

# Risks Associated to Size Estimation of E-Commerce System using Function Point based Estimation Techniques

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## Abstract

**Background/Objectives:** To identify the risks associated to the size estimation of E-commerce systems with the help of existing and new metrics and values using function point based estimation techniques. **Methods/Statistical Analysis:** An innovative combined approach is required for finding the risks associated to the size estimation of E-Commerce system. Here we are using Function points, Risk analysis techniques and the basic size estimation techniques like Line of Codes, DELPHI etc. **Findings:** E-Commerce system is a versatile software having function points with variable behavior. Ranking the function points is very difficult with E-Commerce system. The existing metrics for calculating Complexity Adjustment Factor is not sufficient. It also faces the empirical risks like financial risks, environmental and ecological risks and security risks. **Applications/Improvements:** At last, it will give the risks associated to the size estimation using function points.

**Keywords:** Agile, COSMIC (Common Software Measurement International Consortium), Delphi Cost Estimation, E-Commerce, Expert Judgment, Function Point (FP), Function Point Analysis (FPA), Line of Codes (LOC)

## 1. Introduction

### 1.1 E-Commerce System



Figure 1. E-commerce model.

The internet gave yet another enhancement to e-commerce because it is a low cost choice to proprietary networks. The well-known Electronic Data Interchange<sup>1</sup> (EDI), the inter-organizational replacement of business documentation in structured and machine understandable form over computer communication networks, is still the dominant part of e-commerce.

#### 1.1.1 Actors Involved in E-Commerce System

Many people and agencies will be involved for single E-Commerce activity. There are:

- Buyer.
- Seller.
- Shipping Agencies (both buyer and seller).
- Financial Institutions (both buyer and seller).

#### 1.1.2 Types of Communications in E-Commerce System

To do the business activities, we are following different

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ways of communication. They are:

- Buyer to seller and seller to buyer.
- Buyer to financial institution and financial institution to buyer.
- Seller to shipping and shipping to seller.
- Seller's shipping agency to buyer's shipping agency and buyer's shipping agency to seller's shipping agency.
- Buyer to shipping and shipping to buyer.
- Buyer to financial institution and financial institution to buyer.
- Seller to financial institution and financial institution to seller.
- Shipping agencies to financial institutions and financial institutions to shipping agencies.
- Financial institutions to financial institutions.

### 1.1.3 Activities Involved in E-Commerce System

To do secure data transfer, fund transfer and product delivery, many activities are involved in E-commerce System. These are:

- Authentication (buyer, seller, financial institutions and shipping agencies).
- Quality checking.
- Fund transfer.
- Product transfer.

## 1.2 Software Risk Management

### 1.2.1 What is Risk?

Risk is a measure of the probability and severity of adverse effects.

### 1.2.2 Risk Types

Different types of risks are available, there are,

- Financial risks.
- Health risks.
- Environmental and ecological risks.
- Security risks.

### 1.2.3 Risk Process

To overwhelm the risks, the following steps will be processed. These are,

- Identify the risk.
- Analyze its implications.
- Determine treatment methods.
- Monitor performance of treatment methods.

### 1.2.4 Software Risk Management

Software risk management is a process, to identify, address and eliminate risk items before they become either threats to successful software operation or major sources of software rework. It is necessary that some form of measurement is undertaken to determine and classify the range of risks a software development project faces and to identify areas where significant exposure exists.

### 1.2.5 Software Risk Management Steps and Techniques

The Software risk management<sup>7</sup> steps and techniques are shown in Figure 2.

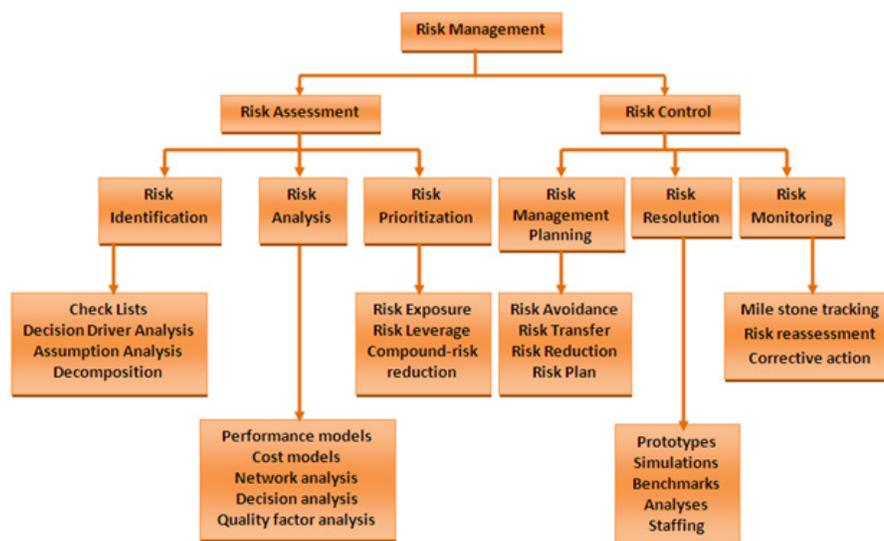


Figure 2. Software risk management steps and techniques.

### 1.2.6 Relationship between Risk and Environment

The following formula says the relationship between risks and the environment.

$$R = R (R_r, P_v, I)$$

R -> Risk.

Pr -> Probability of Risk.

Pv -> Probability of the week point to be attacked.

I -> Potential influence of risk,  $I = V * C_i$ .

V -> The relative value of asset.

Ci -> The extent of asset's loss,  $0 < C_i \leq 1$ .

## 1.3 Function Points

In 1970, Alan Albrecht while working for IBM developed a new technique for measuring the size of the software called Function Points. Function Point method is autonomous of the language, tools, or methodologies used for implementation; i.e., they do not take into deliberation programming languages, database management systems, processing hardware, any other database technology or any platform. Function points can be predictable from requirement specifications or design specifications, thus creating it possible to guess development effort in premature phases of development. Function points are directly linked to the statement of requirements; any alter of requirements can simply be followed by a re-estimate. Functional points are based on the system user's external observation of the system; non-technical users of the software system have an enhanced understanding of what function points are computing.

### 1.3.1 Functional Units of Function Point Analysis (FPA)

The FPA functional units are shown in Figure 3.

#### 1.3.2 Functional Units of FPA

The five functional units<sup>3</sup> of FPA is separated in two categories:

##### 1.3.2.1 Data Function Types

- Internal Logical Files (ILF): A user identifiable group of rationally connected data or control information uphold within the system.
- External Interface Files (EIF): A user identifiable group of rationally connected data or control information referenced by the system, but maintained with in another system. This means that EIF counted for one system, may be an ILF in another system.

##### 1.3.2.2 Transactional Function types

- External Input (EI): The EI processes data or control information that approaches from outside the system. The EI is a basic process, which is the nominal unit of activity that is significant to the end user in the business.
- External Output (EO): An EO is an basic process that makes data or control information to send outside the system.
- External Inquiry (EQ): An EQ is an basic process that

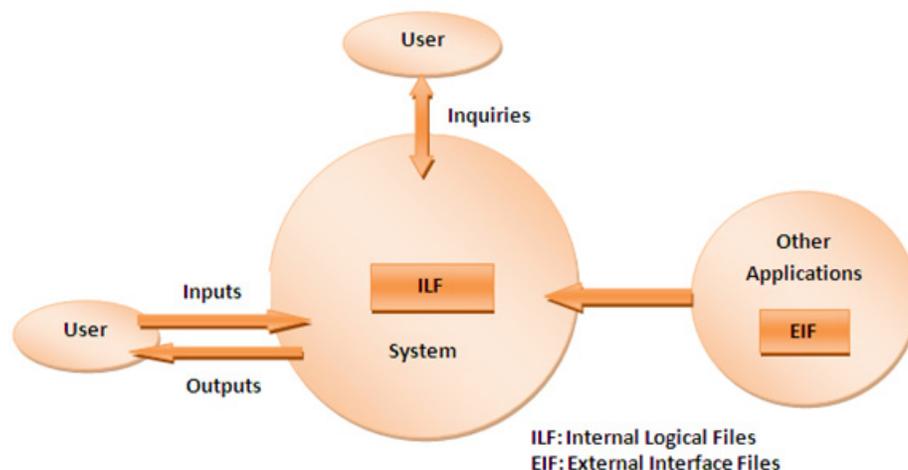


Figure 3. FPA's functional units.

is made up of an input – output combination that consequences in data retrieval.

### 1.3.3 Counting Function Points

The five functional units are ordered according to their complexity i.e., Low, Average, or High, using a set of prescriptive standards.

**Table 1.** Functional units with weighting factors

Functional Units	Weighting factors		
	Low	Average	High
External Inputs (EI)	3.00	4.00	6.00
External Output (EO)	4.00	5.00	7.00
External Inquiries (EQ)	3.00	4.00	6.00
Internal Logical Files (ILF)	7.00	10.00	15.00
External Interface Files (EIF)	5.00	7.00	10.00

### 1.3.4 Unadjusted Function Points (UFP)

After classifying all of the five function types, the UFPs are calculated using predefined weights for all function type.

$$UFP = \sum_{i=1}^5 \sum_{j=1}^3 Z_{ij} W_{ij}$$

Where i designate the row and j designate the column of Table 1.

$W_{ij}$  : It is the access of the  $i^{\text{th}}$  row and  $j^{\text{th}}$  column of the Table 1.

$Z_{ij}$  : It is the count of the number of functional units of Type I that have been classified as having the complexity corresponding to column j.

### 1.3.5 Calculate Adjusted Function Points (AFP)

The AFP count is obtained using the following relationship

$$AFP = UFP * CAF$$

Where CAF is complexity adjustment factor and is equal to

$$[0.65 + 0.01 * F_i]$$

The  $F_i$  ( $i= 1$  to 14) are the amount of influence and are based on responses to questions noted in Table 2.

## 2. Risks Associated to E-Commerce System Size Estimation using Function Points

E-Commerce system is a web based secured analytical application software. It is a combination of web pages, data base management systems, application programs, high level security software and online financial and commodity transactions and tracking. That is why; E-Commerce system is a versatile one, so any single method or the existing metrics and measures won't give the actual software size.

But the function point based estimation technique is independent of the language, tools, or methodologies used for implementation; i.e., they do not take into consideration programming languages, database management systems, processing hardware or any other database technology. So some updating with the existing metrics and measures of the function point will give actual size of the E-commerce system. Let we see the risks associated to E-commerce system size estimation using function points.

### 2.1 E-Commerce System is a Versatile Software System

E-commerce system is a combination of distinct software, so the homogeneous approach for finding the function points is very difficult, that is why; we want to use a heterogeneous approach. For example, In an E-commerce application, for getting information from the user, a normal webpage is used, which is developed using HTML and JavaScript. But the database is stored using Oracle application software and the authentication application is developed using .Net software. Suppose the aloofness of the systems, the Operating Systems may be varied. To overcome this versatile behavior we want to form a new collective metrics and measures in the function point approach.

### 2.2 Variable Behavior of Function Points

In E-commerce system, one type of function point will act

**Table 2.** Computing function points

Rate each factor on a scale of 0 to 5.					
0	1	2	3	4	5
No	Incidental	Moderate	Average	Significant	Essential
1. Does the system require unflinching backup and recovery?					
2. Is data communication necessary?					
3. Are there dispersed processing functions?					
4. Is presentation critical?					
5. Will the system run in an existing heavily used operational environment?					
6. Does the system need on line data entry?					
7. Does the on line data entry needs the input transaction to be built over multiple screens or operations?					
8. Is the master file updated on line?					
9. Are the inputs, outputs, files, or inquiries multifaceted?					
10. Is the inner processing complex?					
11. Is the code planned to be reusable?					
12. Are conversion and installation built-in in the design?					
13. Is the system planned for multiple installations in different organizations?					
14. Is the application planned to facilitate change and ease of use by the user?					

as another type in some other module, so the prediction of function points become difficult. For example, the authentication process will generate a result it become External Output (EO) to the authentication process but the result become External Input (EI) to the transaction process. So we need a procedure to measure the variable function points.

### 2.3 Difficult to Rank Function Points

The rank of function point is changing from organization to organization. So a uniform rank assessment is required in function point estimations.

### 2.4 Complexity Adjustment Factor (CAF)

The existing 14 CAF are not sufficient for fund transfer like financial activities. So we add new factors or do some updating in the existing CAF.

### 2.5 Dynamic Function Points

In same module itself, some function points having dynamic behavior. So we can't predict the actual function point type correctly. So that it wants to get more care on dynamic function points.

### 3. Other Risks Associated to E-Commerce System

E-commerce is a computer based business system; it is having communications, authentications, fund transfer and commodity transfer like high-level business transactions. So many non-technical<sup>8</sup> risks like Financial Risks, Environmental and Ecological Risks and Security Risks also possible.

#### 3.1 Financial Risks

In E-commerce system, many agencies and individuals and their financial institutions are involved. So many authentications and fund transfer based issues will be evolved under financial risks.

#### 3.2 Environmental and Ecological Risks

In E-commerce activities, the buyer and seller are unknown to each other and the buyer doesn't know the quality of the product directly; so it may give the environmental and ecological risks to the society.

#### 3.3 Security Risks

The various security issues in E-commerce system are authentication of buyer and seller, fund transfer, commodity transfer and international and local standards of the product.

### 4. Conclusion

E-commerce system is a web based secured analytical application software. It is a combination of web pages, data base management systems, application programs, high level security software and online financial and commodity transactions and tracking. That is why; E-Commerce system is a versatile one, so any single method or the existing metrics and measures won't give the actual software size.

But the function point based estimation technique is autonomous of the language, tools, or methodologies

used for implementation; i.e., they do not obtain into consideration programming languages, database management systems, processing hardware, any other database technology or any platform. So some updating with the existing metrics and measures of the function point will give actual size of the E-commerce system.

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