

OPTIMIZED GSCs IN FUNCTION POINT ANALYSIS – A MODIFIED APPROACH

Jagrit S Srivastava¹ & Gurmit Singh²

¹ IBM India Pvt. Ltd, A-26, Sector 62, Noida, U.P, India

²Department of Computer Science and Information Technology,
Sam Higginbottom Institute of Agriculture, Technology and Sciences,
Allahabad, U.P., India

ABSTRACT

In function point analysis for software cost estimation, fourteen “General Systems Characteristics” (GSCs) are used to calculate a “Value Adjustment Factor” (VAF), with which unadjusted functions point count is adjusted. Although the GSCs and VAF have been criticized on both theoretical and practical grounds, they are used by many function point specialists. This paper extends earlier rationalisation done by C.J. Lokan [1] on GSCs and proposed modified GSCs and formula to calculate Value Adjustment Factor VAF. We conclude that recording non functional requirement by using four new GSCs factor and using modified VAF formula ensure increase in function point count to extent of 20% which in turn will improve productivity. Further empirical research would also be valuable. In particular, it would be worthwhile to repeat the factor analysis on different data sets, to obtain a better understanding of the underlying factors.

Keywords: *Function points analysis {FPA}; Software cost estimation; General Systems Characteristics {GSCs}; Value Adjustment Factor {VAF}; Unadjusted and adjusted function points; Total Degree of Influence{TDI}; ISO; International Function Point Users Group {IFPUG}*

1. INTRODUCTION

For an organisation to know if its productivity is improving or declining it has to first find some way to measure it; Albrecht [2] identified five objectives that a successful software development measure should meet: It must consistently determine the productivity and productivity trends of development, maintenance, or support activities, or projects, relative to other similar activities at the site, and other development sites.

- 1) It must promote actions or decisions that can improve the output of the development site.
- 2) It must demonstrate the results of the actions taken to improve the output of the development site.
- 3) It must support the estimating process at the development site.
- 4) It must support the management process at the development site.

Function Point Analysis (FPA) came about, not because a new measure of system size was requested, but because productivity was becoming increasingly important, FPA aims to provide a consistent measure of system size that:

- 1) Is independent of the development technology
- 2) Is simple to apply
- 3) Can be estimated (reasonably well) from the requirements specification
- 4) Is meaningful to the end user.

Two parts are involved while estimating software size using FP, first part being unadjusted function point where all functional requirements get captured and second part being adjusted function point which captures non functional requirements, together giving an estimation of particular software and is known as function point. To start at a high level for Unadjusted Function Point, there are five steps in the process of counting FPs. They are:

- 1) Determine the type of count.
- 2) Identify the scope and boundary of the count.
- 3) Determine the unadjusted FP count.
- 4) Determine the Value Adjustment Factor.
- 5) Calculate the Adjusted FP Count.

FP practitioners look at a software application in terms of five standard functions subdivided into two groups:

- 1) Data Functions:
 - i. Internal logical files
 - ii. External interface files
- 2) Transactional Functions:
 - i External Inputs
 - ii External Outputs
 - iii External Inquiries

Using this technique while counting FPs, a software system seems like something shown in Figure 1.

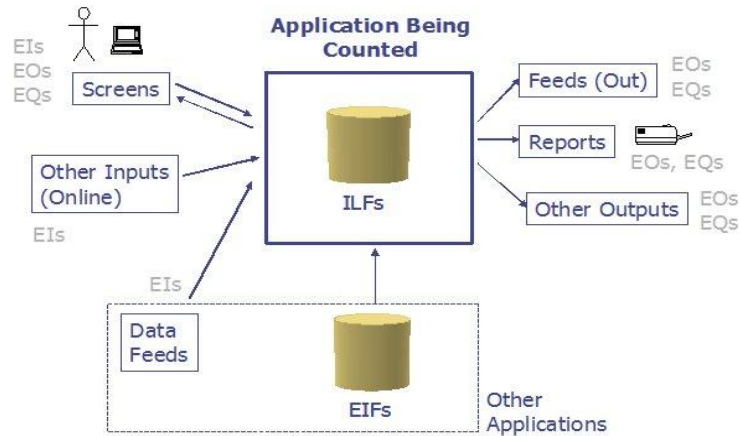


Figure 1: Software Application -Fp Practitioner View

Component Type	Component Complexity			
	Low	Average	High	Total
External Inputs	__ * 3=EI1	__ * 4=EI2	__ * 6=EI3	EI1+EI2+EI3
External Outputs	__ * 4=EO1	__ * 5=EO2	__ * 7=EO3	EO1+EO2+EO3
External Inquiries	__ * 3=EQ1	__ * 4=EQ2	__ * 6=EQ3	EQ1+EQ2+EQ3
Internal Logical Files	__ * 7=ILF1	__ * 10=ILF2	__ * 15=ILF3	ILF1+ILF2+ILF3
External Interface Files	__ * 5=EIF1	__ * 7=EIF2	__ * 10=EIF3	EIF1+EIF2+EIF3
Total UFP	$(EI1+EI2+EI3) + (EO1+EO2+EO3) + (EQ1+EQ2+EQ3) + (ILF1+ILF2+ILF3) + (EIF1+EIF2+EIF3)$			

Table 1: Unadjusted Function Point Summary

For Adjusted Function Point:

The following steps outline the procedures to determine the value adjustment factor. [3]

Step	Action
1	Evaluate each of the 14 general system characteristics on a scale from zero to five to determine the degree of influence (DI).
2	Add the degrees of influence for all 14 general system characteristics to produce the total degree of influence (TDI).
3	Insert the TDI into the following equation to produce the value adjustment factor $VAF = (TDI \times 0.01) + 0.65$ For example: the following value adjustment factor is calculated if there are three degrees of influence for each of the 14 GSC descriptions (3 x 14) $VAF = (42 \times 0.01) + 0.65$ $VAF = 1.07$

Table 2: Steps to Calculate Value Adjustment Factor

Overall size for the system in adjusted function points:

$$FP_s = UFP \times VAF$$

Measuring non-functional requirements is making life somewhat difficult for functional point experts. There are theories with statistical evidence that the adjustment process in function point analysis is not effective for adequate effort prediction since these were formulated based on existing model. However, from an overall perspective, VAF calculations do form a critical part in adjusting function point. VAF based on 14 GSCs, lead to double counting as many GSCs are interrelated and also while calculating VAF it is not appropriate to give all of the GSCs the same weight.

2. STATEMENT OF THE PROBLEM

The value adjustment factor (VAF) is calculated using predefined general systems characteristics (GSC) to assess the processing complexity of the software application as a whole. The VAF adjusts the functional size determined to produce the adjusted function points (AFP). The GSCs are intended to measure size of the technical and quality aspects of the requirements, to supplement or adjust the size obtained from the pure information-processing or “functional” parts of the requirements. Intuitively, they are used to adjust a function point count so as to conclude an accurate estimation based on FP. Researchers have censured use of VAF and GSCs both in theory and practice. Theoretically GSCs are interrelated and because a complexity factor is involved while calculating unadjusted function point as well while identifying GSCs, the final count is ambiguous due to this double counting. Practically while calculating VAF, some GSCs were allocated equal importance due to which VAF doesn't provide enough variation. This paper is an attempt to overcome these shortcomings.

3. JUSTIFICATIONS AND IMPORTANCE

Many organizations are not using the adjustment part of Function Point Analysis, Mark II Function point and ISO standard of function point measurement exclude this on Function size measurement; however IFPUG and many organizations still consider this as a critical part of Function Point Analysis. In view of this and in context of the finding mentioned in this paper and by other researchers, it is advisable to revive the adjustment phase. C.J. Lokan (2000) in his article titled “An empirical analysis of function point adjustment factors” concluded that in function point analysis, fourteen “general systems characteristics” (GSCs) are used to construct a “value adjustment factor” (VAF), with which a basic function point count is adjusted. This paper reports an empirical investigation into their use and practical value. We conclude that recording GSCs may be useful for understanding project cost drivers and for comparing similar projects, but VAF should not be used: doubts about its construction are not balanced by any practical benefit. A new formulation is needed for using GSCs to explain effort; factors identified here could guide further research.

Lokan suggested that the 14 GSCs need to be regrouped and proposed four new factors. This study further investigates the findings of Lokan, based on 4 new GSCs and proposes a modified VAF calculation. A collection of 118 applications of telecom domain, used for one of the leading European telecom operators, were analyzed.

4. RESULT AND DISCUSSION

4.1 New GSCs Factor and Modified VAF Result

Examination of these application data reveals some relationship between GSCs. These relationships suggest that a smaller number of underlying dimensions might be involved, with some being captured several times over by different GSCs. Preliminary analysis showed that FOUR factors (Table 3 below) should be retained in the model and re-constructed value adjustment factor (Equation 1.0) adjust the unadjusted function point to a extent of 20%.

New Factor
Independence
Problem Complexity
Interactivity
Operability

Table 3: New GSCs Factor

4.2 Modified Value Adjustment Factor:

$$VAF = TDI \cdot 0.1 + 14$$

$$VAF = 1 + \sum GSC_i$$

$$I=1$$

The comparative analysis of these modifications in Telecom domain was carried out and the results are as shown below:- Table 4 represents VAF based on existing GSCs whereas Table 5 is calculated using factor mentioned in Table 3 i.e. with new factors. We conclude that new factors will increase the productivity for all applications (Table 6). Data presented in Table 6 has been taken from one of key telecom service provider in Europe; application taken belongs to Business Support Systems area of IT division. Value adjustment factor of each application were calculated twice. First all 14 GSCs were identified and based on the functionality delivered by these applications, the degree of influence was derived using exiting VAF. To validate the proposed new formula these applications were again studied under new GSCs definition and VAF were calculated for each application. A bar graph was then plotted to compare between old (blue) and new (purple) VAF as shown in table 6. It is evident that the new proposed formula will give higher Function Point Count resulting in more productivity for organisation.

Application Name	VAF	GSC1	GSC2	GSC3	GSC4	GSC5	GSC6	GSC7	GSC8	GSC9	GSC10	GSC11	GSC12	GSC13	GSC14
Billing Interfaces (Tuxedo facturación)	1.02	4	4	3	3	2	5	0	4	1	3	1	3	2	2
EXTRACTOR	0.8	0	2	1	2	3	0	0	0	1	2	2	0	1	1
DOC1 (reusable)	0.87	4	2	3	2	2	0	1	0	2	1	0	2	2	1
Factura electrónica (Electronic Bill)	0.91	4	4	1	1	2	5	3	1	1	0	1	2	0	1
Facturaweb	1.04	5	4	3	2	2	5	4	1	3	2	1	3	2	2
ARBOR	0.9	2	0	2	2	2	1	0	2	2	3	1	3	3	2
ARBOR 11.8	0.9	2	0	2	2	2	1	0	2	2	3	1	3	3	2
DWH	1.03	0	3	3	3	4	0	4	5	4	4	1	0	3	4
NPPI	0.87	3	0	3	3	3	4	0	3	2	1	0	0	0	0
Catalogue System	0.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CID (Post-paid)	0.92	3	3	4	2	3	1	2	4	1	1	0	0	0	2
Incentix	1.09	5	4	3	4	3	5	5	4	3	1	1	1	0	5
Precos	1.11	5	5	3	4	4	5	5	4	3	1	1	1	0	5
Envío de correo masivo (Massive Mailing)	1.03	4	4	3	3	2	5	4	4	1	3	1	1	3	0
Loyalty rewards system	1.3	5	4	5	4	5	5	5	4	4	5	5	5	4	5
DDE (Apolo)	0.88	1	2	2	2	2	0	1	4	1	2	1	1	1	3
Parex (Apolo)	0.88	1	2	2	2	2	0	1	4	1	2	1	1	1	3
Apolo Pre-paid	1.03	5	1	4	4	3	0	4	0	4	1	3	3	3	3
SWITCH AUDIT	1.03	4	3	4	4	4	0	3	0	4	2	3	3	1	3
SGCyR (SAP R/3)	0.95	1	2	1	5	3	0	4	0	5	4	1	0	0	4
Query web	1.06	5	4	4	2	4	5	4	3	3	2	1	3	0	1
SAP Financials	1.03	3	2	3	3	3	3	4	1	5	4	4	0	0	3
Gallery	1.03	3	2	3	3	3	3	4	1	5	4	4	0	0	3
Credit Card Retrocession	1.03	5	4	4	2	4	4	3	3	3	1	1	3	0	1
IMEI Control	1.04	3	0	1	2	4	5	4	4	5	1	3	1	4	2
BTR- Blocking system for stolen phones	1.04	3	0	1	2	4	5	4	4	5	1	3	1	4	2
Availability hours	0.92	3	1	3	2	2	1	3	1	3	5	0	0	0	3
Employee self-service (Kiosco Empleados)	1.02	4	3	3	3	3	3	4	3	3	5	0	0	0	3
OneWay	1.05	4	4	3	3	2	5	4	4	3	3	1	1	3	0
SAP HR	1.02	4	3	3	3	3	3	4	3	3	5	0	0	0	3
Rainbow	1.15	5	0	4	3	3	4	5	3	5	4	3	4	4	3
AGORA	1.03	3	0	5	3	2	2	5	2	3	4	1	3	2	3
Network Configuration System	1.15	5	0	4	3	3	4	5	3	5	4	3	4	4	3
Aracne	1.07	3	0	4	3	3	4	5	3	3	4	1	4	2	3
Tindaya	1.03	4	3	3	4	3	5	5	3	3	1	1	1	0	2
NCV Mapping	0.9	4	3	0	1	2	5	5	0	1	1	1	0	0	2
SERPA	1.15	5	4	5	5	4	2	4	1	4	2	4	3	4	3
SANDRA Charging Case Audit	1.06	4	0	4	3	2	4	5	3	3	4	1	3	2	3
Pera Online	1.07	4	0	4	3	3	4	5	2	3	4	1	4	2	3
Credits	1.07	3	0	2	2	4	5	4	4	5	1	5	1	4	2
SAP R/3	0.95	3	2	3	2	3	0	4	3	2	5	0	0	0	3
Network spare parts	0.83	3	1	1	1	1	1	2	0	1	5	0	0	0	2
Purchase to Pay	1.05	3	5	3	3	3	3	3	1	5	4	4	0	0	3
On-line Consumption	0.92	4	4	1	1	2	5	3	1	2	0	1	2	0	1
Own shops (Tiendas propias)	1.08	5	4	3	2	5	5	4	4	3	5	0	0	0	3
Workflow Apps	1.11	4	4	3	3	4	5	3	2	3	3	2	5	0	5
ACNAC	1.02	4	3	4	2	4	5	3	2	2	1	1	3	1	2
Agora	1.03	3	0	5	3	2	2	5	2	3	4	1	3	2	3
Almacen Virtual	1.07	4	4	2	2	2	5	5	4	2	1	3	3	2	3
Amadeus	0.99	3	0	5	3	2	1	5	1	1	1	1	4	4	3
Archivo Digital	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
Argos	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
BRM	0.93	4	0	0	2	3	5	3	3	2	1	1	0	2	2
Cadenas SDI / SMS	0.83	3	2	1	2	2	0	0	0	2	0	2	1	2	1
CALLP	0.86	1	1	3	2	3	0	0	0	2	1	1	5	1	1
CIFRA	0.79	0	2	0	1	3	0	0	0	2	1	1	0	2	2
Clarify 10.1 / Activa	1.14	4	4	4	3	5	5	2	4	5	2	2	3	1	5
Commercial Portal	1.17	5	4	5	1	4	4	4	4	4	4	1	2	5	5
Consumos Electricos (Cons Elect)	0.85	3	2	3	2	2	0	0	0	2	0	2	1	2	1

Table 4: VAF of Telecom Applications – Existing Model

Control Obras	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
Extranet contratos	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
Gestion Actas Aceptación	1.12	5	5	2	3	2	5	5	4	3	1	3	4	2	3
Gestion Hitos	0.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gestion Pedidos	1.1	4	0	4	3	3	4	4	3	5	4	1	3	4	3
Gestion Unidades Moviles	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
GIS-NCV	1	4	3	2	2	2	5	5	0	3	1	3	2	2	1
GIS-Sugar	1.09	3	0	4	3	3	4	5	3	3	4	1	4	4	3
Houston	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
HSO	1.04	4	2	3	1	3	5	4	3	4	2	2	2	2	2
INFRANET	1.15	5	5	5	3	5	3	1	4	4	5	3	5	1	1
INTEFACT	0.86	1	1	1	2	3	0	0	1	3	1	2	2	3	1
INTRA/FINTRA	1.14	4	2	4	4	4	5	4	4	4	1	3	3	2	5
IRIS	1.16	5	4	4	2	4	5	4	4	4	2	3	3	3	4
Mobile Portability System	1.14	5	4	3	2	3	5	3	4	4	2	4	4	1	5
Mortirolo	1	5	0	4	2	4	0	1	4	4	1	3	3	2	2
NCRM	1.18	5	4	4	3	4	5	4	3	3	5	5	3	2	3
NOVA	1.1	4	4	3	4	3	4	3	4	5	1	2	2	3	3
Pais	1.04	4	4	3	3	2	5	4	4	2	3	1	1	3	0
Portal del Proveedor	1.07	5	4	3	3	3	5	4	4	3	3	1	1	3	0
PUC	0.87	1	1	3	2	3	0	0	0	2	1	1	5	1	2
Remedy	1.13	5	4	3	4	4	5	4	4	3	1	5	1	3	2
Renove	1.06	4	4	3	2	3	5	4	4	3	3	1	2	2	1
SADA	1.07	5	4	3	4	3	5	4	4	2	3	1	1	3	0
Sales Academy(T-2)	1.05	4	4	3	3	2	5	4	4	3	3	1	1	3	0
San Pedro	1.08	5	4	3	4	3	5	4	4	3	3	1	1	3	0
Bank management-Payments	1.04	2	5	3	3	3	3	3	1	5	4	4	0	0	3
SAP FINANCE	1.03	3	2	3	3	3	3	4	1	5	4	4	0	0	3
Official books management	1.03	3	2	3	3	3	3	4	1	5	4	4	0	0	3
Other financial process	1.03	3	2	3	3	3	3	4	1	5	4	4	0	0	3
Real Estate management	1.03	3	2	3	3	3	3	4	1	5	4	4	0	0	3
Employee payroll management	0.96	3	4	3	2	5	3	0	0	3	4	0	2	0	2
SAP-Personnel Administration	1.03	3	4	1	1	3	5	4	3	3	4	0	0	3	4
Training and event management(PE)	1.01	3	4	1	1	1	5	4	3	3	4	0	0	3	4
B2B for handsets	1.01	3	3	3	3	3	1	1	1	4	5	3	3	0	3
Document mgmt for PO	1.11	4	4	1	3	3	5	4	4	1	5	4	4	0	4
SAP ONOFRE	1.09	4	4	3	3	4	5	4	3	3	5	3	0	0	3
Credit limit mgmt;Invoicing and collection	0.95	1	2	1	5	3	0	4	0	5	4	1	0	0	4
SAVIA Herramienta captura	1.05	4	4	3	3	2	5	4	4	3	3	1	1	3	0
Segmentation	1.04	5	4	4	4	4	1	2	2	4	3	1	1	2	2
SIGRA	0.96	3	4	1	2	3	1	3	2	4	1	2	2	1	2
SIRA (Recargas)	1.18	5	4	4	5	5	5	1	5	5	1	3	5	2	3
SMO	1.07	5	3	2	1	4	4	4	4	3	1	1	3	3	4
Sombra	1.13	5	5	3	3	2	5	5	4	3	1	3	4	2	3
STP	1.1	4	0	4	3	3	4	5	3	3	4	1	4	4	3
Stratus Recargas	0.88	1	4	1	1	1	2	1	2	2	1	1	1	3	2
Stratus(Nimbus)	0.83	3	1	1	0	0	0	3	0	0	1	1	2	3	3
SVT	1.04	4	1	3	1	3	5	4	4	5	2	1	2	2	2
Tablón de anuncios(T-2)	1.03	4	4	3	3	2	5	4	4	1	3	1	1	3	0
TIBCO	1.02	5	5	3	0	4	5	0	0	5	1	1	5	0	3
Ulises	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
WAMA	1.05	5	4	3	1	3	2	4	4	3	2	1	3	3	2
Web CRI	1.1	5	4	2	2	2	5	5	4	3	1	3	4	2	3
WhoisWho	1.08	5	4	3	3	4	5	4	4	3	2	1	2	3	0
WebComponentes TIBCO	0.82	0	1	0	0	0	5	3	2	0	1	0	3	0	2
Integration with Logistic operators (SAP)	1	3	3	3	3	3	1	0	1	4	5	3	3	0	3
Loyalty program. Integracion with ERP	1.01	3	3	3	3	3	1	1	1	4	5	3	3	0	3
Pension plan requests	1.06	3	4	2	3	3	5	4	3	3	4	0	0	3	4
SAP(QM and PM)	0.98	3	3	3	3	3	0	0	1	4	5	3	3	0	2

Application Name	VAF	GSC1	GSC2	GSC3	GSC4
Billing Interfaces (Tuxedo facturación)	1.06	3	1	1	1
EXTRACTOR	1.14	3	5	3	3
DOC1 (reusable)	1.1	4	4	1	1
Factura electrónica (Electronic Bill)	1.14	5	4	3	2
Facturaweb	1.14	4	4	3	3
ARBOR	1.13	4	3	4	2
ARBOR 11.8	1.11	3	0	5	3
DWH	1.12	4	4	2	2
NPPI	1.11	3	0	5	3
Catalogue System	1.13	5	4	2	2
CID (Post-paid)	1.13	5	4	2	2
Incentix	1.06	4	0	0	2
Precos	1.08	3	2	1	2
Envío de correo masivo (Massive Mailing)	1.07	1	1	3	2
Loyalty rewards system	1.03	0	2	0	1
DDE (Apolo)	1.14	4	4	3	3
Parex (Apolo)	1.05	0	2	1	2
Apolo Pre-paid	1.11	4	2	3	2
SWITCH AUDIT	1.1	4	4	1	1
SGCyR (SAP R/3)	1.14	5	4	3	2
Query web	1.06	2	0	2	2
SAP Financials	1.06	2	0	2	2
Gallery	1.09	0	3	3	3
Credit Card Retrocession	1.09	3	0	3	3
IMEI Control	1.05	1	2	0	2
BTR- Blocking system for stolen phones	1.12	3	3	4	2
Availability hours	1.16	5	4	3	4
Employee self-service (Kiosco Empleados)	1.17	5	5	3	4
OneWay	1.14	4	4	3	3
SAP HR	1.18	5	4	5	4
Rainbow	1.07	1	2	2	2
AGORA	1.07	1	2	2	2
Network Configuration System	1.14	5	1	4	4
Aracne	1.15	4	3	4	4
Tindaya	1.09	1	2	1	5
NCV Mapping	1.15	5	4	4	2
SERPA	1.11	3	2	3	3
SANDRA Charging Case Audit	1.11	3	2	3	3
Pera Online	1.15	5	4	4	2
Credits	1.06	3	0	1	2
SAP R/3	1.06	3	0	1	2
Network spare parts	1.09	3	1	3	2
Purchase to Pay	1.13	4	3	3	3
On-line Consumption	1.14	4	4	3	3
Own shops (Tiendas propias)	1.13	4	3	3	3
WorkFlow Apps	1.12	5	0	4	3
ACNAC	1.11	3	0	5	3
Agora	1.12	5	0	4	3
Almacen Virtual	1.11	4	0	4	3
Amadeus	1.13	5	4	2	2
Archivo Digital	1.11	4	3	2	2
Argos	1.1	3	0	4	3
BRM	1.13	5	4	2	2
Cadenas SDI / SMS	1.1	4	2	3	1
CALLP	1.18	5	5	5	3
CIFRA	0.8	5	5	3	2
Clarify 10.1 / Activa	1.17	5	5	2	5
Commercial Portal	1.14	5	5	3	1
Consumos Electricos (Cons Elect)	1.12	4	1	3	4

Control Obras	1.12	4	2	5	1
Extranet contratadas	1.13	5	4	2	2
Gestion Actas Aceptación	1.15	5	5	2	3
Gestion Hitos	1	0	0	0	0
Gestion Pedidos	1.11	4	0	4	3
Gestion Unidades Moviles	1.13	5	4	2	2
GIS-NCV	1.11	4	3	2	2
GIS-Sugar	1.1	3	0	4	3
Houston	1.13	5	4	2	2
HSO	1.1	4	2	3	1
INFRANET	1.18	5	5	5	3
INTEFACT	1.05	1	1	1	2
INTRA/FINTRA	1.14	4	2	4	4
IRIS	1.15	5	4	4	2
Mobile Portability System	1.14	5	4	3	2
Mortirolo	1.11	5	0	4	2
NCRM	1.19	5	5	5	4
NOVA	1.12	2	3	3	4
Pais	1.07	2	0	1	4
Portal del Proveedor	1.07	3	0	4	0
PUC	1.07	4	0	3	0
Remedy	1.07	3	0	4	0
Renove	1.16	4	5	4	3
SADA	1.11	3	3	4	1
Sales Academy(T-2)	1.11	3	3	4	1
San Pedro	1.14	4	4	3	3
Bank management-Payments	1.17	4	5	4	4
SAP FINANCE	1.17	4	5	4	4
Official books management	1.07	2	1	3	1
Other financial process	1.13	3	3	4	3
Real Estate management	1.15	2	5	4	4
Employee payroll management	1.13	3	3	4	3
SAP-Personnel Adnministration	1.15	3	4	5	3
Training and event management(PE)	1.11	2	2	5	2
B2B for handsets	1.15	3	4	5	3
Document mgmt for PO	1.15	3	4	5	3
SAP ONOFRE	1.16	3	5	5	3
Credit limit mgmt;Invoicing and collection	1.12	2	5	5	0
SAVIA Herramienta captura	1.11	4	2	4	1
Segmentation	1.14	2	4	5	3
SIGRA	1.14	3	4	5	2
SIRA (Recargas)	1.17	4	5	4	4
SMO	1.1	3	0	4	3
Sombra	1.16	5	4	3	4
STP	1.13	2	5	3	3
Stratus Recargas	1.11	3	2	3	3
Stratus(Nimbus)	1.11	3	2	3	3
SVT	1.11	3	2	3	3
Tablón de anuncios(T-2)	1.11	3	2	3	3
TIBCO	1.12	3	4	3	2
Ulises	1.14	4	1	5	4
WAMA	1.07	0	0	3	4
Web CRI	1.14	4	3	3	4
WhoisWho	1.14	4	3	3	4
WebComponentes TIBCO	1.04	1	1	0	2
Integration with Logistic operators (SAP)	1.12	3	4	2	3
Loyalty program. Integracion with ERP	1.12	1	4	4	3
Pension plan requests	1.07	1	1	3	2
SAP(QM and PM)	1.09	1	2	3	3

Table 5: VAF Of Telecom Applications – Modified Model

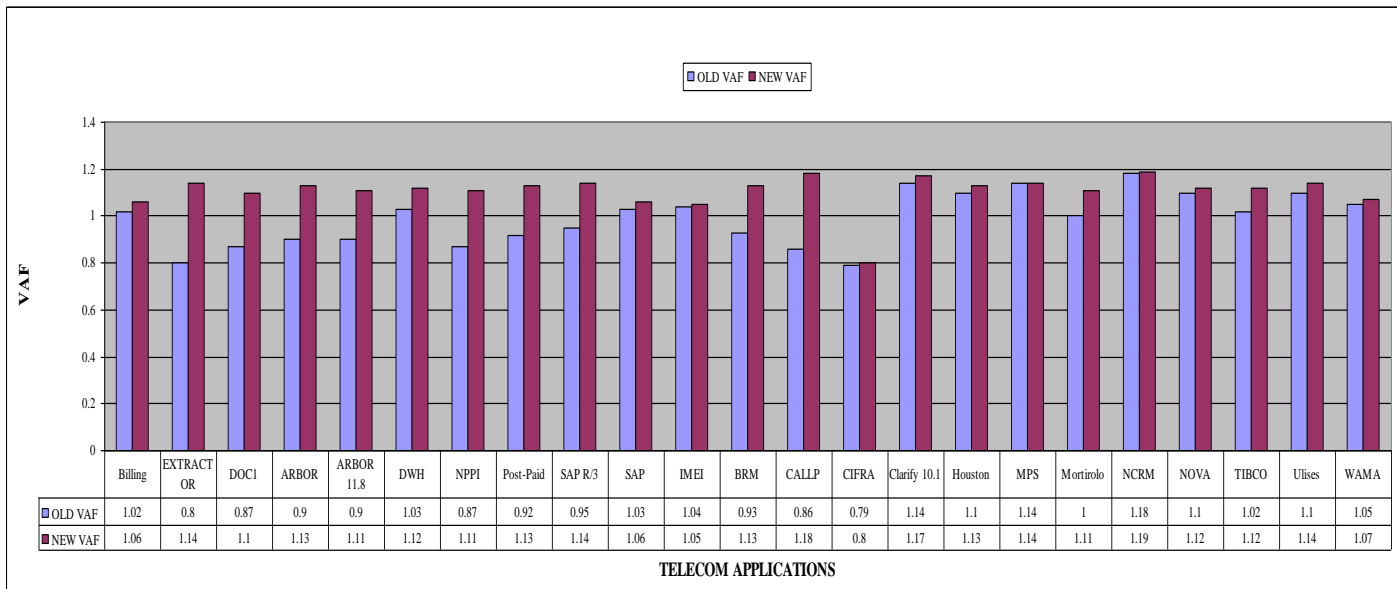


Table 6: VAF Result - Telecom Applications

5. SUMMARY AND CONCLUSION

The initial focus is on the GSCs alone, without regard to their use in the VAF. Questions investigated are: how the GSCs are used overall; how their use varies in different type of applications; and what relationship exists between them. Attention then turns to the adjustment process, to find out how to optimize GSCs and to confirm these finding by taking a much larger data set. This recording of GSCs may be useful for understanding project cost drivers and for comparing similar projects, by using modified General System Characteristics and enhanced Value Adjustment Factor. Software organizations may effectively do estimation and in turn measure productivity accurately. It is evident that new values of GSCs and Value Adjustment Factor will give a more accurate value and in turn lead to more accurate results of productivity.

6. FUTURE DIRECTIONS

In order to make overall calculation effective Adjusted Function Point calculation should be made as effective as unadjusted function point. An appropriate mathematical formulation needs to be derived. Instead of using a single VAF-like multiplier to adjust a function point count, a change of philosophy may be appropriate. It would be best to regard size as having multiple dimensions, instead of trying to capture it in a single number.

7. REFERENCES

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