Measurement with IFPUG

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If we do not know the size of the software we are going to develop we can not size the project. Not in effort, therefore neither in personnel nor in time, nor in cost.

How do we measure the size of the software?

With lines of source code

Problems of the source code lines:

1. The number of lines of source code depends on the ability of the programmer. The greater the experience of the programmer the less lines of source code will be used to implement the same function.
2. There is an inverse relationship between the level of programming language and the lines of source code that are needed to implement the same function. C ++ needs fewer source code than C.
3. There is no agreed way of how to count lines of code, such as comments or generated automatically.

You do not have it at the beginning of the project

If the lines of code are not the solution.

How do we measure the size of the software?

By measuring Functionality

What measures functionality?

The number of functions provided by the software

It does not have any of the problems of the lines of code, but the most important thing is that the measurement of the functionality of a software can be obtained before developing it.

How do we measure the functionality of the software?

Analyzing the Requirements Specification

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It only makes sense to measure if a measurement database is going to be established

The process of measuring the software according to the ISO / IEC 15939 standard:

Activity 1. Establish and maintain the commitment

Activity 2. Plan the measurement process

Activity 3. Execute the measurement process

Activity 4. Evaluation of the measurements obtained

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Units of measurement of standardized software functionality:

- ISO/IEC 19761-03. COSMIC
- ISO/IEC 20926-03. IFPUG
- ISO/IEC 20928-02. MkII
- ISO/IEC 24570-04. NESMA
- ISO/IEC 29881-10. FISMA

- IEEE 14143.1-00. Functional Size Measurement Concepts

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Measurement process with IFPUG:

- Determine the type of measurement of function points
- Development, Improvement, Application
- Identify the borders of the application
- Identify Data Functions and their complexity
  - 3.1. Identification of ILFs and ELFs
  - 3.2. Determination of complexity through the RETs and DETs of each ILF and EIF
- Identify Transactional Functions and their complexity
  - 4.1 Identification of the EI, EO and EQ
  - 4.2 Determination of complexity through the FTRs and DETs of each EI, EO and EQ
- Determine the mismatched function points
- Determine the adjustment factor of the function points
- Calculate the adjusted function points

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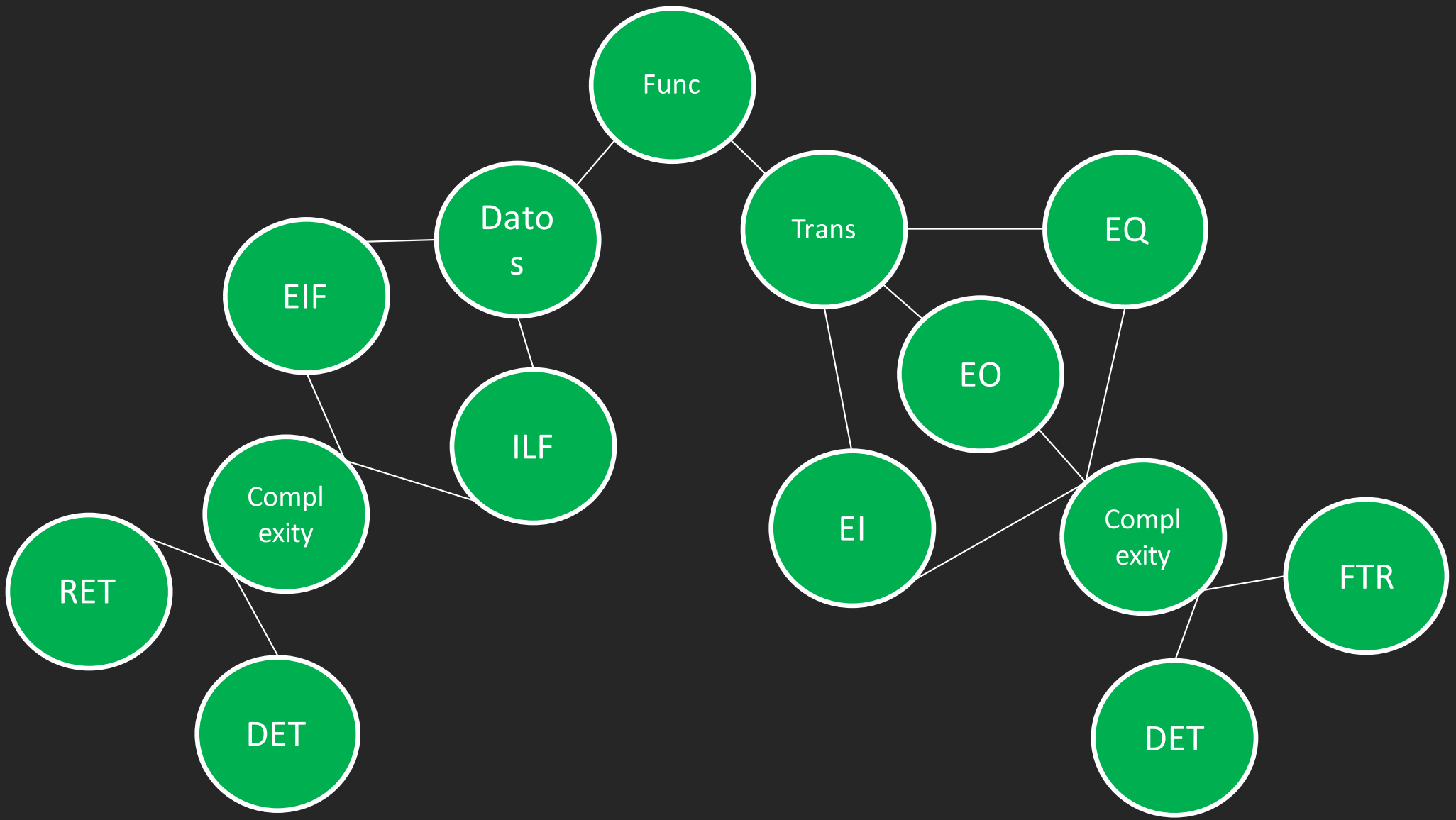

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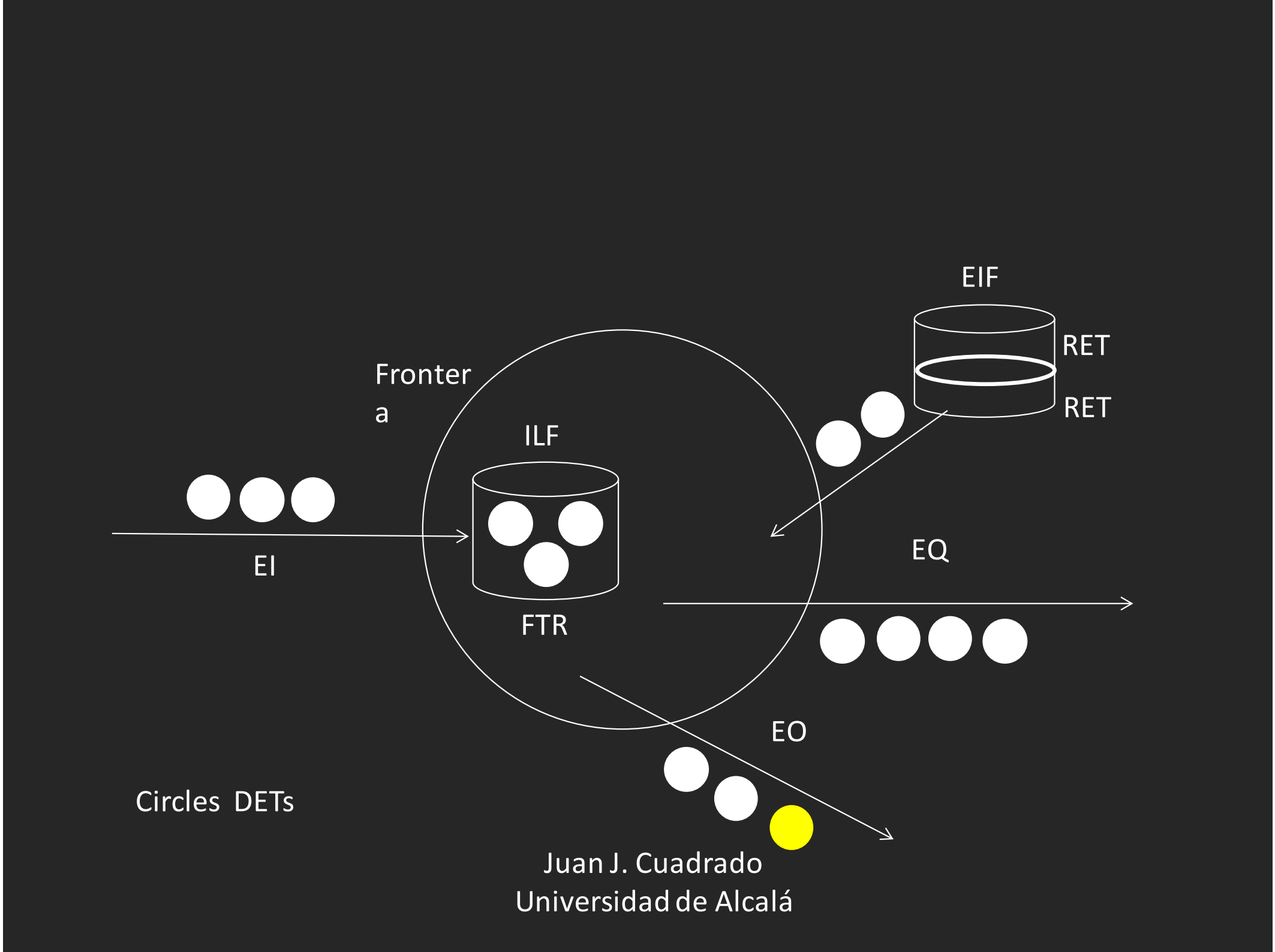
EIF
RET
RET
Frontera
ILF
EI
EQ
FTR
EO
Circles DETs
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Example: A program stores in two internal files (of 4 fields each) customer data (3 fields) and invoices (4 fields) and produces a report of invoices by customers that includes a total. How many function points does it have?

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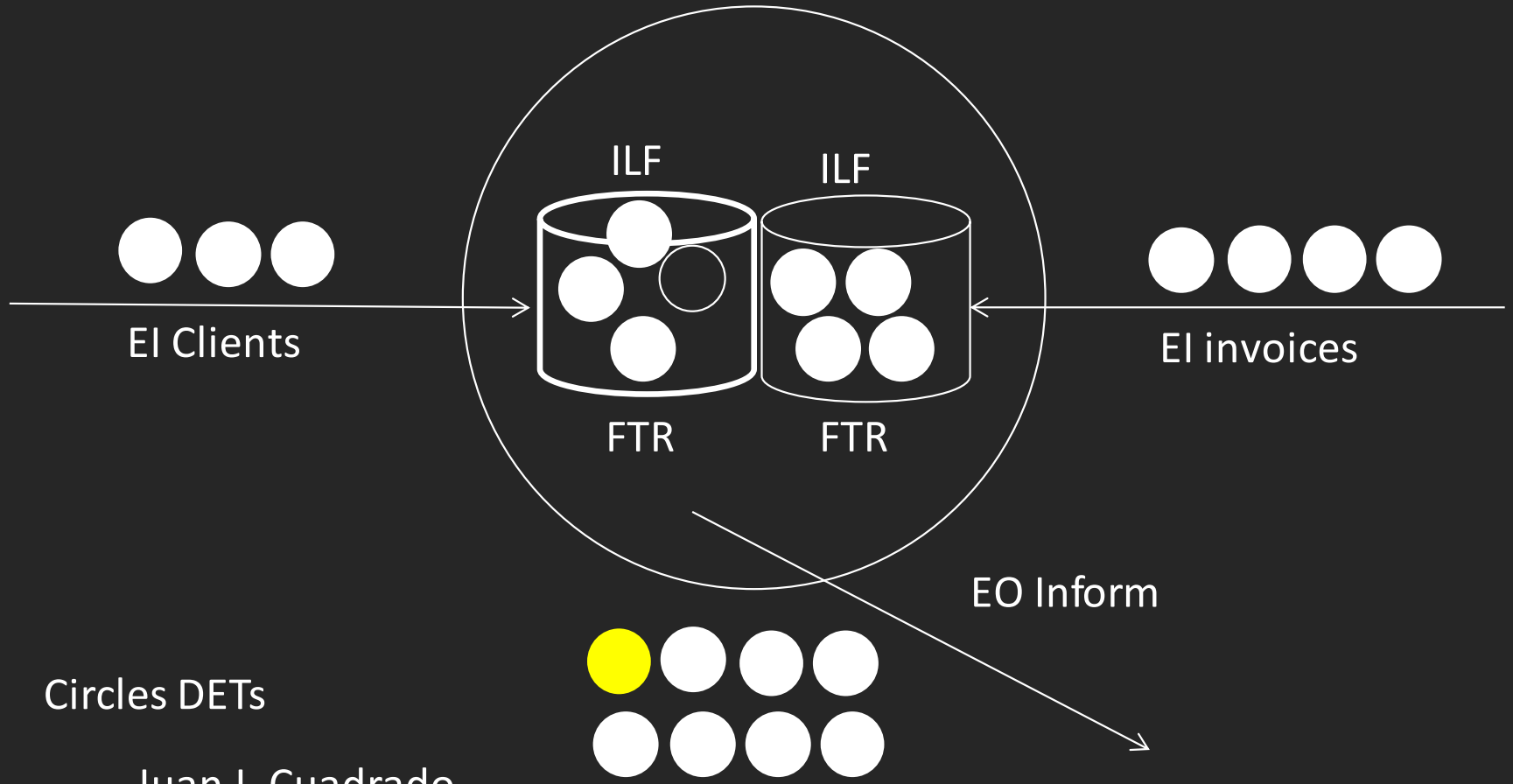

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ILF/EIF	1-19 DET	20-50 DET	≥51 DET
1 RET	low	low	medium
2 a 5 RET	low	medium	high
≥ 6 RET	medium	high	high
ILF	low = 7	Med = 10	high = 15
EIF	low = 5	Med = 7	hich = 10

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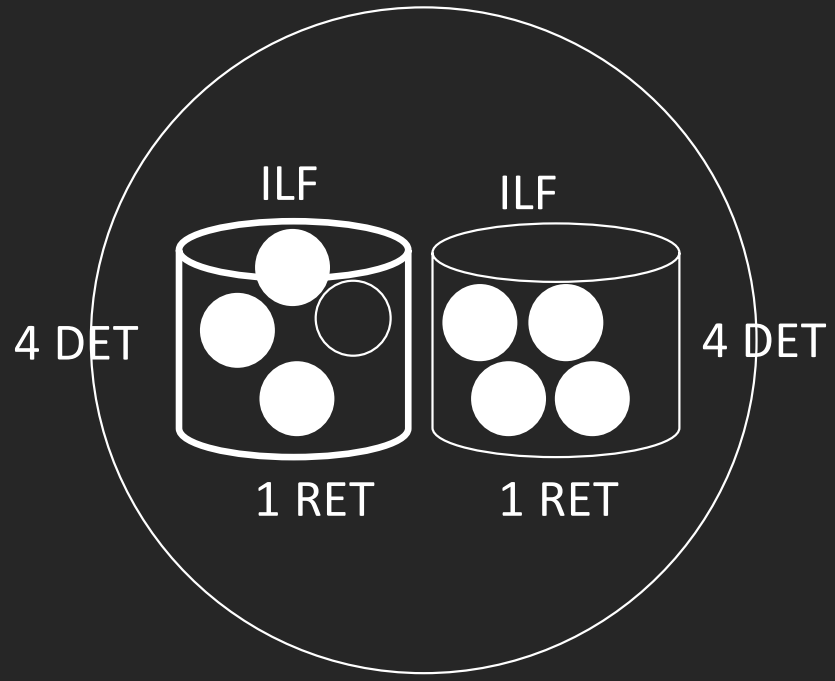

ILF 4 DET 1 RET → Complex low → 7 function points

14 function points per data

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EI	1-4 DET	5-15 DET	≥16 DET
0-1 FTR	Low	L	Medium
2 FTR	L	M	High
≥ 3 FTR	M	H	H
EO/EQ	1-5 DET	6-19 DET	≥20 DET
0-1 FTR	L	L	M
2-3 FTR	L	M	H
≥ 4 FTR	M	H	H
EI/EQ	L = 3	M = 4	H = 6
EO	L = 4	M = 5	H = 7

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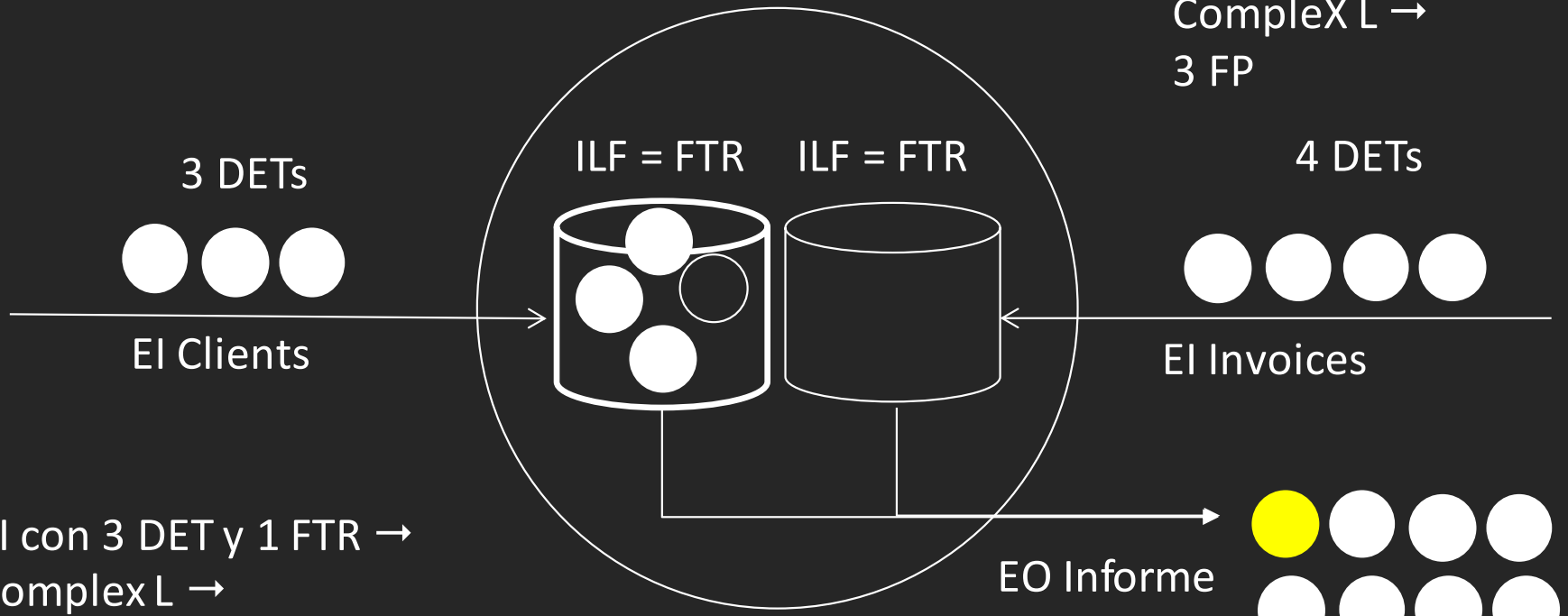

11 FP transactions

Func	Complex	Number		Points
EIF	L	0	5	
	M	0	7	
	H	0	10	
ILF	L	2	7	14
	M	0	10	
	H	0	15	
			Total Dat	14
EI	L	2	3	6
	M	0	4	
	H	0	6	
EO	L	0	4	
	M	1	5	5
	H	0	7	
EQ	L	0	3	
	M	0	4	
	H	0	6	
			Total Trans.	11
			Total	25

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Exercise: The unadjusted function points of a software should be measured for an international chain of clothing stores with headquarters in Spain.

Specifications:
For each store will be stored: Name, Address, City, Country Code, Country, Telephone and Director.
Users must be able to add, change and delete data. To delete the data just enter the Name and the phone number of the store.
In addition, the user will be able to obtain 3 different types of reports:
List of All Stores, with the fields: Name, Phone
List of stores in Spain, with the fields: Name, City, Address, Telephone, Director, and total stores in Spain
List of stores outside of Spain, with the fields: Name, Country Code, Country, Director

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Exercise: The unadjusted function points of a software should be measured for an international chain of clothing stores with headquarters in Spain.
Solution:
Specifications:
For each store will be stored: Name, Address, City, Country Code, Country, Telephone and Director. ILF Stores, 7 DETs and 1 RET. Low Complexity
Users must be able to add, change and delete data. To delete the data just enter the Name and the phone number of the store. 3 EIs, 1 to add, another to change and another to erase. Add and change: 7 DETs and 1 FTR. Delete: 2 DETs and 1 FTR. All of low complexity.
In addition, the user will be able to obtain 3 different types of reports:
List of All Stores, with the fields: Name, Phone. EQ with 2 DETs and 1 FTR. Complexity Low
List of stores in Spain, with the fields: Name, City, Address, Telephone, Director, and Total stores in Spain. EO with 6 DETs and 1 FTR. Low Complexity
List of stores outside Spain, with the fields: Name, Country Code, Country, Director. EQ with 4 DETs and 1 FTR. Complexity Low

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Solution:

Func	Complex	Number		Points
EIF	L	0	5	
	M	0	7	
	H	0	10	
ILF	L	1	7	7
	M	0	10	
	H	0	15	
			Total Data	7
EI	L	3	3	9
	M	0	4	
	H	0	6	
EO	L	1	4	4
	M	1	5	
	H	0	7	
EQ	L	2	3	6
	M	0	4	
	H	0	6	
			Total Trans.	19
			Total	26

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Exercise: The unadjusted function points of a software should be measured for an international chain of clothing stores with headquarters in Spain.

In a new version, 2.0, of the software it is requested that, if a user wants to do an erasure, he has to enter a login, a password that is consulted in an external system, as well as the country code. How does this change the measurement made?

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Exercise: The unadjusted function points of a software should be measured for an international chain of clothing stores with headquarters in Spain.

In a new version of the software, it is requested that, if a user wants to do an erasure, he has to enter a login and a password that are consulted in an external system, as well as the country code. How does this change the measurement made?

Solution:
The new requirements impact on the following functions:
Now an EIF is used with the fields: Login and password. EIF Access, 2 DETs and 1 RET. Low Complexity
The deletion changes, now you have to enter 5 fields, in addition to the name and phone number of the store, the country code, login and password and 2 FTRs are used: Stores and Access. Delete: 5 DETs and 2 FTR. The complexity becomes average.

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Solution:

Func	Complex	Number		Points
EIF	L	1	5	5
	M	0	7	
	H	0	10	
ILF	L	1	7	7
	M	0	10	
	H	0	15	
			Total Data	12
EI	L	2	3	6
	M	1	4	4
	H	0	6	
EO	L	1	4	4
	M	1	5	
	H	0	7	
EQ	L	2	3	6
	M	0	4	
	H	0	6	
			Total Trans.	20
			Total	32 (+6)

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Adjustment Factor (Value Adjustment Factor: VAF)

Based on 14 general characteristics of the system.

Each characteristic has 6 degrees of influence. From 0 (without influence) to 5.

The sum of the degrees of each of the 14 characteristics gives the total degree of influence, GTI.

The VAF is obtained from the GTI by means of the equation the equation:

$$VAF = (GTI * 0.01) + 0.65$$

The VFA modifies the non-adjusted PF by 35% to produce the final PF.

If some degree of influence is unknown, it is evaluated as 0. If few are known, it is better not to adjust

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1. Data communications
2. Distributed processing
3. performance
4. Configuration with high usage load
5. Transaction rate
6. Online data entry
7. End-user efficiency
8. Online updates
9. Complex processing
10. Reusability
11. Ease of installation
12. Ease of operation
13. Multi-site
14. Ease of change

0 = Not present or without influence

1 = Occasional influence

2 = Moderate influence

3 = Average Influence

4 = Significant influence

5 = Very strong influence

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Data communications

The control and data information used in the application is sent or received through the communications installation. The terminals connected locally to the control unit are intended for use in the communications installation. A protocol is a set of conventions that allows transferring or exchanging information between two systems or devices. All data communication links require some type of protocol.

Descriptions to Determine the Degree of Influence:

0. The application is a pure batch process or a stand-alone PC.
1. The application is a batch but has remote data entry or remote printing.
2. The application is a batch but has remote data entry and remote printing.
3. The application includes a collection of data online or TP (teleprocessing) for a process 4. batch or query system.
4. The application is more than a front-end system, but supports only one type of TP communications protocol.
5. The application is more than a front-end system, but supports more than one type of TP communications protocol

Exercise: The unadjusted function points of a software should be measured for an international chain of clothing stores with headquarters in Spain. And the following general characteristics of the system are known:

The operation of the application will be on-line and in network, but it is enough with only one type of communication protocol.
The application must be very documented and open to facilitate its reuse.

Reuse

The application and the code of the application were specially designed, developed and supported to be usable in other applications.

Descriptions to Determine the Degree of Influence

0. Non-reusable code.

1. The reusable code is used within the application.

2. Less than 10% of the application considered more than one of the user's needs.

3. Ten percent (10%) or more of the application considered more than one of the user's needs.

4. The application was specially packaged and / or documented to facilitate reuse and the application is customized by the user at source code level.

5. The application was specially packaged and / or documented to facilitate reuse and the application is customized to be used by maintaining user parameters.

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Exercise: The unadjusted function points of a software should be measured for an international chain of clothing stores with headquarters in Spain. And the following general characteristics of the system are known:
Solution:
The operation of the application will be on-line and in network, but it is enough with only one type of communication protocol. Feature: Data Communication. Degree of influence: 4.
The application must be very documented and open to facilitate its reuse. Feature: Reuse Degree of influence: 5.

GTI: 4 + 5 + 0 + ... + 0 = 9
VAF = (GTI * 0.01) + 0.65 = (9 * 0.01) + 0.65 = 0.74

PFA = PF * VAF = 32 * 0.74 = 23.68
(As there are few reported characteristics the adjustment is incorrect, because it should be up)

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Exercise: The user must have the possibility of entering an Employee ID, and retrieve and display on the screen all the data (19) about an employee that does not contain the ID_Employee.

What happens if the output also contains the number of data displayed?

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Exercise: The user must have the possibility of entering an Employee ID, and retrieve and display on the screen all the data (19) about an employee that does not contain the ID_Employee.

What happens if the output also contains the number of data displayed?

EQ 19 + 1 = 20 DET y 1 FTR → Complex M → 4 PF

EO con 20 + 1 = 21 DET y 1 FTR → Complex M → 5 PF

Exercise: A software must store data about customers (20 in a group) and their orders (51 in two groups, the order date will be stored as an attribute of each order).
Calculate the measurement of the following functionality (and its associated data):
Show a list of data (18) of Customers and number of orders for those customers who have placed orders between start and end dates that are entered.
Like 1, but sorting the list alphabetically before showing it.
It should show "No Clients", if there are none in the range of dates entered.

* In a complete system there should be necessarily input flows to feed the ILFs, otherwise it would be wrong. In this exercise, only part of the system is measured.

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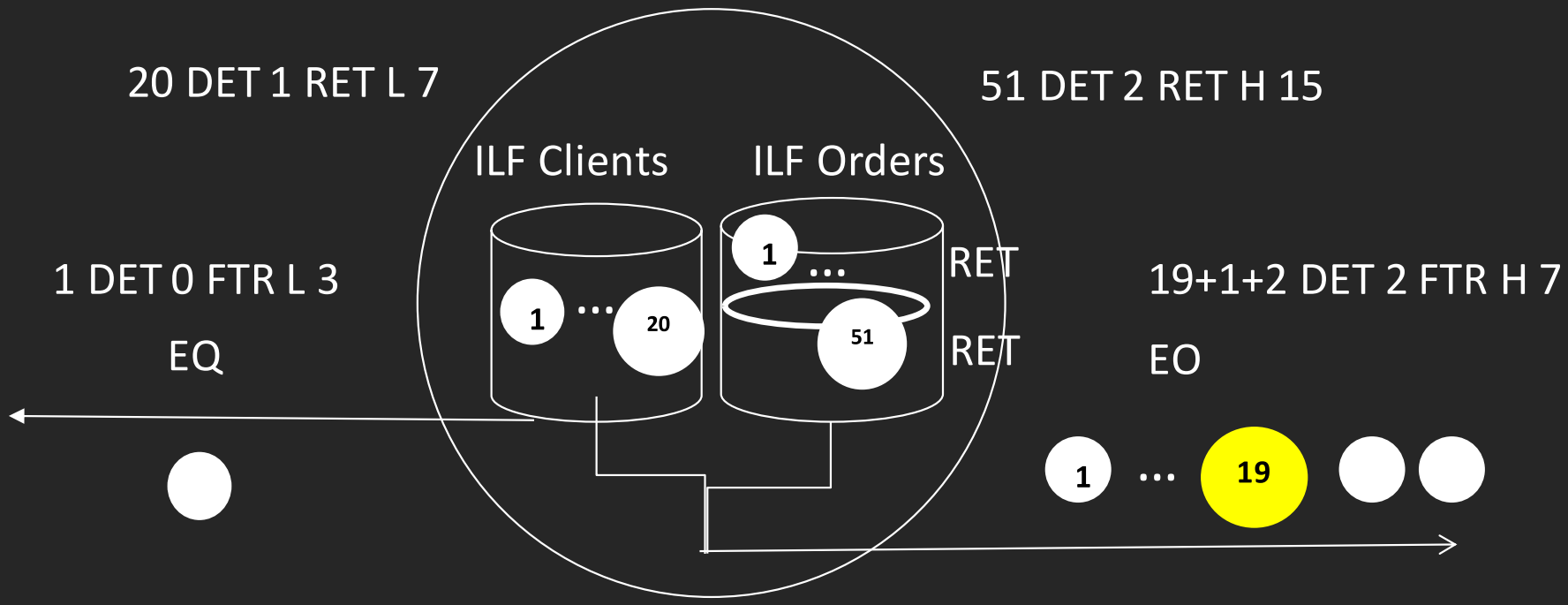

Total: 32. Data: 22. Transacc: 10

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