Jamie: Whoa! How are we supposed to do that?

Vinod: I've done it on past projects. You begin with use cases, determine the functionality required to implement each, then guesstimate the LOC count for each piece of the function. The best approach is to have everyone do it independently and then compare results.

Doug: Or you can do a functional decomposition for the entire project.

Jamie: But that'll take forever and we've got to get started.

Vinod: No . . . it can be done in a few hours . . . this morning, in fact.

Doug: I agree . . . we can't expect exactitude, just a ballpark idea of what the size of *SafeHome* will be.

Jamie: I think we should just estimate effort . . . that's all.

Doug: We'll do that too. Then use both estimates as a cross-check.

Vinod: Let's go do it . . .

25.6.4 An Example of FP-Based Estimation

Decomposition for FP-based estimation focuses on information domain values rather than software functions. Referring to Table 25.1, you would estimate inputs, outputs, inquiries, files, and external interfaces for the CAD software. To compute the *count total* needed in the FP equation:

$$FP_{estimated} = \text{count total} \times [0.65 + 0.01 \times \Sigma(F_i)]$$

For the purposes of this estimate, the complexity weighting factor is assumed to be average. Table 25.1 presents the results of this estimate, and the FP count total is 320.

To compute a value for $\Sigma(F_i)$, each of the 14 complexity weighting factors listed in Table 25.2 is scored with a value between 0 (not important) and 5 (very important).

The sum of these ratings for the complexity factors $\Sigma(F_i)$ is 52. So the value of the adjustment factor is 1.17:

$$[0.65 + 0.01 \times \Sigma(F_i)] = 1.17$$

Finally, the estimated number of FP is derived:

$$FP_{estimated} = \text{count total} \times [0.65 + 0.01 \times \Sigma(F_i)] = 375$$

TABLE 25.1

Estimating information domain values

Information domain value	Opt.	Likely	Pess.	Est. count	Weight	FP count
Number of external inputs	20	24	30	24	4	96 (24 × 4 = 96)
Number of external outputs	12	14	22	14	5	70 (14 × 5 = 70)
Number of external inquiries	16	20	28	20	5	100 (20 × 5 = 100)
Number of internal logical files	4	4	5	4	10	40 (4 × 10 = 40)
Number of external interface files	2	2	3	2	7	14 (2 × 7 = 14)
Count total						*320*

TABLE 25.2

Estimating information domain values

Complexity Factor	Value
Backup and recovery	4
Data communications	2
Distributed processing	0
Performance critical	4
Existing operating environment	3
Online data entry	4
Input transaction over multiple screens	5
Master files updated online	3
Information domain values complex	5
Internal processing complex	5
Code designed for reuse	4
Conversion/installation in design	3
Multiple installations	5
Application designed for change	5

The organizational average productivity for systems of this type is 6.5 FP/pm. Based on a burdened labor rate of $8,000 per month, the cost per FP is approximately $1,230. Based on the FP estimate and the historical productivity data, the total estimated project cost is $461,000 and the estimated effort is 58 person-months.

25.6.5 An Example of Process-Based Estimation

The most common technique for estimating a project is to base the estimate on the process that will be used. That is, the process is decomposed into a relatively small set of activities, actions, and tasks and the effort required to accomplish each is estimated.

Like the problem-based techniques, process-based estimation begins with a delineation of software functions obtained from the project scope. A series of framework activities must be performed for each function. Functions and related framework activities[11] may be represented as part of a table similar to the one presented in Figure 25.3.

Once problem functions and process activities are melded, you estimate the effort (e.g., person-months) that will be required to accomplish each software process activity for each software function. These data constitute the central matrix of the table in Figure 25.3. Average labor rates (i.e., cost/unit effort) are then applied to the effort estimated for each process activity.

11 The framework activities chosen for this project differ somewhat from the generic activities discussed in Chapter 2. They are customer communication (CC), planning, risk analysis, engineering, and construction/release.