Early Function Point Analysis

Nesma recognizes three function point analysis methods:

- Detailed FPA
- High Level FPA (also called Estimated FPA)
- Indicative FPA

All these three methods are a self-contained Functional Size Measurement (FSM) method on their own. The high level FPA method and the indicative FPA method do not require detailed user requirements, while the functional size determined using these methods is very close to the functional size determined using the detailed FPA method. That's why these two methods are very suited to be applied early in de software development life cycle or in case the functional size needs to be determined fast.

This document discusses these three methods, their accuracy and applicability.

1. Detailed FPA method

This is the usual function point analysis method and is performed as follows:

- determine all functions of all function types (ILF, EIF, EI, EO, EQ)
- rate the complexity of every function (Low, Average, High)
- calculate the total number of function points

2. High Level FPA method

The high level function point analysis method is performed as follows:

- determine all functions of all function types (ILF, EIF, EI, EO, EQ)
- rate the complexity of every data function (ILF, EIF) as Low,
  and of every transactional function (EI, EO, EQ) as Average
- calculate the total number of function points

So, the only difference with the detailed function point analysis method is that the complexity is not determined per individual function, but by default.

3. Indicative FPA method

The indicative function point analysis method is performed as follows:

- determine all data functions (ILF and EIF)
- calculate the number of function points as follows:
  functional size (fp) = 35 x number of ILFs + 15 x number of EIFs

So the functional size is based solely on the logical files (ILFs and EIFs).

The indicative function point analysis method is based on the assumption that there will be about three EIs (to add, change, and delete information in the ILF), two EOs, and one EQ on average for every ILF, and about one EO and one EQ for every EIF.

4. Example of indicative, high level and detailed FPA

This section illustrates the three FPA methods by a small case study: an application that maintains Customer data and Product data, and references Supplier data.

The more accurate functional size one wants, the more detailed user requirements one needs. That's why this case study presents the three methods of function point analysis in the order of increasing accuracy:

- indicative function point analysis
- high level function point analysis
- (detailed) function point analysis

Indicative FPA

For an indicative function point analysis just information about the data functions is needed.

User requirements:

- user wants to maintain Customer data and Product data, and to reference Supplier data

This (rough) specification is enough for an indicative function point analysis:

- ILF: Customer and Product
- EIF: Supplier

Data function	Function type	Function points (by default)
Customer	ILF	35
Product	ILF	35
Supplier	EIF	15
Functional size		**85**

High level FPA

To perform a high level function point analysis also information about the transactional functions is needed, so more detailed user requirements are necessary.

User requirements:

- user wants to add, change, delete Customer data, wants to inquire on Customer, and also requires four different reports on Customer with calculated data
- user wants to add, change, delete Product data, wants to inquire on Product, and also requires a report on Product with calculated data
- user wants to inquire on Supplier using supplier number, and also requires a report on Supplier with totaling results

This more detailed specification of the user requirements contains also the transactional functions, and therefore enables a high level function point analysis:

Data *or* Transactional Function	Function type	Complexity (by default)	Function points
Customer	ILF	Low	7
Product	ILF	Low	7
Supplier	EIF	Low	5
Add Customer	EI	Average	4
Change Customer	EI	Average	4
Delete Customer	EI	Average	4
Inquire on Customer	EQ	Average	4
Report 1 on Customer	EO	Average	5
Report 2 on Customer	EO	Average	5
Report 3 on Customer	EO	Average	5
Report 4 on Customer	EO	Average	5
Add Product	EI	Average	4
Change Product	EI	Average	4
Delete Product	EI	Average	4
Inquire on Product	EQ	Average	4
Report on Product	EO	Average	5
Inquire on Supplier	EQ	Average	4
Report on Supplier	EO	Average	5
Functional size			**85**

Detailed FPA

To carry out a detailed function point analysis, one does not only need the number of functions of each function type (EI, EO, EQ, ILF, EIF), but one also needs to determine the functional complexity of each individual function (Low, Average, High).

In a detailed FPA, the functional complexity of a (data or transactional) function is determined, based on the number of DETs, RETs and File Types Referenced that are relevant to this function. That's why the user requirements (as they were stated above when the high level function point analysis was discussed) need to be analyzed in more detail: which data elements (DETs) and logical files (File Types Referenced) are used by a transactional function (EI, EO, EQ), and which logical data groups (RETs) and data elements (DETs) a data function (ILF, EIF) consists of.

This detailed analysis of the user requirements could result in the following (detailed) function point analysis:

Data *or* Transactional Function	Function type	Complexity	Function points
Customer	ILF	Average	10
Product	ILF	Low	7
Supplier	EIF	Low	5
Add Customer	EI	High	6
Change Customer	EI	Average	4
Delete Customer	EI	Low	3
Inquire on Customer	EQ	Low	3
Report 1 on Customer	EO	Low	4
Report 2 on Customer	EO	Average	5
Report 3 on Customer	EO	Low	4
Report 4 on Customer	EO	High	7
Add Product	EI	Average	4
Change Product	EI	Low	3
Delete Product	EI	Low	3
Inquire on Product	EQ	Average	4
Report on Product	EO	Average	5
Inquire on Supplier	EQ	Low	3
Report on Supplier	EO	Average	5
Functional size			**85**

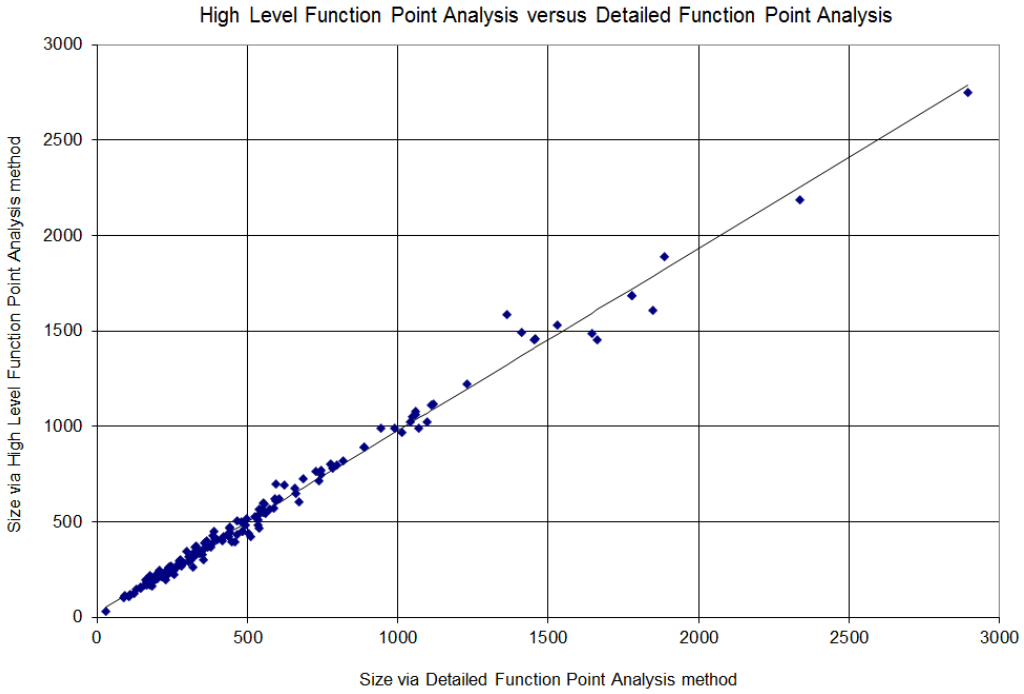
Conclusion

In this particular case study all three FPA-methods result in the same functional size of 85 function points. Usually the results are not exactly the same, but still are pretty close to each other. In the next section the results of research on the accuracy of the high level and indicative function point analysis methods are shown.

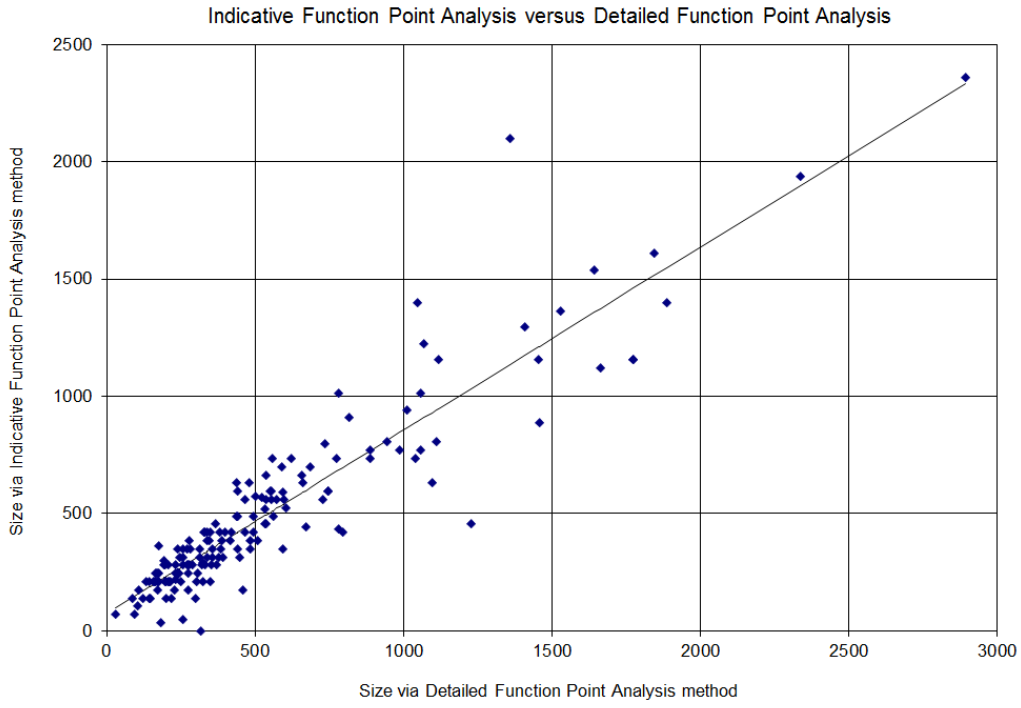
5. Accuracy

Using a database of about 100+ developed and implemented applications Nesma did research on the accuracy of the high level and indicative FPA methods, compared to the detailed FPA-method. The applications were simultaneously measured using all three FPA methods. The results are presented in two graphs:

1. the size measured via the high level function point analysis method versus the size measured via the detailed function point analysis method



2. the size measured via the indicative function point analysis method versus the size measured via the detailed function point analysis method



There is a good correlation (straight line) in both cases.

The results of the high level function point analysis and the detailed function point analysis (first graph) are very close. There is no statistically significant difference in the outcomes of both FPA methods.

In the graph of the indicative function point analysis (second graph), however, there are considerable deviations (up to about 50%) in some cases. That is why one should be careful using the indicative function point analysis method. The strength of the indicative FPA method is that one easily gets a rough estimate of the size of an application in only a very short time.

6. When to use which FPA method

All three FPA-methods (detailed, high level, indicative) are part of the ISO standard and therefor are certified by ISO.

Depending on the need and the phase of the software development life cycle it is determined which function point analysis method is used.

A detailed function point analysis is more accurate than a high level or an indicative analysis, but it also costs more time and needs more detailed specifications.

Because there is no statistically relevant difference in the functional size determined via the detailed FPA method versus the high level FPA method, many organizations have chosen to use the high level FPA method by default, instead of the detailed FPA method.

The high level FPA method and the indicative FPA method do not require detailed user requirements. That's why these methods are very suited to be applied early in de software development life cycle or in case the functional size needs to be determined fast.

In many applications an indicative function point analysis gives a surprisingly good estimate of the size of the application. It is often relatively easy to carry out an indicative function point analysis, because a data model is available or can be made with little effort.

The indicative FPA method is very suited to determine the rough order of magnitude early in the software development life cycle. This method is also very suited to make a base line size estimate of the application portfolio of a company within a limited time frame.
Be careful in using the indicative FPA-method, because it provides just a rough indication of the size, and considerable deviations are possible.