowledge required of an IT project estimator is much greater than just being able to characterize the software development. Having an understanding of the elements that comprise the organization infrastructure, deployment concepts, and security issues as well as the complex interactions within the environment are essential to preparing the estimate. The estimation methodology described here is composed of two parts: a formalized estimation structure, and a series of “catalogues” or mini-estimates that provide defaults to use as starting points for all critical estimation elements.

INTRODUCTION

“But I get dozens of catalogues in the mail every week. Why do I need another one?”

Estimation of complex software development is nothing new to the estimation community. The common use of parametric models which typically use historical data, data ratios and math models to characterize the software development activities allow the estimator to provide reasonable estimates of cost, effort and schedule without extensive interaction with other organizations.

Estimation of IT projects adds a whole new set of knowledge requirements for the estimator to master. In addition to the usual skills, it requires an extensive amount of interaction between the estimator and providers of all the services needed to develop an estimate. The estimator must acquire expertise in the areas of Project Management, Infrastructure and End User Services in addition to the more familiar area of Software Development.

This paper draws upon Galorath Incorporated’s SEER for IT and SEER for Software as the underlying parametric models. However, the methodology described can easily be adapted to any estimation process because it defines a means of collecting and organizing the data necessary to make a successful estimate. The methodology allows the estimator to divide the estimation into manageable subsets.

SEER for IT – A parametric cost estimation model from Galorath Incorporated.

SEER for IT (SEER-IT) for estimating IT projects is the latest in a family of software estimation models developed by Galorath Incorporated. Designed for senior IT professionals, SEER-IT enables CIOs to improve their success rates on complex IT projects. There are two main areas that SEER-IT is designed to use parametric modeling as an integral part of estimation development:

IT Project Estimating - Supports planning efforts throughout the project development lifecycle from concept through design, development, test, implementation, and ongoing support.

IT Project Planning - Provides detailed insight into the risks, uncertainty and cost drivers associated with IT project development and management.

Current expectations for IT extend well beyond simply managing routers, disks, and servers. Today's IT organizations are expected to optimize and orchestrate complex IT disciplines into a well behaved business-delivery machine, and reconfiguring IT systems as needed and on-the-fly to address specific corporate and line-of-business objectives.

Spurred by new compliance regulations, the rise of outsourcing options, flattened budgets, and calls by senior management to "run IT more like a business," CIOs are under increasing pressure to impose more formal processes on IT project activities. And yet, while a number of tools and standards have emerged to manage IT infrastructure and processes, the very act of implementing efficiency measures often proves problematic.

Parametric/predictive modeling was developed to assess what is known about a project and to model or simulate what is unknown, based on meaningful comparative data. Based on sophisticated modeling technology, parametric modeling helps organizations objectively assess up-front project feasibility, optimize project costs and schedules, assess risks and probabilities, monitor project progress, and develop detailed project plans.

The need for an IT Estimation Structure

The eternal question for the estimator is "What am I being asked to provide an estimate of?" and "Who is this estimate for?" In the IT world this is further complicated for the estimator because of the number of organizations and functional areas involved in the development of the typical IT project. There is generally a large amount of software to be developed either from scratch or modified from existing code for additional functionality. The hardware requirements for developing, testing and supporting the deployed system can range from a simple use of existing systems to procurement, installation and operation of new suites of equipment. There may be training requirements for the development staff and well as the new users. There is the issue of support personnel turnover as well as dealing with replacing and upgrading of equipment over the life cycle of the project. Along with those issues there are the concerns about security, facilities, interfacing systems and budget restrictions. The scope can be intimidating and lead to the next question in the minds of the estimator – "Where do I start?"

The answer that is recommended here is to start with a template that will ensure that the estimator has answered all the questions that need to be addressed. This “template” will allow the estimator to fill in the blanks by using default data or data specific to the project.

Figure 1 shows the structure of a typical IT estimate. While there will be variations in the makeup of the final estimate, the structure below has proven to be an excellent starting point. The template represents a default Work Breakdown Structure (WBS). A typical WBS would have a top level representing the total project with major WBS levels for Project Management, Application Software Development, Infrastructure and Deployment. Within those major WBS levels there are further subdivisions that represent specific activity areas.

Figure 1 – Typical IT Estimate Structure

Estimation area	WBS Level	Typical Subdivisions
Project Management and coordination including both Pre and Post project activities	1.1 Project Management	PMO Support Business Unit Support Security
Software development lifecycle activities such as requirements definition , design, implementation and testing including integration	1.2 Application Software	Core Application Middleware Common Services Interfacing Systems
Activities and services necessary to develop and support the project including hardware, software, services and support.	1.3 Infrastructure	Development Tools Development Environment Network Portal Production Environment Disaster Recovery
Deployment services including installation, training and ongoing support to the project	1.4 Deployment	Transition Management Deployment Services Service Desks Facilities & Site Preparation

The template is a starting point. In addition to providing the basic structure for an IT estimate it supports the analysis of multiple estimates at the portfolio level by making the extraction of data for further analysis simpler. For example, answers to question of how much is going to be spent on facilities modification this year or how many Java programmers do with need next year can be found easily when all the estimates start with a similar WBS structure.

Catalogues – Mini-estimates of functional areas

A catalogue in the setting of this paper is a “mini-estimate” of a functional area of an IT project. It is complete in the sense that the boundaries of the functional area are defined by the estimate. The data contained within the estimate is complete enough to represent a reasonable estimate of the functional area. To the estimator it represents one of the pieces of an estimation puzzle. The estimator’s role is to select the catalogue item appropriate to the project for which the estimate is being prepared. He will then further refine the selected catalogue items based on the project-specific details.

The example in this paper is drawn from actual data used in a large IT organization. It has been simplified and made more generic for the purpose of explaining the methodology. The terms in the catalogue description refer to specific organizations and activities. They are abbreviated to refer to terms common to most IT organizations and

are easily recognized by those within the industry. In order to provide clarity for the terminology, it is defined for the reader in the section below.

Abbreviation	Service Provider Organization/Activity
AD	Application Development
BU	Business Unit
CS	Cyber Security
EAIB	Enterprise Application Interface Broker
EN	Enterprise Networks
EOPS	Enterprise Operations
EUES	End User Equipment & Services
ITS	Information Technology Services

One additional term, Integrated Project Team (IPT) is also used in this paper. It refers to having stakeholders on the team from the different IT service provider organizations (e.g., Enterprise Networks, Enterprise Operations, Infrastructure, etc.) and from the Business Units.

The remainder of this paper describes the various catalogues and their structure and content. The catalogues are organized by the major WBS sections and subdivisions within them.

- **Project Management** - ITS and business unit participation including travel and training, end user training and security.
- **Application Development** - Core software application development activities, middleware development and interfaces.
- **Infrastructure** –Purchased hardware and software, installation services and on going support.
- **Deployment** –Installation, training and ongoing support to the project

PROJECT MANAGEMENT OFFICE (PMO) CATALOGUES

The first group of catalogues describes the project management activities in the estimate. By definition, this can cover many more activities than are shown in the example. In general, the range of subjects covered here is determined by the roles and responsibilities of specific groups within an organization. The example covers the group responsible for the managing the development of the project, the business unit that will be the user of the deployed project and the security activities associated with the typical project development and deployment. Table 1 shows an overview of the overall structure and content of the Project Management catalogs. The estimator may use all the default settings at the beginning of the estimation process and then refine the specific information for each element. For example, at the beginning of the estimation process the proposed start date of development and the planned deployment date may be all that is known. As the Application Development schedule and Infrastructure needs become known, these dates may be refined.

Table 1 PMO Catalog Summary

Catalog	Selection Criteria / Category		Labor Hours	Materials	O&M Support
			Hours		
None	BU PMO	BU Project Manager	1 FTE LOE	\$ -	\$ -
		BSP Project Manager	¼ to ½ FTE LOE	\$ -	\$ -
		SME Support	5 to 15 FTEs LOE	\$ -	\$ -
		Travel		Default – One one-person trip per month	\$ -
		Technical Training	Default – 0 hours	\$ -	\$ -
	MITS PMO	AD PMO	.5 to 1.5 FTEs LOE	\$ -	\$ -
		AD Travel		Default – One one-person trip per two months	\$ -
		AD Technical Training	Default – 0 hours	Default – \$0	\$ -
	Security	New System	Low Risk	1,924	\$ -
Moderate Risk			2,563	\$ -	\$ 60,217
High Risk			4,151	\$ -	\$ 97,029
Subsequent Release		Low Risk	1,924	\$ -	\$ 1,769
		Moderate Risk	2,563	\$ -	\$ 3,539
		High Risk	4,151	\$ -	\$ 6,533

PMO Support

The first part of Table 1 shows the values used in the catalogues for the Business Unit (BU) PMO and the ITS PMO. These need to be customized for each estimate based on the duration of the project. Some of the elements in this section reflect level-of-effort (LOE) labor. All LOE costs entries should be deferred until the entire dates are established for the project. Understanding these activities will help the estimator to explain the source of associated costs, or to identify costs that might be reduced (when activities are not required for a specific project), or added (for additional activities required for a specific project). Additionally, consideration should be given by the estimator for pre- and post-development activities for which a level of project management is required.

Business Unit (BU) PMO

This section contains three kinds of costs: LOE, Travel, and Training for the estimator to consider. The Business Unit (BU) PM is typically 1.0 Full Time Equivalent (FTE). The Business Systems Planning (BSP) PM is typically between 0.25 and 0.5 FTE. Projects have various numbers of Subject Matter Experts (SME), and sometimes none.

Travel and Technical Training for the Business Unit are based on inputs from the Integrated Project Team (IPT). Note that the Technical Training items in this section refer to training for project personnel required to allow them to implement the project.

Training required for eventual end-users of the system should be included in the section for Deployment.

Infrastructure Technology Systems (ITS) PMO

This section contains three kinds of costs: LOE, Travel, and Training, which are similar to the type of cost in the Business Unit PMO. Application Development (AD) Domain Support defaults to 0.5 to 1.5 FTE, but the AD representative to the IPT can advise for a smaller or larger level of effort

Travel and Technical Training for AD are based on inputs from the IPT. AD Travel might be required when a system is to be deployed at multiple sites. Note that the Technical Training items in this section refer to training for project personnel required to allow them to implement the project.

Security Catalog

The Security Catalog describes the effort needed for Security Certification & Accreditation (C&A) and other security-related activities. The catalog contains six items corresponding to the three security categories of low, moderate and high security impact. For each level of security risk, there are two items corresponding to a new system or a subsequent release of an existing system.

Security categories are derived according to the potential impact on a system that would occur if its Confidentiality, Integrity, or Availability were compromised. The estimator selects a Cost Catalog roll-up of elements based on this category and whether the proposal is for the initial release of a system or the subsequent release of an existing system.

APPLICATION DEVELOPMENT

The second group of catalogues is the most important group of all the catalogues. The software development usually represents 30%-40% of the typical project costs. This is where the estimator will begin. The selection made here will determine the scope of the project both in cost and schedule. It will drive the requirements for infrastructure items, determine the extent of deployment issues and determine the extent of project management activities. The focus here is to determine the "size" and complexity of the software that will be developed for this project. It will include newly developed software, software that will be reused, and software functionality that will be purchased.

There are three major groups of catalogues in the application development. First, there is the Core Application Development set of catalogues. These represent data from historical project that be summarized into logical groups. Second, there is a set of Middleware catalogues that allow the estimator to characterize typical interfaces between this project and other software systems. Finally, there are a set of catalogues that represent the use or development of common business services for this project.

An overview of the structure and content of the catalogs is shown in Table 2-1.

Table 2-1 Application Development Catalogues

Catalog	Selection Criteria		Category	Labor Hours		
				Small	Med	Large
Core App Dev	Application Software Development	Based on Historical data	Very Small App Dev		1,563	
			Small App Dev		21,247	
			Medium App Dev		27,736	
			Large App Dev		94,224	
			Very Large App Dev		11,244,253	
Middleware	Interfaces to Legacy Systems	FTP	One Size	No Cost is Passed onto the Project		
	Interfaces to Other Systems	Other	N/A	-	-	-
			1-2 Interfaces	284	412	539
			3-5 Interfaces	569	824	1,080
			5+ Interfaces	853	1,236	1,619
Common Business Services (CBS)	Estimate the number of services required.	Cost per Existing Service	N/A	0		
			Small	900		
			Medium	1,040		
			Large	2,080		
		Cost per New Service	N/A	0		
			Small	1,560		
			Medium	3,120		
			Large	5,179		

The interfaces among systems can be characterized as shown in Figure 2. A logical high-level interface between a proposed new system and an external system is enabled through the use of middleware (hardware and software). Application Interface Cost is the Cost of Middleware plus the cost of External System Support. Middleware costs depend on the type of bridge, e.g., bridge to a modernized system, non-modernized system, or Common Business Service.

External System Support captures the effort for an external system to support the core system. The Integrated Production Model and Common Business Services are specialized types of External Systems for which we have catalog pricing.

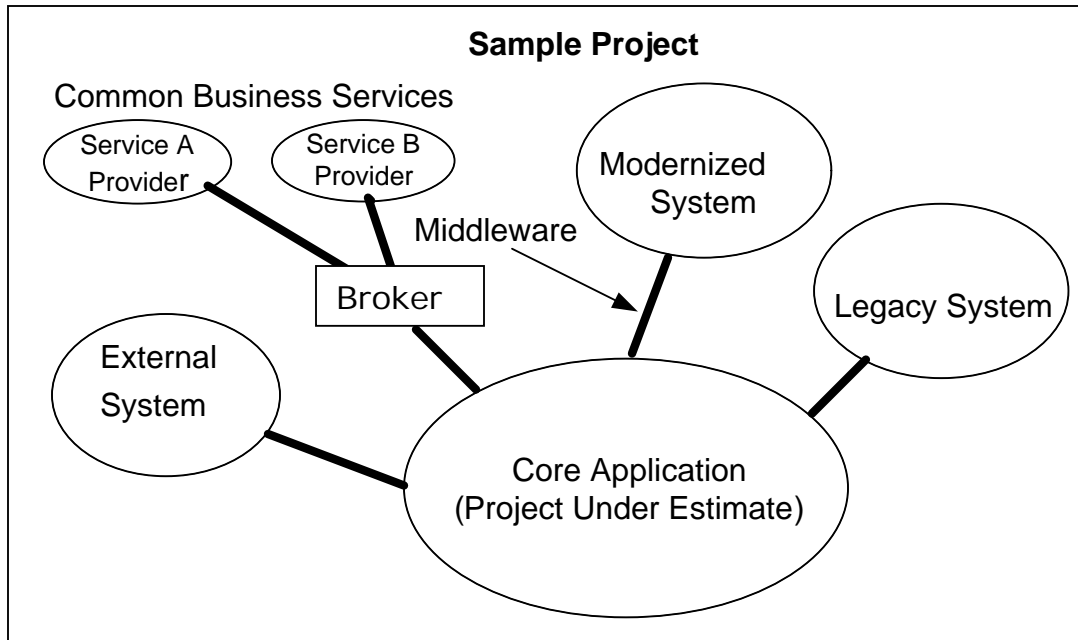


Figure 2 Application Interface Cost Boundaries

Application Development Catalogues

Application Development catalogues are based on historical data. In the example shown, the data is based on recently developed projects in a large IT organization. Most organizations have information about recently completed projects that could be normalized and used in a similar manner as is shown. It is also possible to obtain commercial products that have size information about typical IT projects that could also be used for the same purpose. Of course, it is also possible to use any combination of historical, commercial data or internal engineering judgment to construct representative projects. The objective is to provide the estimator with a starting point for characterizing the project.

Middleware Catalogues

Middleware, often thought of as the pipe between processes that run on different platforms, is the set of enabling services that allow multiple processes running on one or more machines to interact across a network. Middleware costs rely on catalog pricing that segregates these costs into 3 categories which are defined below:

- 1) Batch Interface to Legacy System – Select this category if the interface is intended to be used for a batch file transfer with a Legacy system. There are no costs passed onto the project for this type of interface.
- 2) Real Time or Broker – This is a data access provider for commonly used business services. This interface typically uses https, http or WebSphere network communication software/protocols to enable the data transfer. Interface selection criteria are as follows:

N/A	Projects that will NOT interface with a Broker to access Common Business Services (CBS) should not use this catalog.
Existing Interface	Select if application will leverage an existing Interface for this project
1-2 New Interfaces	Select if application will add 1 - 2 new Interfaces
3+ New Interfaces	Select if application will use add 3 or more new Interfaces

3) Other - Select this category for a real-time or modernized system interface, exclusive of a Broker interface

N/A	Projects that will NOT interface with other application should specify Not Applicable.
Few	Select if application will use 1 - 2 interfaces with other applications.
Several	Select if application will use 3 - 5 interfaces with other applications.
Many	Select if application will use more than 5 interfaces with other applications.

Common Business Services Catalog

Common Business Services (CBS) are capabilities applicable across business domains, developed in house, and subsequently made available to other applications. Middleware provides the access to this software. Developers use function calls via a registry to utilize these services.

A needed software routine is identified by an engineer as an existing service during the review of the potential additional user. The service is made available during development thus saving the user time and money.

Subsequent new applications may take advantage of the same services as engineers identify opportunities in their reviews. The cost of CBS is estimated using the CBS catalog pricing. Use of this catalog requires that the estimator determine the number and type (i.e., complexity) of services required and whether the services already exist or need to be developed from scratch.

Other Interfacing Systems Catalog

The Other Interfacing Systems Catalog costs includes the cost of any custom software development as well as development of the API to a middleware component needed on the external system to send or receive data or control information from the core application. The cost may also include purchased hardware or COTS needed to support increased capacity/load on the external system.

PROJECT INFRASTRUCTURE

The second group of catalogues is organized to provide an estimation framework for the infrastructure needs to the project. The catalogues are organized to provide estimates of support labor for implementation expertise and management. The major area of Infrastructure encompasses the activities and services necessary to develop and support the project. This includes purchased hardware; purchased software; hardware installation, testing and maintenance; and software and database services. The

catalogues are grouped by environment and networks. The environment catalogues cover the three major areas of Development, Testing and Production along with management and expertise support to these activities. The networks catalogues cover the external access to and from the project and network costs.

Each catalogue area is further augmented with a Hardware catalogue. This catalogue contains a list of hardware items including vendor, price and a generic description of the item. It is understood that it would be impossible to specify the exact make and model of a piece of hardware that will be procured at a future date. Using this generic description allows the estimator to narrow the cost of the items and include a reasonable estimate of support cost early in the estimation process.

An overview of the overall structure and content of the catalogs for infrastructure estimation is shown in Tables 3-1 and 3-2. Table 3-1 summarizes catalogs for estimating the environments needed to develop, test and operate the proposed system. Table 3-2 summarizes the network catalogs that are not specific to a particular environment.

Table 3-1. Infrastructure Environments Catalogue Summary

Catalog	Selection Criteria	Category	Labor Hours			Purchased HW/SW	O&M Support
			Small	Med	Large		
Infrastructure Project Support	Implementation Support	Small	835			-	-
		Medium	1,670			-	-
		Large	3,340			-	-
	Project Mgt	Small	209			-	-
		Medium	417			-	-
		Large	835			-	-
	DEV	N/A	-	-	-	See Hardware Catalogue for specific hardware items, vendor and pricing	
		Small	213	308	404		
		Medium	426	618	810		
		Large	853	1,236	1,619		
	EITE	N/A	-	-	-		
		Small	409	592	776		
		Medium	817	1,184	1,551		
		Large	1,634	2,368	3,103		
	FIT (opt)	N/A	-	-	-		
		EOPS Model	817	1,184	1,551		
	DITE Seat Cost	any DITE				O&M: \$12,000 per developer per year	

Table 3-2 Tools, Network and Portal Catalog Summary

Catalog	Selection Criteria		Category	Labor Hours			Purchased HW/SW	O&M Support
				Small	Med	Large		
Portal	Access Type	EUP or RUP (SA or LA)	N/A	-	-	-	\$ -	
			Host Only	545	789	1,034	\$ -	
			Few Changes	2,178	3,157	4,135	\$200K - \$568K	
			Sep Env.	3,267	4,736	6,204	\$400K - \$1,136K	
		RUP (WS)	N/A	-	-	-	\$ -	
			Host Only	636	922	1,208	\$ -	
			Few Changes	2,545	3,688	4,832	\$200K - \$568K	
			Sep Env.	3,816	5,532	7,247	\$400K - \$1,136K	
Network	Cost of network augmentation - includes cost of hardware circuits.		N/A	-			\$ -	-
			Small	2,487			\$ 100,000	\$ 78,680
			Medium	4,764			\$ 180,000	\$ 151,457
			Large	7,661			\$ 340,000	\$ 283,507
			X-Large	1028			\$ 600,000	\$ 471,457

Infrastructure Project Support Catalog

Infrastructure project support consists of several activities involving the management, engineering, acquisition and initial configuration of the hardware and software infrastructures (development, test, production, disaster recovery). The Project Support Catalog contains two categories of labor:

- Project Management Support
- Engineering & Analysis, Acquisition and setup of the Initial Configuration

The catalog contains labor in three items: Small, Medium, and Large. The labor categories apply to the entire project as opposed to a particular environment. Most projects will be a Medium implementation. In general:

- Small – applies to a subsequent release of system or a prototype system that isn't going into full production.
- Medium – applies to a new system where infrastructure is being installed at only one site.

- Large – applies to complex configurations where infrastructure hardware is being installed at multiple sites (e.g., campuses).

Development Environment Catalogues

The term ‘environment’ refers to a set of hardware and software components that hosts various activities associated with a project and the system it builds. Most projects are required to use a Development Environment (DEV) to support their development and testing activities. The DEV is a managed set of shared development, test, and integration environments which are used to support the evaluation, development, testing, deployment, and maintenance of systems.

- Development (DEV): the environment used by developers to analyze, design, code, and unit test the system.
- Enterprise Integration and Test Environment (EITE): the environment in which the completed system is tested with interfaces that represent the other systems with which the system must work.
- Functional Integration Test (FIT): an environment that interfaces with production systems for testing with “live” data (unlike the synthetic data used in other testing). This is an optional environment, typically only used for the “largest of the large” systems.
- Production/Disaster Recovery: an environment where the deployed project resides. The Disaster Recovery is generally a mirror image set of equipment that is used to ensure continue operation of critical functions in the event of failure of the Production environment.

Catalog Selection Criteria. Selecting a catalog item from the DEV Environments Catalog is based on the following distinctions:

- Hosting only – This refers to use of an existing hardware environment, sharing use of the environment with other projects or systems. This is an attractive option for some purposes because no new hardware or software is procured; the only cost is the engineering labor to set up the environment.
- Shared Environment, few changes – This refers to sharing an existing hardware environment, but with dedicated resources and few changes required to the configuration. This is a low-cost option, but requires more engineering support than hosting-only.
- Need own environment – This refers to a situation where the project’s needs would conflict with other projects, so sharing would not be feasible. This option requires procurement of hardware and software to support the project, at much larger cost than the other options.

The catalogs for the environments contain only engineering services costs, and placeholders for purchased hardware. Use the Hardware Catalog described below to add items to the estimate.

DEV Seat Cost

Use of the DIEV environments incurs a cost for maintenance of the environments during the O&M phase. At present, DEV accounts for this cost through a so-called “seat cost.” The nature and amount of this cost is based on a cost of \$12,000 per developer per

year. The Project Template includes an element for the "DEV Seat Cost - O&M". The estimator must set the Quantity field of the element to the peak project staff.

Hardware Catalog

The DEV, EITE, FIT, Production and DR environments are built up from processors and other hardware purchased or leased through acquisition contracts. Several types and configurations of processors are available, including mainframe, Sun (UNIX), and Wintel. The Hardware Catalog describes these and provides a convenient way for the estimator to incorporate them into an estimate. The estimator should recognize that the actual models that will be available in future years will be different from those currently available; estimates should always identify hardware by its generic description.

Network Catalog

The Network Catalog contains four items for network augmentation, corresponding to Small, Medium, Large, and Extra-Large network requirements. The selection is typically performed by a representative of the Enterprise Network (EN) organization, based on the amount and patterns of data to be exchanged among the Computing Centers, Campuses, and other facilities. The estimator can simply copy the selected item into the estimate template; the template contains the Medium catalog item as a default; if EN chooses the Medium item, the estimator doesn't have to change the estimate.

Portal Catalog

Portal costs are included in all estimates for proposed and design-phase business applications requiring end-user interactions (human-computer interactions) or external file transfer and system-to-system capabilities.

There are two categories for portal costing which depend on the number and type of users that require authentication:

- 1) Employee User Portal (EUP) - A web hosting infrastructure that supports an Intranet portal that allows employees to access business applications and data and Customer Account Data Engine.
- 2) Registered User Portal (RUP) - The RUP is the external portal that allows registered individuals and third party users (registration and login authentication required) and other individuals to access interaction systems, applications, and data.

The Catalogs contain placeholders for specifying purchased hardware and software for the Shared and Separate Environment selection criteria. The hardware elements should be copied out of the Hardware Catalog and entered into the portal costs for the project. The catalogs recommend the following suite of purchased hardware and software:

Deployment and Implementation

This fourth group of catalogues is used to characterize the deployment and implementation of the project. The focus here is on managing the introduction of the project to the user community and ensures that the roll out of the project is successful in all aspects. The catalogues are grouped by major areas, and the selection criteria are related to the major functions. The category is related to the characterization of the project. In each criteria area the estimator selects the most appropriate category for the

project. The selection provides an estimate of labor hours. An overview of the overall structure and content of the cost catalogs and a summary of the catalog pricing for deployment estimation is shown in Table 4.

Table 4 Deployment Services Catalog Summary

Catalog	Selection Criteria	Category	Labor Hours		
			Small	Medium	Large
Transition Management Services	Transition Management Office	Small-Short	2,108		
		Med-Long	2,871		
		Large-Long	4,003		
End User Equipment & Services	PMO Support	Small	239		
		Medium	598		
		Large	899		
		X-Large	1,998		
	Desktop HW	per PC	5		
	Desktop SW	per PC	36		
	Help Desk	Users	Number of Users and Hours of Coverage		
Facilities	Sq Feet				

Transition Management Catalog

Transition Management (TM) is a planning activity performed to ensure that all activities required for the transition to operations are completed. The TMO Transition Management catalog consists of three entries defined by several variables: the project implementation risks, the number of impacted organizations, the duration of the project, and the costs of the project. If the project duration is greater than 12 months, and the cost is greater than \$5M then select the Large-Long category item. If the average of the project implementation risk factors is low, use the Medium-Long category item. If the average of the project implementation risk factors is medium or high, select the Large-Long category item. If the project duration is not greater than 12 months, or the cost is less than \$5M, then select the Small-Short category item.

End User Equipment Services Catalog

End User Equipment and Services (EUES) performs analysis and deployment services for software and hardware deployed to desktop and laptop computers, and provides help desk services. The EUES catalog contains various activities that EUES might perform for a project:

- Desktop software certification
- Software deployment by broadcast or manual installation
- PC hardware upgrade for specialized project requirements
- Installation of special-purpose PCs
- PMO Support for desktop hardware and software deployment

PMO Support

Selection of one of the four increments in the Cost Catalog is determined by the number of workstations that will either receive software installations or hardware upgrades. The catalog has elements for Small (1-1,000), Medium (1,001 to 5,000), Large (5,001 to

10,000), and Extra large (> 10,000) workstations. This element may be excluded from the estimate only if there will be zero PCs receiving either software or hardware upgrades.

Desk Top Hardware and Software

The criteria here are based on the number of PC/Laptops that will be deployed or upgraded. The estimator enters the number of PC/Laptops and a corresponding number of hours for software and hardware functions is the result.

Service Desks

Typically, an estimate requires only one Support Help Desk. Additional support desks can be added by the estimator as required.

- For each required help desk the estimator should enter the number of concurrent users that will be supported. This is usually 10% of the total users of the system, unless better guidance is provided.
- The coverage is set at 60 hours per week by default; the estimator can adjust this if better information is provided.

Facilities and Site Preparation

At a ROM time frame there is usually not enough information available for a precise estimate of facilities and site preparation. The Project Template provides default elements representing typical site preparation costs for computing centers.

PUTTING IT ALL TOGETHER

The following steps will help the estimator take advantage of the corporate knowledge captured in the numerous catalogues. With a reasonably robust set of catalogues and by carefully picking appropriate catalogues, the estimator will capture about 60% of what is required for the complete estimate on the first pass. The object then becomes one of filling in the details where necessary. The following steps suggest a process to follow to achieve this goal.

Step One – Identify the components of the project.

The first task of the estimator is to determine the scope of the project. Is this an existing application that is being enhanced? Is this a completely new application? What organizations and individuals will be responsible for providing resources and skill to the project? What is the time frame for this project? Start by collecting all the information about the project in one folder. Base your assumptions on this information and make sure you have documented the authority for the assumptions you have made.

Starting with the basic template for a typical IT project (which has major areas for Project Management, Application Development, Infrastructure and Deployment), begin filling in the sub categories with the default selections from the available catalogues.

Step Two - Determine the effort and schedule for the Application Development

Most projects will have a software development component to it. Generally this development effort will be the driving factor of the estimate. Start by defining, in as much detail as possible, the characteristics of this component.

Determine such things as the implementation language, the environment that will be used to develop the code, the degree of integration of this project with other applications and the amount of code that will be developed, both new and re-used. For most estimators this will be the area that they are most familiar and comfortable with - a natural place to begin.

Step Three – Use the Application Development schedule to align the dates of the Catalogue Items

Change the Project Start dates and On Going Support Start dates in each catalogue items to match the dates for the Application Development schedule. Take into consideration the organization's policy on pre- and post-development activities. For example, PMO activities may begin 3 months before the Application Development start date and continue for several months after completion. On Going Support start dates usually align with the Application Completion date but can be adjusted as necessary for each project.

Infrastructure dates are usually driven by "need by" dates of Application Development. A typical scenario would provide the development hardware early in the project and the production hardware near the end of the development phase.

Step Four - Adjust labor rates

Estimates are usually initially built with default labor rates. If the default rates in the catalogues are the current rates then continue to use those. If the default rates are significantly different from the required rates for this proposal then the rates should be updated before proceeding further.

Step Five - Analyze the estimate results

Look for consistency between major activities. Identify the largest cost drivers and then look to see the extent of possible risk to the data used to generate the estimate. For example, if the software is really a modification of an existing system, is there sufficient integration effort for both the new development and for functional threads in the complete system?

Finally, Document and Review the Estimate with the Customer

- Focus on Major Components – Point out the major cost drivers and highest risk items in the project. Identify possible alternative approaches for further analysis.
- Show the Cost Expenditure over time – Budget constraints often will lead to a reanalysis of the project approach. Breaking up a project into smaller segments can result in meeting annual budget constraints. Looking at the budget expenditures for Materials, Contractor Support and In-House labor will lead to alternative implementation approaches to balance the budget constraints against the requirements for functional capabilities.

- Show the Labor Category requirements – Identify the skills needed over the project development period. It will be useful to show the labor requirements of this project against previously approved projects to show where the new needs are.
- Revise as appropriate to reflect consensus – The goal here is to reduce any subjective objections to the total project estimate. Strive for consensus on the majority of the project estimate elements, and then continue working to resolve the remaining issue to conclusion.

SUMMARY

Using a structured Work Breakdown Structure along with a robust set of catalogues or mini-estimates provides the estimator with a successful and proven methodology for estimating IT projects.

The span of knowledge required of the estimator of IT projects is much greater than just being able to characterize the software development. The process and methodology described here provides the estimator with a way to understand the elements that comprise the organization infrastructure, deployment concepts and security issues as well as the complex interactions among the groups that are the integral part of the environment are essential to preparing the estimate.

The methodology reduces the estimation challenge to capturing the necessary data in a series of min-estimates or catalogues. These catalogues then become the foundation upon which project estimates can be built. The estimator uses the overall structure of a template and then selects the best fit catalogues to build out the estimate. The process continues by refining the catalogue data to reflect the specifics of the project estimate at hand.

The process ensures that all the necessary elements of a complete estimate are addressed by focusing the decisions on default data that is reflects the organization history or industry wide data.