Function Points of “Tour Guide” Project

There have been several serious attempts to measure functionality of software products. We examine two approaches : Albrecht’s function points (FPs) and the COCOMO II approach. Here we follow function points approach.

1.To compute the number of FPs we first compute an ***unadjusted function point count (UFC)***. To do this, we determine from some representation of the software the number of “items” of the following types:

A) **External inputs:** Those items provided by the user that describe distinct application oriented data (such as file names and menu selections). These items do not include inquiries, which are counted separately.
B) **External outputs:** Those items provided to the user that generate distinct application oriented data (such as reports and messages, rather than the individual components of these).
C) **External inquiries:** Interactive inputs requiring a response.
D) **External files:** Machine-readable interfaces to other systems.
E) **Internal files:** Logical master files in the system.

Next, each item is assigned a subjective “complexity” rating on a three-point ordinal scale: simple, average, or complex. Then, a weight is assigned to the item. Then we can compute UFC by multiplying the number of items in a variety by the weight of the variety and summing them.

$$\text{UFC} = \sum_{i=1}^{15} (\text{Number of items of variety } i) \times (\text{weight}_i)$$

2.To complete our computation of FPs, we calculate an adjusted function point count, FP, by multiplying UFC by a technical complexity factor, TCF. This factor involves the 14 contributing factors listed.
Each component or subfactor in is rated from 0 to 5, **where 0 means the subfactor is irrelevant, 3 means it is average, and 5 means it is essential** to the system being built. Although these integer ratings form an ordinal scale, the values are used as if they are a ratio scale, contrary to the principles. Also, we find it curious that the “average” value of 3 is not the

median value.The following formula combines the 14 ratings into a final technical complexity factor.

$$\mathrm{TCF} = 0.65 + 0.01 \sum_{i=1}^{14} F_i$$

3.This factor varies from 0.65 (if each F i is set to 0) to 1.35 (if each F i is set to 5). **The final calculation of FPs multiplies the UFC by the technical complexity factor :**

$$\mathrm{FP} = \mathrm{UFC} \times \mathrm{TCF}$$

Components of the Technical Complexity Factor

F 1 Reliable backup and recovery	F 2 Data communications
F 3 Distributed functions	F 4 Performance
F 5 Heavily used configuration	F 6 Online data entry
F 7 Operational ease	F 8 Online update
F 9 Complex interface	F 10 Complex processing
F 11 Reusability	F 12 Installation ease
F 13 Multiple sites	F 14 Facilitate change

Function Point Complexity Weights

	Weighting factor		
	Simple	Average	Complex
External Input	3	4	6
External Output	4	5	7
External Inquiry	3	4	6
External Files	7	10	15
Internal Files	5	7	10

Unadjusted function point count (UFC)

External Input

Item	Complexity	Weight	Total
Tourists find out tour guide	Simple	3	External Input=9 Simple=4 Average=3 Complex=2
Tourists search for a spot	Simple	3	
Tourist gives the registration info	Simple	3	
Guide gives the registration info	Average	4	
Tourist provides feedback to guide	Complex	6	
Tourists search for a specific spot	Simple	3	
Change tourist profile	Average	4	
Guide change his/her profile	Average	4	
Tourists confirm a guide	Complex	6	

External Output

Item	Complexity	Weight	Total
Tourist profile create	Simple	4	External Outputs=8 Simple=3 Average=2 Complex=3
Guide profile create	Complex	7	
Tourists show the guide list	Simple	4	
Tourists show the tour spot list	Simple	4	
Tourist profile update	Average	5	
Guide profile update	Average	5	
Guide confirms successfully	Complex	7	
Guide shows the tourist feedback	Complex	7	

Internal Files

Item	Complexity	Weight	Total
Guide info file	Simple	5	Internal Files=4 Simple=1 Average=2 Complex=1
System fee file	Average	7	
Image directory	Average	7	
System document	Complex	10	

External Inquiries

Item	Complexity	Weight	Total
The system can manage tour guide	Complex	6	External Inquiries=5 Simple=1 Average=2 Complex=2
Guide Confirmation fee manage by system	Complex	6	
Manage most visited tourist spot	Average	4	
Calculate tour guide cost	Average	4	
Calculate system fee in advance	Simple	3	

External Files

Item	Complexity	Weight	Total
Provide trusted guide info file	Average	10	External Files=1 Simple=0 Average=1 Complex=0
System fee per tour	Complex	15	

UFC = (4 * 3 + 3 * 4 + 2 * 6) + (3 * 4 + 2 * 5 + 3 * 7) + (1 * 10) + (1 * 3 + 2 * 4 + 2 * 6) + (5 * 1 + 7 * 2 + 10 * 1)
= 36 + 43 + 10 + 23 + 29
= 141

TFC = 0.65 + 0.01(14 x 3) [For each complexity factor we assume its average which is 3]
= 0.65 + .42
= 1.07

FP (Function Point) = UFC x TFC
= 141 x 1.07
= 150.87