# The Organization of an Estimating Department

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**ABSTRACT:**

*There are many issues to deal with organizationally when creating and maintaining an estimating department. This article reviews some of these issues and shows examples from the authors' experience that may benefit others in similar situations. Identifying and documenting estimator skills and competencies, developing estimating training plans, acquiring estimating tools and resources, managing the estimating workload, measuring department performance, and interfacing with project management and controls—all of these topics are important in achieving an effective estimating department.*

**KEY WORDS:** estimates, estimator skills, core competencies, estimator training, database creation, estimating workload, project management, project controls

Preparing estimates for capital projects is a key part of a company's strategic asset planning. It is one of the core processes of total cost management. Although the procedures, processes, and steps needed to prepare an estimate are often discussed and written about, the organizational aspects of creating and maintaining an estimating department are usually ignored. This article reviews many of these organizational issues.

We have experience in estimating from both an owner's and an architect/engineer-contractor's viewpoint. Both organizations may maintain estimating departments to develop project cost estimates. This article is based primarily upon our experience with the worldwide capital estimating department at the Eastman Kodak Company (an owner organization), but much of the discussion is relevant to a contractor's estimating department as well.

## BACKGROUND

In late 1986, the capital estimating department was first formed as part of the project management division of the Eastman Kodak Company. The department was created to provide accurate, strategic, conceptual, and semi-detailed estimates for capital projects executed at Kodak Park.

Today, the capital estimating department has become a worldwide corporate resource as part of the worldwide capital and process reliability organization. It serves the estimating needs of Kodak's primary engineering offices (located in seven countries around the world), and supports estimates at all of our manufacturing plants. The department supports an extremely diverse customer base and prepares estimates for a variety of machine, chemical, and manufacturing processes, as well as for general construction and infrastructure projects. In addition, the department supports the development and maintenance of estimating data and tools, international location factors, and historical project and process benchmarking information. The department is currently comprised of 18 project estimators, including the department supervisor.

## WHERE ESTIMATING FITS IN THE CAPITAL ORGANIZATION

At a high level, our capital organization is split into four divisions: administrative, business flows, engineering/design, and process reliability (see figure 1).

The administrative division is responsible for the overall administrative functions of the capital organization and includes departments for financial systems, human resources, quality systems, information technology, and summary report-
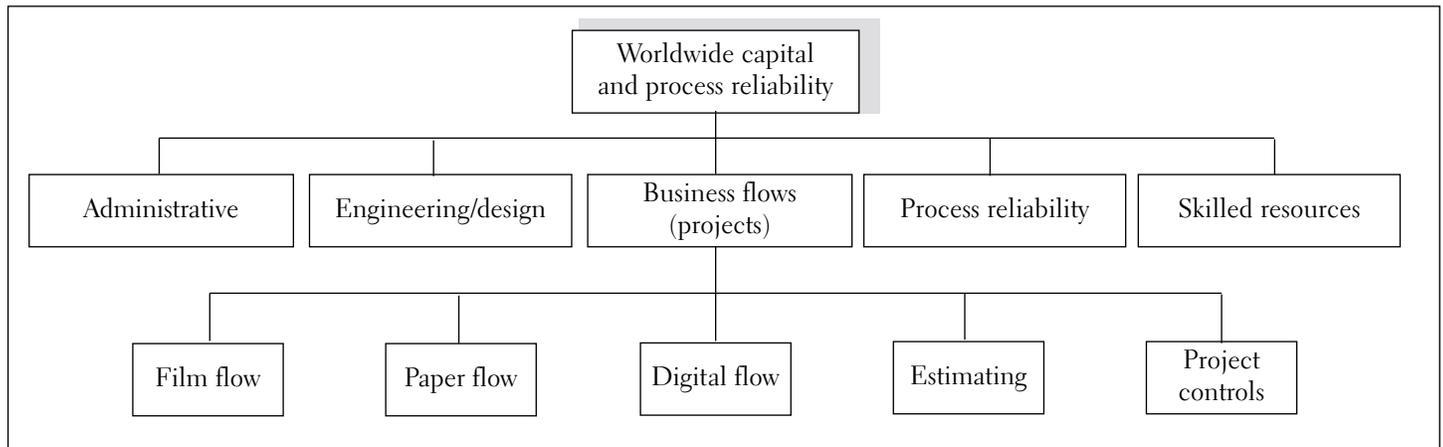


Figure 1—Capital Organization at the Eastman Kodak Company

ing of capital budgets. The engineering /design division is organized by functional areas related to processes, including departments related to developing and implementing global baseline technologies and designs. The process reliability division is organized to support process reliability and maintenance of the company's worldwide assets, and includes departments related to predictive maintenance, reliability benchmarking and training, spare parts management, etc. The skilled resources division maintains the in-house construction force and the construction managers who are responsible for managing the in-house construction, as well as all contracted construction.

The business flows division provides project management resources and is the interface to the customer areas (the manufacturing divisions). Each business flow maintains a group of project managers. These project managers are responsible for the actual capital projects required to support the needs of the manufacturing community with which they are aligned. The project managers, as needed, pull resources from the engineering/design division to create project teams for the execution of projects. The business flows division also includes the centralized estimating and project controls departments.

As you can tell from this description, the capital estimating department is a centralized corporate resource that provides global estimating capabilities. The department is responsible for the preparation and/or review of all significant capital projects. Each local plant site may prepare estimates for small capital and site-related projects (generally $50,000 or less in value). This is similar to most owner organizations. Approximately 80 percent or more of large owner organizations maintain a centralized estimating department.

### ESTIMATOR SKILLS, KNOWLEDGE, AND CORE COMPETENCIES

An effective estimating organization requires highly knowledgeable personnel who possess a broad set of both technical and nontechnical skills. We have defined this set of skills as "estimating core competencies." Documenting the core competencies is important for estimators to understand the basic skills required to per-

form effectively in their position, and is also important to define the requirements of an estimator for recruiting purposes (whether recruiting from other departments in-house or from outside companies).

The core competencies are divided into four major groups: business skills, software skills, communication skills, and general skills.

### Business Skills

- An understanding of the capital project process;
- a detailed understanding of the estimate requirements for each class of estimate;
- ability to read engineering documents;
- code of accounts/work breakdown structures/project breakdown structures;
- basic project controls (budgets, schedules, cost control, change management, progress measurement, earned value, and forecasting);
- data analysis (labor productivity, database standards and development, historical data analysis, and benchmarking);
- strategic estimating skills (capacity factoring, equipment factoring, cost modeling, general factor, and ratio development); and
- detailed estimating skills (material takeoffs, pricing, and costing).

### Software Skills

- Company software (accounting system, purchase order system, material pricing system, timecard, and project charging systems);
- general software (Excel, Word, Powerpoint, or Lotus Notes);
- estimating software (all estimating software used by the department);
- estimating workload reporting system;
- project historical retrieval and analysis system; and
- risk analysis software.

### Communication Skills

- Presentation skills;

- report writing; and
- listening.

### General Skills

- Planning, organizing, and delegating;
- resourcefulness and problem-solving;
- decision-making;
- teamwork and relationships;
- following project process and procedures;
- leadership and negotiations; and
- marketing.

### Estimator Performance Expectations

The list of estimating core competencies is expanded upon and supplemented by other needs (such as understanding specific industrial processes) in a document known as the estimator performance expectations. This document establishes the level of the specific skills and knowledge required for various estimator job levels (or wage grades). The estimator performance expectations document is a rubric for measuring the overall skill and performance level of the estimator, and for indicating which areas require attention in order to facilitate promotion to the next wage grade.

### ESTIMATING TRAINING

Extensive training is conducted for each estimator in accordance with the estimator performance expectations and the estimating core competency areas described above. The training for each individual estimator is summarized in a document called the employee development plan. Similarly, the training plans for all estimators are summarized in a department training plan, and are monitored on a monthly basis.

Regular informal training meetings are scheduled for the entire estimating group on a monthly basis. These monthly meetings are typically conducted by a member of the estimating department and usually focus on recent enhancements to the estimating systems or other estimating resources, recent additions or updates to the estimating item cost database, or the sharing of experiences on recent large or significant estimates. Although most training sessions are taught by senior estimators

in the department, all estimators are encouraged to organize and lead a training session.

These informal training sessions are supplemented by additional formal training classes that are taught by either corporate training resources or outside training organizations. These classes cover a variety of topics—from technical training in the industrial processes employed in Kodak's manufacturing units, to software training in Excel or Word. Other topics may include business issues such as the economic evaluation of projects or other financial topics; general issues such as teamwork, diversity training, or negotiating skills; or personal issues such as stress management, nutrition, or other health-related topics. Estimators also are encouraged to seek college degrees (undergraduate and advanced) with potential corporate financial support subject to corporate guidelines and defined business needs. Last, estimators are encouraged to join AACE International and to attend the monthly meetings and other training opportunities provided by the local AACE section. Many estimators are active both locally and internationally in AACE.

## ESTIMATING TOOLS AND RESOURCES

One of an estimator's most important tools is, of course, a computer and associated software. Today, the personal computer, or PC, is most often the estimator's computer of choice; it is usually connected to a local area network (LAN). The use of a LAN increases overall productivity for the estimating group, and easily allows sharing of files and data between estimators. At Kodak, all estimators use Pentium-based personal computers on a Microsoft NT-based network.

### Software

As mentioned previously, our estimating department prepares a variety of estimates, from very early strategic cost studies through semi-detailed budget authorization estimates (and occasionally detailed check estimates). A variety of estimating techniques and estimating software is used in preparing the many classes of estimates (see figure 2).

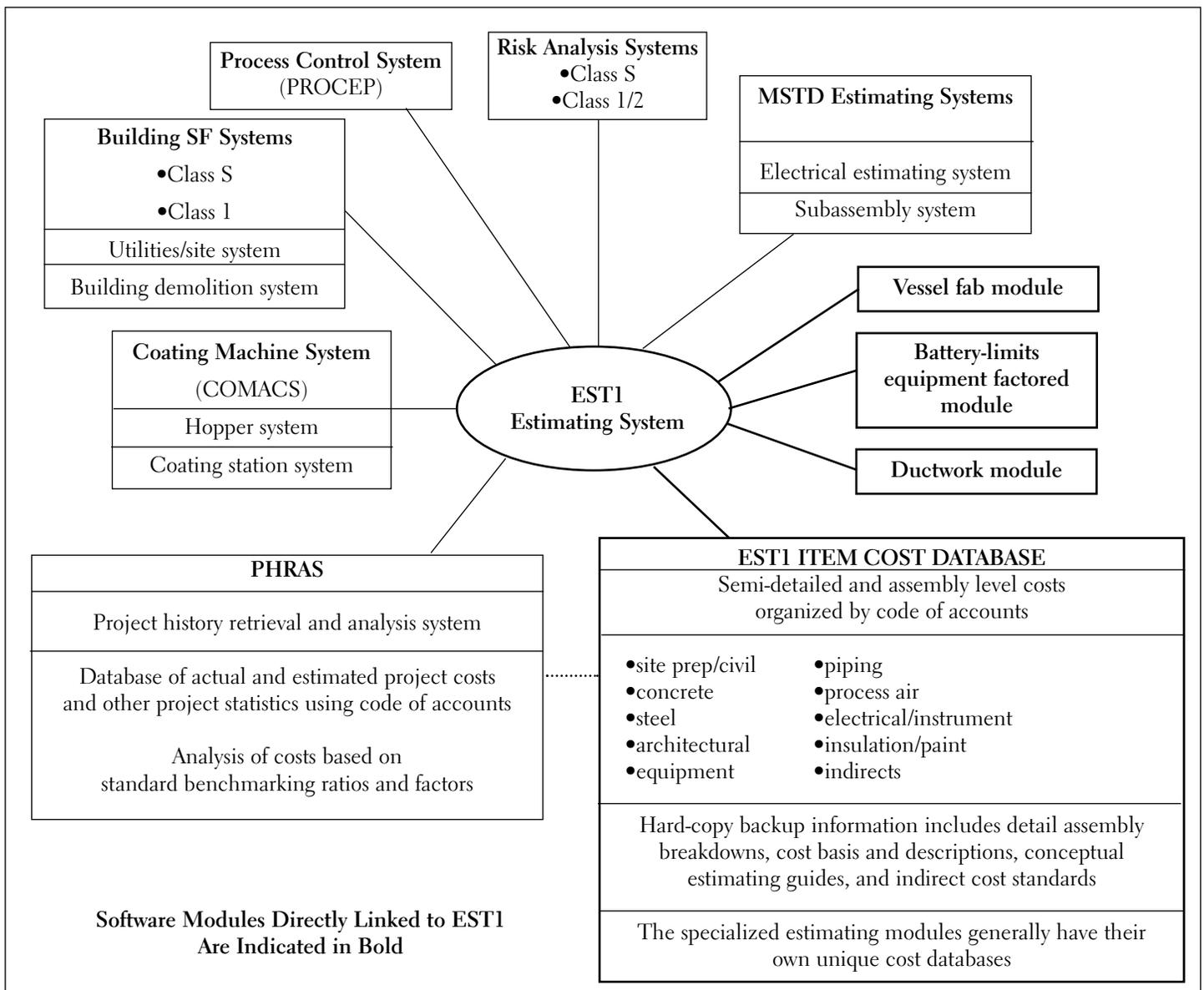Kodak's estimating software is organized around a central estimating system



Figure 2—Cost Estimating Systems Diagram

known as EST1. This system provides a generic line-item estimating system and forms a "hub" from which many of the other specialized estimating modules can be accessed. The system also provides access to our cost estimating database. The EST1 system is typically used in the preparation of all semi-detailed estimates.

As can be seen in figure 2, there is no single system that can satisfy all of the department's needs. This is especially true in a department that works with such a wide variety of projects. The department has therefore concentrated on supplying many small, focused estimating systems to meet specific needs, and has linked these into the core estimating system where it makes sense to do so. All of the systems support our standard code of accounts, and reports are standardized as much as possible across the systems.

Many of the specialized estimating systems are conceptual in nature, and are based on parametric estimating methods and algorithms. Most of these are based on elaborate, custom-developed, Excel spreadsheets. The department also uses ICARUS project manager software, primarily for process equipment pricing. Other than the ICARUS software, all other estimating software is developed and maintained in-house by the estimating department.

Kodak's estimating line-item database contains approximately 20,000 items (including individual components and assemblies). It was derived by benchmarking unit material and labor cost data from many different sources. Depending on the discipline, up to 11 sources of unit rates (including various contractor standards, in addition to commercial and other published sources) were compared and evaluated to determine the "reasonable" average unit rates that comprise our standard database.

In addition to estimating systems, the department also has developed software systems for risk analysis and benchmarking. These systems supplement the services that the department provides, and are another critical contributor to the department's success. Kodak's risk analysis software is made up of two systems: a strategic evaluation system based on overall project definition status and technological complexity, and a more detailed risk modeling system based on risk assessments for individual components of the estimate.

Another important system is the project historical retrieval and analysis system (PHRAS). Since one of the most important tools for an estimator is experience, PHRAS is designed to collect summary level project cost, schedule, and scope information in order to provide a structured format for the collection of project experience. PHRAS is used to capture and analyze data for all completed projects over $50,000, as well as for selected estimates and non-Kodak projects. The information collected by PHRAS is used for many purposes. It provides benchmarking data to monitor project cost and schedule performance, gives meaningful ratios and statistics to aid with estimate reviews, provides estimating database feedback and calibration information, and serves as a strategic resource planning and forecasting tool. The system also can be a strategic cost estimating system that generates estimates based upon benchmark measures. PHRAS analysis provides the raw material for the many parametric estimating tools used at the company.

Besides these estimating systems, estimators also need access to word processing and spreadsheet software. Spreadsheets are useful for many purposes, and are a great general-purpose tool for ad hoc estimate reporting, in addition to using them for customized estimating applications.

## Data

Kodak subscribes to R.S. Means, Richardson Engineering Services, and trade services to acquire their published books on cost information. New copies are acquired every year and are kept in a department library. In addition to these, we rely on several other published sources of international cost factors and data. Vendor catalogs also are acquired and maintained in the estimating library. The estimators have access to Kodak's engineering and technical library and are provided with Internet accounts to access vendor and other related information from the worldwide web.

To supplement the published sources on international cost factors, the department sends out a yearly survey to our international sites to obtain material and labor pricing information. This data is consolidated and published for use by the department.

Kodak also participates in the cost engineering committee of the Industry Benchmarking Conference facilitated by Independent Project Analysis, Inc. to collect additional benchmarking data. Much of this data is incorporated into the PHRAS system.

## Procedures

Department estimating procedures are documented and maintained under controlled distribution, as is end-user documentation for the software systems, item cost database information, and other resource information. All resource information is also maintained on an intranet site that is available to all Kodak sites worldwide. The estimating procedures manual contains the following sections:

- overview of the estimating process;
- review of estimate requirements;
- planning the estimate;
- structuring the estimate;
- developing the estimate;
- analyzing cost risk and estimating contingency;
- documenting the basis of an estimate;
- estimate reporting;
- review and issue estimate (including benchmarking analysis);
- estimate maintenance (change management);
- estimate close-out (project close-out support); and
- estimate databases and systems maintenance.

## Maintenance

Just as with a mechanic at your local automotive repair shop, tools are a key contributor to an estimator's productivity. They must be maintained and kept up-to-date for maximum effectiveness. This is not an easy nor exciting task; however, time and effort must be devoted to these activities. The department budgets approximately 1½ work-years (about 8.5 percent of total workhours) to developing and maintaining our estimating tools and resources. Although much of this work is concentrated with a few individuals, all estimators are expected to contribute.

All scheduled improvements, enhancements, and maintenance of the tools and resources are scheduled and monitored using standard project control tech-

niques. The activities are planned, budgeted, and entered into SureTrak (which is used as the project management tool). Progress on activities is monitored on a monthly basis. It is expected that progress on these activities will slow during periods of high estimating activity, but the opposite is also true. When the actual estimating workload is low, estimators are expected to work on these development and maintenance activities. There is never a time when the estimators don't have something to keep themselves busy.

## MANAGING THE ESTIMATING WORKLOAD

Managing the workload of a large group of estimators can be a difficult task. The individual workload assignment for the estimating staff needs to be monitored, as well as the progress for all active estimates. The estimating department at Kodak uses a software application, the Workload Reporting System (WRS), to aid in managing the estimating workload.

All new (and even potential) estimates are entered in the system, with their start and planned completion dates, planned hours needed to prepare the estimate, lead and supporting estimators, estimate customer, estimate type, and other miscellaneous data. At any point in time, WRS can be used to display all of the estimates that are currently in progress or are planned in the future. The data can be sorted by project, estimator, or by planned completion date. This information is used to monitor the workload of the department and to ensure that all estimates are obtaining the resources needed to be completed on time. The system also can indicate which estimators will be free to work on the next or near-term estimates. One estimator is assigned as the workload coordinator to centralize the input of all information into the system and issue reports. Working with the department supervisor, he/she may assist in assigning estimators to specific projects. The assignment of being a workload coordinator is rotated on an ad hoc basis.

When an estimate is completed, the final estimated cost for the project and the hours expended to complete the estimate are input to the system. This provides a history on all completed estimates. The actual completed estimates are filed in a central area. This information can be very valuable. For instance, when a new estimate is being started, the estimator can access the WRS and look up similar estimates by keyword, estimate location, or other meaningful data. The estimator could then easily locate the completed estimates for similar projects, and obtain equipment pricing information or other data that is useful for preparing the current estimate.

The estimating workload is monitored on a weekly basis by the estimating supervisor and the workload coordinator. It also is reviewed by the entire estimating department staff at monthly group meetings.

## MEASURING THE PERFORMANCE OF THE ESTIMATING DEPARTMENT

It is always important to measure performance, and most organizations have some form of performance measurement and/or continuous improvement process in place. The estimating department at Kodak maintains a variety of measures and statistics to measure performance and record trends in workload, estimate types, etc.

One set of key measures comes directly from the workload reporting system described above. Using this system, the department keeps track of the number of estimates completed, the average size of estimates, estimate preparation costs as a percent of total project cost, and a variety of other measures. This data can be sorted in many ways, including by type of estimate, project size, business unit, customer, etc. This data can be reported by month and/or year. Standard reports with a core set of measures are reviewed at the monthly group meetings.

The department also measures and tracks the progress of its planned improvement activities (also described above). Progress against the plan becomes one element of an overall performance matrix, and is a team contribution element on the estimators' year-end performance appraisals. Other items on this team performance matrix include the total hours charged to customers, the training hours accomplished, the number of estimate marketing presentations made, and the number of estimate reviews completed using benchmark data from our PHRAS system.

Individual performance measures are supplemented by behavior and performance surveys that are sent to selected customers and peers. These are summarized by the estimating supervisor and become a part of each estimator's year-end reviews and performance appraisal.

## INTERFACING WITH PROJECT MANAGEMENT AND PROJECT CONTROLS

The estimating department does not work in a vacuum. In many organizations, estimates are treated as being "owned" by the estimator who prepared it, who assumes full responsibility for its accuracy. An estimate should be "owned" by the entire project team. This requires a close interface with project management and project controls. After the initial estimate is prepared, it is important that adequate change management is in place so that changes in project scope can be assessed, and the project estimate updated accordingly. Project managers should ensure that estimators are involved in project teams early (when many important design decisions are made that may affect cost), and that they stay involved, at least minimally, throughout the project process. The estimators need to be involved in project close-outs to obtain any cost information that may be beneficial in future estimates, and to collect data for the historical database system.

Estimators usually will work closely with project controls personnel to format estimates so that they can be cast in the project work breakdown structure, and to assist in preparing schedules and resource plans. Estimators are encouraged to develop relationships with project managers and project controls personnel, and to build relationships based on trust. Estimators often will make presentations at group meetings of project managers or project controls personnel to demonstrate new estimating tools, resources, or other ways in which estimating can add value to the project process.

*T*here are many issues to deal with organizationally when creating and maintaining an estimating department. This article reviews some of these issues and shows examples from our experience that may benefit others in similar situations.

All of the above topics—identifying and documenting estimator skills and competencies, developing estimating training plans, acquiring estimating tools and resources, managing the estimating workload, measuring department performance, and interfacing with project management and controls—are important to achieve an effective estimating department. Each of these subjects brings value by helping to develop people or assisting in managing the department, but it is the combination of all of these issues that builds a truly successful estimating department.

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