

Initial Orientation



- ⊕ If necessary, adjust the language of the virtual conference room in the toolbar located in top right hand corner
- ⊕ The event will last 1 hr. of which 45 min. will be devoted the presentation and 15 min. for questions.
- ⊕ You will be able to send you questions through the chat functionality throughout the presentation. All questions will be answered at the end.
- ⊕ The presentation will be recorded and the recording and slides will be available to those that fill out the event questionnaire at the end.
- ⊕ For those that are PMP certified, this event is worth 1 PDU.
- ⊕ Follow us on Social Media.



FATTO Software Consulting



- ⊕ Mission: “Help our clients to better plan and control their software projects.”
- ⊕ Consultancy and training in **Measurement, Estimation and Software Requirements:**
 - Function Point Analysis (IFPUG, NESMA, COSMIC)
 - Software Project Estimations
 - Requirements Engineering
 - Software Measurement and audit
 - Software Project Productivity Analysis
- ⊕ The most sold book in regards to FPA in Brazil was written by us
- ⊕ Trained/Certified 25% of the CFPS specialists in Brazil.
- ⊕ Scope Sizing Software Representatives
 - Increases your governance level in functional measurements and software **asset management**



FATTO Educational Services



Software Engineering
24 hours

Software Project Estimation with COCOMOII
16 hours

Estimation and Measurement with the COSMIC method
16 hours (In Person)

Function Point Measurement Workshop
Sessions of 8 ~ 40 hours

FPA: Fundamentals, Benefits and Implementation
8 hours (online and in person)

Training in FPA: Measurement and Software Estimation
16 hours (online and in person)

Workshop FPA: Measurement Methodology and Practices
16 hours (in person)

Preparation for the CFPS Exam
96 hours (online and in person)



Function Point Analysis:

Software Measurement and Estimation

Presentation Objectives



- ⊕ Present what **Function Point Analysis** is
- ⊕ Present a general description of the measurement process and an example
- ⊕ Present its **main benefits** for the industry

What is Function Point Analysis?



- ⊕ It is a **functionality measurement** technique from user's point of view
 - This analysis **does not take into account** any solution implementation aspect.

⊕ **FPA**: Function Point Analysis

- Where the **User** is any **person** or **thing** that communicates or interacts with the software in any given moment.
 - ⊕ Examples: end user, use case actor, another system

Function Point Analysis



Standard

CPM: Counting Practices Manual

IFPUG: International Function Point Users Group

ISO/IEC 20926:2009

IFPUG Functional Size Measurement Method 2009

Origin

Measuring Application

Development Productivity: Allan J. Albrecht, published in 1979

Productivity: Ratio between goods and services produced by units of time or cost

Measurement Process Objectives



Consistent

To be a **consistent** method between various organizations.

Consistent: Two professionals analyzing the same project should get the same result.

Simple

Be sufficiently **simple** to minimize measurement effort.

Basic Functional Components



- ⊕ The analysis “divides” the functional specification of the system in terms of tasks and services (functions or functionalities) that allow:
 - **Interaction** with the system – should be **self-contained**
 - **Data Storage** – Should be independent

Basic Functional Components

*Transaction Function
Interaction*

*Data Function
Storage*

*External
Input (**EI**)*

*External
Output (**EO**)*

*External
Query (**EQ**)*

*Internal
Logical File
(**ILF**)*

*External
Interface File
(**EIF**)*

Case Study

- For now, everything will be considered of an **average complexity**

FP Type	Low	Avg	High
EI	3	4	6
EO	4	5	7
EQ	3	4	6
ILF	7	10	15
EIF	5	7	10

Suppliers

Search Show all All

Name	Company Name	City	Telephone	Cell-Phone	E-mail	Action
Adriano	Plaza Bittar Hotel		(61) 3328-7077	0800 707 5858	plaza@hoteisbittar.com.br	
André Renauro	Cromia Print Center	Vitória	(27)3323-5559 3033-5003		cromiaprintcenter@uol.com.br	
Gustavo Rezende	Nobel - A maior rede de livrarias do Brasil	Vitória		(27) 9909-5714	gustavo.nobel@hotmail.com	
Carlos Eduardo Vazquez CFPS	FATTO Consultoria e Sistemas	Vitória	(27) 3084-7304	(27) 9254-6389	carlos.vazquez@fattoCS.com.br	

Add

Case Study



FATTO Consultoria e Sistemas : Carlos Eduardo Vazquez CFPS

Personal | Company | Private | Details | Links

	Prefix	Sr.
	Name	Carlos
	Middle Name	Eduardo
	Last Name	Vazquez
	Suffix	CFPS
	Company Name	FATTO Consultoria e Sistemas
	Category	<input checked="" type="checkbox"/> Suppliers <input type="checkbox"/> Clients
	Particular	<input type="checkbox"/>

Telephone Numbers

	Commercial	(27) 3084-7304
	Cell-Phone	(27) 9254-6389
	Private	(27) 9277-9187
		More

E-mail & Internet

	E-mail & Internet	http://www.fattoCS.com.br
	E-mail	carlos.vazquez@fattoCS.com.br
	E-mail	cadu.vazquez@gmail.com













Save Apply Cancel Delete

Case Study

- For now, everything will be considered of an **average complexity**

FP Type	Low	Avg	High
EI	3	4	6
EO	4	5	7
EQ	3	4	6
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The screenshot shows a web application interface for a 'Suppliers' table. At the top, there is a search bar with the text 'Suppliers' and a dropdown arrow, a search button, a 'Show all' dropdown, and an 'All' button. Below the search bar is a horizontal navigation bar with letters A through Z. The main table has the following columns: Name, Company Name, City, Telephone, Cell-Phone, E-mail, and Action. The table contains four rows of data:

Name	Company Name	City	Telephone	Cell-Phone	E-mail	Action
Adriano	Plaza Bittar Hotel		(61) 3328-7077	0800 707 5858	plaza@hoteisbittar.com.br	  
André Renauro	Cromia Print Center	Vitória	(27)3323-5559 3033-5003		cromiaprintcenter@uol.com.br	  
Gustavo Rezende	Nobel - A maior rede de livrarias do Brasil	Vitória		(27) 9909-5714	gustavo.nobel@hotmail.com	  
Carlos Eduardo Vazquez CFPS	FATTO Consultoria e Sistemas	Vitória	(27) 3084-7304	(27) 9254-6389	carlos.vazquez@fattoCS.com.br	  

At the bottom of the table, there is an 'Add' button.

Case Study



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Personal | Company | Private | Details | Links

	Prefix	Sr.
	Name	Carlos
	Middle Name	Eduardo
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Save Apply Cancel Delete

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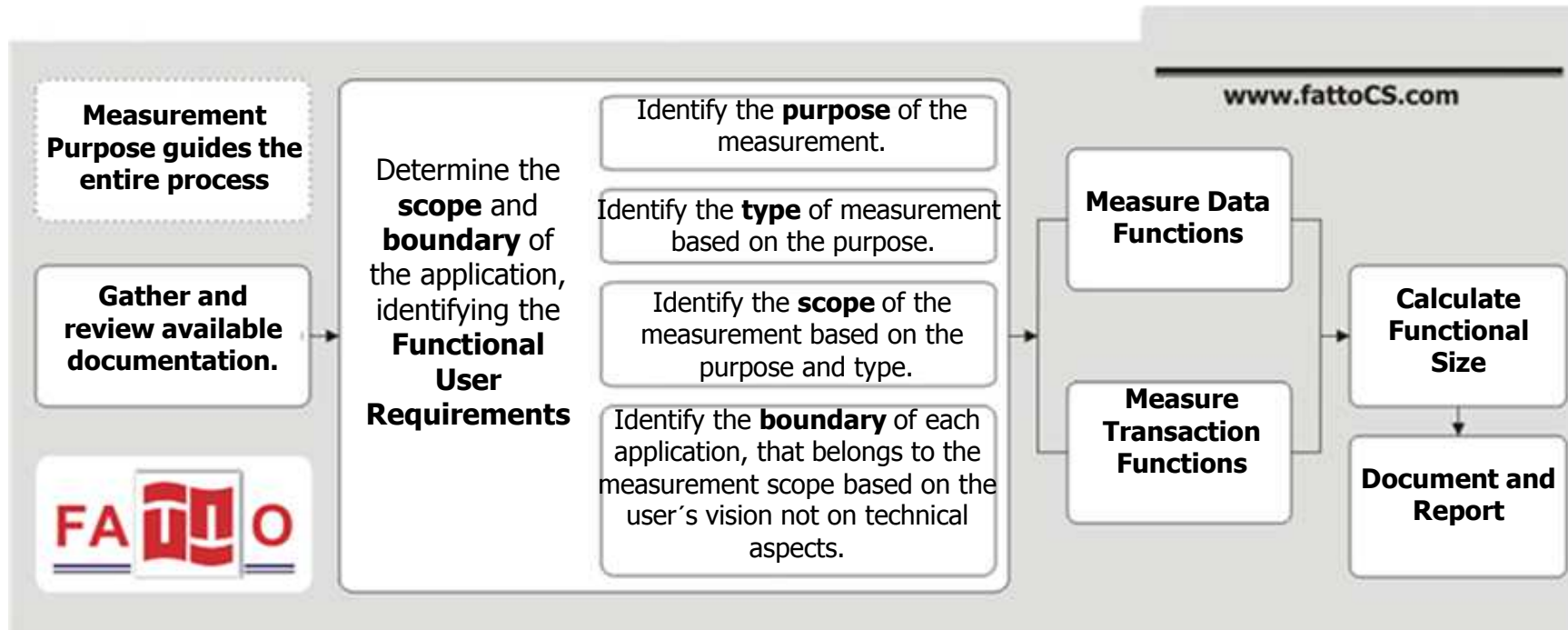
⊕ For now, everything will be considered of an **average complexity**

The screenshot shows a web application interface for 'Suppliers'. The interface includes a search bar, a table of supplier records, and an 'Add' button. Annotations provide FP values for various actions:

- File 10 FP (ILF)**: Points to the table header.
- list 5 FP (EO)**: Points to the first row of the table.
- Eliminate 4 FP (EI)**: Points to the 'Action' column of the second row.
- Add 4 FP (EI)**: Points to the 'Add' button.
- Consult 4 FP (EQ)**: Points to the 'Action' column of the third row.
- Modify 4 FP (EI)**: Points to the 'Action' column of the fourth row.

Name	Company Name	City	Telephone	Cell-Phone	E-mail	Action
Adriano	Plaza Bittar Hotel		(61) 3328-7077	0800 707 5858	plaza@hoteisbittar.com.br	[Icons]
	Cromia Print Center	Vitória	(27)3323-5559 3033-5003		cromiaprintcenter@uol.com.br	[Icons]
Gustavo Rezende	Nobel - A maior rede de livrarias do Brasil	Vitória		(27) 9909-5714	gustavo.nobel@hotmail.com	[Icons]
Carlos Eduardo Vazquez CFPS	FATTO Consultoria e Sistemas	Vitória	(27) 3084-7304	(27) 9254-6389	carlos.vazquez@fattoCS.com.br	[Icons]

The Functional Measurement Process





Why measure software?



Productivity Benchmarking

(Source ISBSG: The Software Metrics Compendium – 2002)



Programming Language	N	Min	P10	P25	Median	P75	P90	Max	Mean	StDev
ABAP	5	8.0	-	13.3	13.8	18.0	-	24.3	15.5	6.1
ACCESS	28	0.3	0.5	1.1	2.0	-	5.5	17.0	3.3	5.1
ADS	7	1.8	-	4.3	6.5	8.5	-	21.6	7.9	6.6
C	27	2.8	-	-	-	-	-	-	15.6	8.9
C++	20	1.2	-	-	-	-	-	17.3	21.2	16.9
CLIPPER	4	8.6	-	-	-	-	-	33.7	11.2	5.0
COBOL	64	1.2	-	-	-	-	-	39.7	20.1	15.2
COBOL II	32	1.5	-	-	-	-	-	22.2	17.0	13.4
CSP	5	15.6	-	-	-	-	-	39.8	29.8	9.2
EASYTRIEVE	8	4.6	-	-	-	-	-	55.3	12.9	6.2
JAVA	10	5.3	-	-	-	-	-	33.2	26.8	22.8
NATURAL	21	2.3	-	-	-	-	-	22.0	12.7	11.1
ORACLE	49	1.2	-	-	-	-	-	33.1	13.4	12.9
PERIPHONICS	6	4.2	-	-	-	-	-	31.0	32.4	36.7
PL/I	8	3.9	-	-	-	-	-	33.3	15.9	10.6
SAS	3	5.2	-	-	11.2	-	-	17.1	11.2	6.0
SQL	56	0.5	3.4	8.2	13.6	19.3	35.3	60.7	16.9	13.4
TELON	7	4.4	-	7.4	10.9	21.0	-	30.4	14.6	9.6
VISUAL BASIC	54	0.4	2.7	3.8	7.5	14.0	37.2	68.0	13.3	14.9
Other 3GL	14	1.3	2.7	6.1	9.3	14.6	-	60.7	14.9	16.3
Other 4GL	10	4.0	6.2	6.4	8.4	18.2	-	24.7	12.1	7.3
Total	438	0.3	2.8	5.9	11.3	19.8	-	101.0	15.6	14.4



Quality Benchmarking (Defects/FP)

(Source: The Economics of Software Quality - 2011)



TABLE 3-9 Approximate Quality Levels for Applications of 10,000 Function Points
(Data Expressed in Terms of Defects per Function Point)

	Defect Potentials	Removal Efficiency	Delivered Defects	Total Defects Delivered	High Severity Defects
CMM 5 + Six-Sigma	4.80	98.00%	0.10	960	259
TSP/PSP + Scrum	4.90	97.00%	0.15	1,470	397
TSP/PSP	5.00	96.00%	0.20	2,000	540
CMM Level 5	5.50	96.00%	0.22	2,200	594
Six-Sigma for software	5.25	94.00%	0.32	3,150	851
CMMI	6.10	94.00%	0.37	3,660	988
CMM Level 4	6.00	93.00%	0.42	4,200	1,134
CMM 3 + OO	6.10	92.00%	0.49	4,880	1,318
CMM Level 3	6.25	92.00%	0.50	5,000	1,350
Waterfall + inspections	6.50	92.00%	0.52	5,200	1,404
Agile/Scrum + OO	5.30	90.00%	0.53	5,300	1,431
TickIT	6.10	88.00%	0.73	7,320	1,976
Extreme XP	6.25	88.00%	0.75	7,500	2,025
Agile/Scrum	6.00	87.00%	0.78	7,800	2,106
Iterative	6.25	86.00%	0.88	8,750	2,363
Spiral	6.50	85.00%	0.98	9,750	2,633
Object oriented (OO)	6.00	83.00%	1.02	10,200	2,754
RUP	6.75	84.00%	1.08	10,800	2,916
SOA	2.50	55.00%	1.13	11,250	3,038
CMM Level 2	7.00	80.00%	1.40	14,000	3,780
Waterfall	7.25	80.00%	1.45	14,500	3,915
RAD	7.25	77.00%	1.67	16,675	4,502
CMM Level 1	7.50	70.00%	2.25	22,500	6,075
Average	5.96	86.83%	0.78	7,785	2,102



Effort Estimation

$$Effort_{(H)} = Size_{(FP)} \times Deliver Rate_{(H/FP)}$$

$$Delivery Rate = \frac{Hours\ or\ \$}{Function\ Points}$$

$$Productivity = \frac{Function\ Points}{Man/Month}$$

PRODUCTIVITY – Ratio for goods and services produced by unit of work and unit of cost.

Duration Estimation– CAIXA (COCOMO II)

$$Duration = \left(J \times \left(\frac{Size \times E}{168} \right)^K \right) \times F \times 30$$

$$TDev = 3.67 \times \frac{SCED \%}{100} \times (PM_{NS}) \left(0.28 + \frac{\sum_{j=1}^5 SF_j}{500} \right)$$

Suitability Factor for Duration		
Range	Size in FP	Factor
5	Up to 75	0,25
4	Higher than 75 and up to 150	0,35
3	Higher than 150 and up to 300	0,50
2	Higher than and 300 and up to 500	0,75
1	Higher than de 500	1,00

J	Variable defined based on historical data from the CAIXA bank
E	Hour Productivity per Function Point, defined by CAIXA
K	COCOMO II constant defined via historical data by CAIXA
F	Suitability Factor for Duration established by CAIXA

Type of Service	J	E	K
New Development and Documentation	2	13.42	0.31888
System Maintenance	2	10	

Software Contract Models



- ⊕ Man-Hour (Body Shopping/ Time and Material)

- ⊕ Fixed-Price/Lump Sum

- ⊕ Unit Price
 - Function Points as a standard unit
 - Vocabulary independent of the technology
 - Business Perspective
 - Function Points facilitate communication
 - **Auditable**

Also.....



- ⊕ While relating functional size with other metrics, indicators are generated to better understand the process
- ⊕ **Productivity**
- ⊕ Hours / FP
 - Cost = \$ / FP
 - Capacity = FP / Man-month
- ⊕ **Quality**
 - Defect Density = Defects / FP
- ⊕ **Scope**
 - Requirement Stability = $FP_{\text{actual}} / FP_{\text{initial}}$
 - Organization Systems *Baseline*
 - *Backlog* Size = \sum PF Projects

Who is the functional measurement for?

⊕ Operational Vision (Project Level)

- Team
- Ex.: Planning, following-up, project control

⊕ Tactical and strategic vision (organizational level)

- Medium and high level management
- Ex.: Follow-up and program and portfolio control

Who uses FPA in the world?



⊕ The IFPUG has affiliates in more than 40 countries around the world, with the most presence in:

⊕ Germany, Australia, Brazil, Canada, South Korea, USA, India, England, Italy, Colombia, Uruguay, Mexico, Argentina and the Netherlands.

- ⊕ IBM
- ⊕ HP
- ⊕ ACCENTURE
- ⊕ ATOS ORIGIN
- ⊕ TCS
- ⊕ CAPGEMINI
- ⊕ STEFANINI
- ⊕ INDRA
- ⊕ TOTVS
- ⊕ DIEBOLD/PROCOMP
- ⊕ SCOPUS
- ⊕ EVERIS
- ⊕ UNISYS
- ⊕ CITIBANK / HSBC / BRADESCO / SANTANDER / BANCO DO BRASIL / Central Banks of (BRASIL, COLOMBIA y CHILE)
- ⊕ PETROBRAS / VALE
- ⊕ TELEFÓNICA / OI / PORTUGAL TELECOM
- ⊕ ITAIPU / CORREIOS
- ⊕ TAM (airline)
- ⊕ The entire federal Brazilian government

To know more...

- ⊕ IFPUG – www.ifpug.org
- ⊕ Frequently Asked Questions on Function Points - fattocs.com/en/faq.html
- ⊕ Allan Albrecht's Published Article
 - <http://goo.gl/N9XcrW>
- ⊕ Function Point Analysis: Software Measurement and Estimation (Demo Version)
 - <http://goo.gl/Lu7PWj>
- ⊕ COSMIC – www.cosmicon.com
- ⊕ NESMA – www.nesma.nl
- ⊕ MKII – uksma.co.uk
- ⊕ FISMA – www.fisma.fi

Closing



Thanks for your attention!

Questions?

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