Instructor Notes for Block 2

Personal Software Process for Engineers

# Sequence of Lectures

* Lesson 4: Planning with a Model
* Lesson 5: Estimating with Standard Sizes
* Lesson 6: Building Standard Size Tables
* Lesson 7: Reducing Estimation Bias
* Lesson 8: Automating Estimation with Regression

## Block 2 Sequence Rationale

Block 2 elaborates the component skills of PROBE, or PROxy-Based Estimating, without ever calling it that. Lesson 4, “Planning with a Model,” introduces the idea of using a *conceptual design* (the traditional PSP term) to relate all known requirements to various “parts” that one would need in order to implement those requirements and to record and classify those parts for planning purposes. Hence, we use the term *planning model*. Lesson 5, “Estimating with Standard Sizes,” introduces the use of a preexisting set of part types with a historical range of sizes as an aid to planning. Lesson 6, “Building Standard Size Tables,” shows a method for turning historical data into just such a set of standard part types. Lesson 7, “Reducing Estimation Bias,” introduces the idea of using one’s personal estimating performance to correct for estimation bias. Lesson 8, “Automating Estimation with Regression,” replaces historical averaging from the previous lesson with regression calculations that may improve estimating precision and accuracy, especially as more data becomes available.

The essential idea of the block is presented in Lesson 4, namely, breaking an estimate down into parts and then estimating the parts. This should result in better estimates for two reasons:

1. There is a natural tendency to decompose a large, possibly unknown object into smaller familiar parts.
2. Smaller parts are generally easier to estimate. This corresponds to the original “Method D” in PSP PROBE.

Lessons 5 and 6 introduce the power of using so-called “standard sizing” and then creating standard size tables from one’s own historical data. This is powerful though probably not essential, since there is some evidence that using any kind of log-normal scaling factors (e.g., a Fibonacci sequence) provides useful guidance to the generic “t-shirt sizing” of small, medium, and large.

Lesson 7 is arguably the second most essential idea of the block, namely, using one’s average performance to date to adjust any personal estimate, for both the size and time for any given piece of work. This corresponds to the original “Method C” in PSP PROBE. Lesson 8 then introduces the idea of replacing historical averaging with regression calculations (either Method A or Method B from PROBE). While this can provide very accurate individual estimates and is easily automated, it is rarely practiced because averages (Method C) seem to be good enough in real-world development.

A minimum treatment of Block 2 concepts would be Lessons 4 and 7, with a Fibonacci or other approximately log-normal distribution filling in for a historical data summary. Adding in standard size tables, based on Humphrey’s own personal data, would add in Lesson 5. Lesson 6 essentially shows how to replace Humphrey’s data with one’s own, although note that Humphrey’s data seems to work well with any C++-like language more than 25 years after he gathered it, probably because of the power of adjusting based on one’s own data in Lesson 7. The full treatment that includes adjusting more precisely using both linear regression and personal data would then arrive in Lesson 8.

## Block 2 Programming Exercises

Block 2 was intended to provide two separate sets of programming exercises: the “E” series (which extends through all blocks) and the “F” series (which begins here in Block 2 and extends through Blocks 3 and 4). While the original idea was that one series would be “easy math” and the other would be “harder math,” easy and hard are relative to one’s background. In general, the F series should require relatively more effort. In Lessons 5 and 7, the F assignment is the E assignment with additions. In Lesson 6, there is no F assignment.

For purposes of this course, the instructor should select the sequence that makes the most sense for the class or group being taught, and then stick with that sequence throughout the blocks, since there is by design some serial dependency in each sequence. This should be straightforward if delivering all of Block 2, then all of Block 3, and then all of Block 4. But it will become problematic if the instructor uses a different order or selects only a few of the lessons in any given block, such as delivering only Lessons 4 and 7 in this block.

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| Lesson | E Assignment | F Assignment |
| 4: Planning with a Model | Gamma function | Task and schedule plan calculations |
| 5: Estimating with Standard Sizes | Mean and standard deviation | Mean, standard deviation, median, range, quartiles |
| 6: Building Standard Size Tables | Relative size tables (log-normal calculations) | Same as E |
| 7: Reducing Estimation Bias | Linear regression | Regression and correlation |
| 8: Automating Estimation with Regression | Simpson’s rule – normal distribution | PSP2.1 alternate process planning calculations |

Document Markings

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