Sizing software by counting 'one, two, many' – does it matter? (Yes)

December 2006

A century ago, explorers in Southern Africa discovered that the Khoisan people, or 'Hottentots' as they became known, have the most primitive counting system known to man. They only have words for 'one', 'two', and 'many'. A Hottentot who has more than two cows, can only tell you that he has 'many' cows, no matter how many.

Other primitive peoples have slightly more sophisticated counting systems. They may also only have words for '1' and '2', but can construct higher numbers by using combinations of the words for '1' and '2', for example

3 = 1 + 2; 4 = 2 + 2; 5 = 2 + 2 + 1, etc.

Interestingly, the most widely used method of sizing software, known as the IFPUG method, is comparable to the Hottentot system. For example, one of the software functions measured by the IFPUG method, an 'Input elementary process', can be counted as 3, 4 or 6 'function points', but no more.

Does this matter in practice? Well, yes, recent evidence suggests it does, a lot. Consider the following two cases.

A major European pension fund had been using the IFPUG method for sizing its software and as a basis for estimating. One project turned out to be seriously under-estimated. To investigate how this happened, the software was measured again using the COSMIC-FFP method of sizing software. This method has a size scale for all software functions that starts at 2 Cfsu (COSMIC-FFP size units), rises with increments of 1 Cfsu, and has no upper size limit for any one function.

The comparison found that some elementary processes that scored the maximum 6 or 7 IFPUG function points turned out to be over 60 Cfsu when measured on the COSMIC-FFP method. Furthermore, the processes with size over 40 Cfsu, accounted for almost 80% of the project budget overrun.

(And, by the way, the staff who measured the COSMIC-FFP size for this pension fund knew nothing about the budget over-run, but independently recommended splitting those processes because of their complexity.)

Studies have shown that the sizes of software that has relatively simple elementary processes measured by both the IFPUG and the COSMIC-FFP methods correlate quite well. But as the average size of processes increases, the fact that the IFPUG measurement scale suddenly stops, causes serious distortions. We conclude that IFPUG sizes will be seriously misleading when used for performance measurement or estimating for software with larger, complex transactions.

The major European pension fund has now switched over to the COSMIC-FFP method.

A similar review of sizing methods is going on with a large, global bank. Although they have invested significantly in Software Process Improvement, their project delivery rate (PDR) showed

almost no improvement when using IFPUG sizes to measure project work-output. In this case, re-sizing the newer applications using the COSMIC-FFP method has given relatively larger sizes.

The problem has been that the average complexity of the bank's software functions measured using the IFPUG method has moved slowly towards the maximum possible sizes on that scale. In contrast, COSMIC-FFP measurements properly reflect the increasing sizes of their processes. After substituting COSMIC-FFP sizes, the bank's PDR shows real improvement.

Apparently, the bank is still hesitating about switching to the COSMIC-FFP sizing method, due to its large set of historical data based on IFPUG sizes. This should not be a barrier. Methods of tracking sizes are frequently re-calibrated in all branches of economics and finance – for example stock market indices are typically re-calibrated every quarter. Re-calibration need not invalidate or make previous data useless.

These findings are pretty devastating. They go a long way towards explaining why so many major projects, which often use the IFPUG method to size the software to be developed, are seriously under-estimated. Now we may also have an explanation why some organizations invest in software process improvement but are unable to measure much benefit from their investment in terms of improved performance. All due to a defective software size measurement method.

In our view, it's time to move on from the Hottentot era.

COSMIC – the Common Software Measurement International Consortium

For more on the COSMIC-FFP method, see www.cosmicon.com and/or contact your local member of the COSMIC International Advisory Committee, whose e-mail address is given on the 'cosmicon' site.