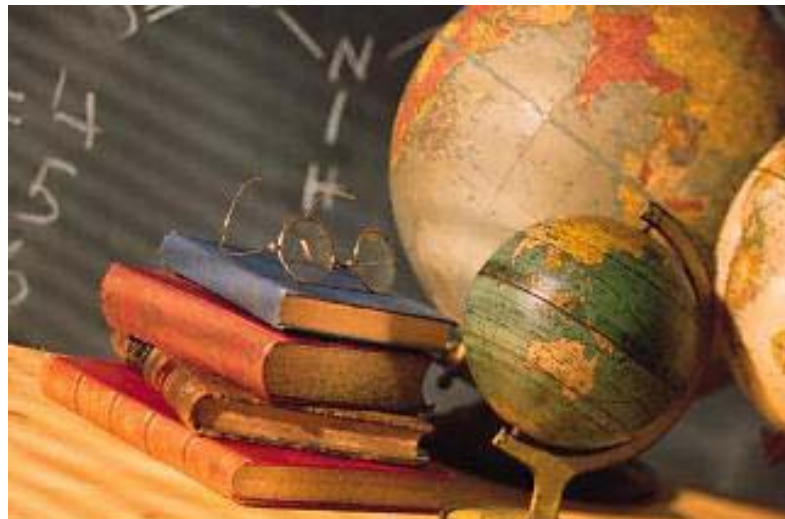




**ÉCOLE DE TECHNOLOGIE SUPÉRIEURE – MONTRÉAL - CANADA**



# **Convertibility of Function Points to COSMIC- FFP: Identification and Analysis of Functional Outliers**



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## List of topics

- 1) Convertibility issue
- 2) Previous studies
- 3) 2006 study
- 4) Discussion



## **Convertibility issue - Relevant for:**

- ☞ Organizations with a portfolio of applications measured with IFPUG
- ☞ Usage of repositories with IFPUG projects – eg. ISBSG
- ☞ Tools vendors:
  - Benchmarking
  - Estimation



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# Previous studies

<b>Authors</b>	<b>Convertibility Equation</b>	<b>R<sup>2</sup></b>
Fetcke	<b><math>Y(\text{Cfsu}) = 1.1 * (\text{UFP}) - 7.6</math></b>	0,97
Letherthuis ≤200 FP	<b><math>Y(\text{Cfsu}) = 1.2 * (\text{UFP}) - 87</math></b>	0,81
Letehrthuis ≥200 FP	<b><math>Y(\text{Cfsu}) = 0.75 * (\text{UFP}) - 2.6</math></b>	0,99
Desharnais 2005	<b><math>Y(\text{Cfsu}) = 0.84 * (\text{UFP}) + 18</math></b>	0,91



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## *Context:*

- ➔ 14 projects from the same organization*
- ➔ Measured by the same person*
  - Based on the same documentation*
  - Based on same assumptions*
  - Based on very high quality of documentation*



## Documentation quality criteria:

### A: Full documentation:

all the required detailed information was available for the measurement process;

### B: Documentation with an incomplete data model;

### C: All functions identified;

### D: Only the number of functions identified

without enough detail for accurate measurement;

### E: Implicit documentation of a function.





### Quality of documentation for measurement:

- ☞ 12 projects: documentation of good quality (= A or B) for over 95% of their functional processes.
- ☞ Projects 3 and 9, the documentation was of good quality for only 62% and 71% of their functional processes respectively.
- ☞ Weighted average = documentation of good quality for more than 90% of the functions measured.
  
- ☞ For projects with documentation of less than good quality, assumptions had to be made for the measurement of the functions not documented well enough for precise measurement; however, since the same assumptions were made for the concurrent duplicate measurement with both methods, this could not be a source of significant distortions for convertibility purposes in this specific case study reported here



ID.	FPA size (in Function Points – FP)					COSMIC-FFP size (in Cfsu)				
	Input	Output	Inquiries	ILF and EIF	Total FP	Entry	Exit	Read	Write	Total Cfsu
1	31	145	95	112	383	63	155	120	26	364
2	98	162	168	217	647	96	233	91	45	565
3	104	127	71	98	400	59	125	146	68	398
4	64	55	25	61	205	39	66	55	28	188
5	94	135	66	77	372	52	158	173	65	448
6	22	29	22	53	126	20	37	24	7	88
7	24	21	10	56	111	11	41	47	16	115
8	94	51	72	70	287	45	103	104	46	298
9	202	54	148	96	500	78	110	198	193	579
10	83	128	28	105	344	54	114	92	31	291
11	55	88	69	105	317	49	119	98	28	294
12	103	49	57	49	258	50	86	78	38	252
13	42	35	10	26	113	19	23	39	33	114
14	157	115	70	105	447	67	149	167	84	467

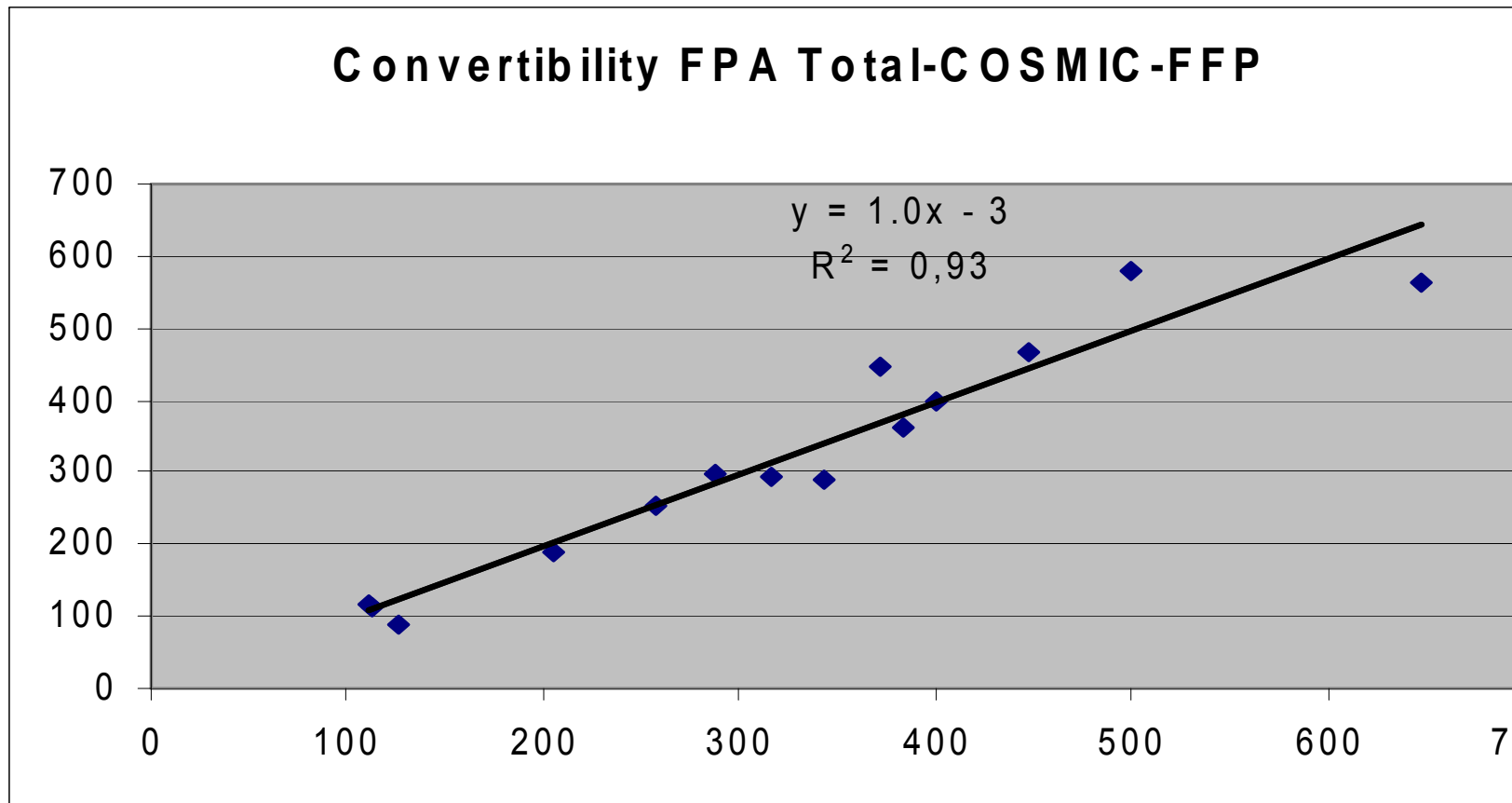
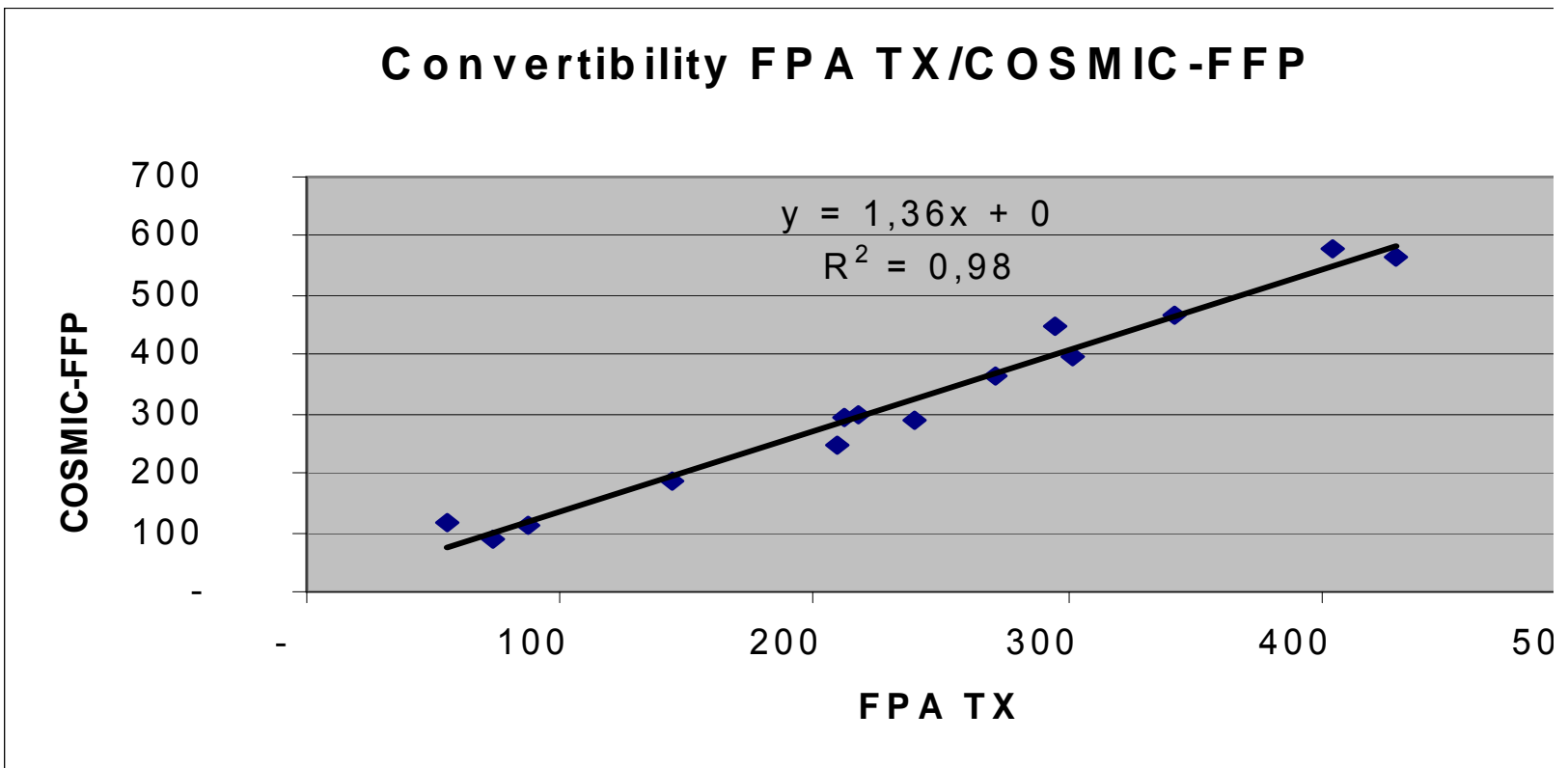


Figure 4: Convertibility model on Total FPA Size (N=14)



**Figure 5: Convertibility model on FPA transaction size only (N=14)**



# Current 2006 study

<b>Context</b>	<b>Convertibility Equation</b>	<b>R<sup>2</sup></b>
All FP	<b><math>Y(Cfsu) = 1.0 * (UFP) - 3</math></b>	0,91
Transac- tions FP	<b><math>Y(Cfsu) = 1.36 * (UFP-TX) + 0</math></b>	0,98



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<b>Project number</b>	<b>FPA Total points</b>	<b>COSMIC 2.2 (2)</b>	<b>With convertibility formula (3)</b>	<b>% diff (4) = (3) – (2)</b>	<b>(5) = (4)/(2)</b>
1	383	364	379	15	4%
2	647	565	643	78	14%
3	400	398	396	-2	0%
4	205	188	202	14	7%
5	372	448	368	-80	-18%
6	126	88	123	35	39%
7	111	115	108	-7	-6%
8	287	298	284	-14	-5%
9	500	579	496	-83	-14%
10	344	291	340	49	17%
11	317	294	314	20	7%
12	258	252	255	3	1%
13	113	114	110	-4	-4%
14	447	467	443	-24	-5%

Table 2 Convertibility comparison on Total FPA Size (N= 14)

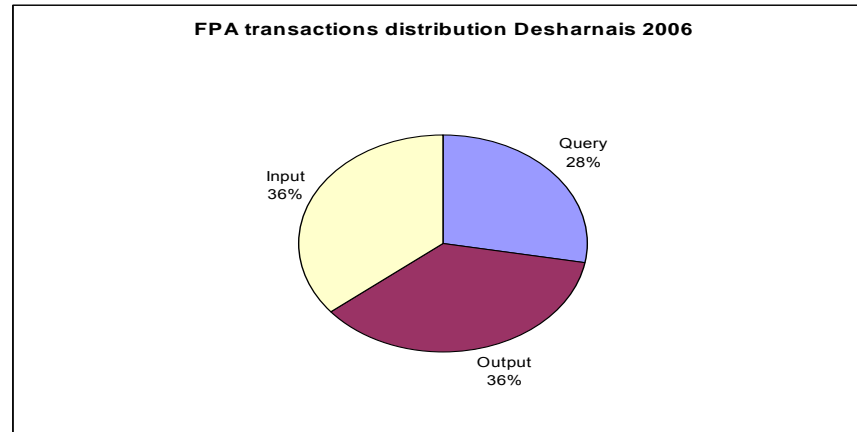


Figure 1: FPA transaction size distribution (N= 14)

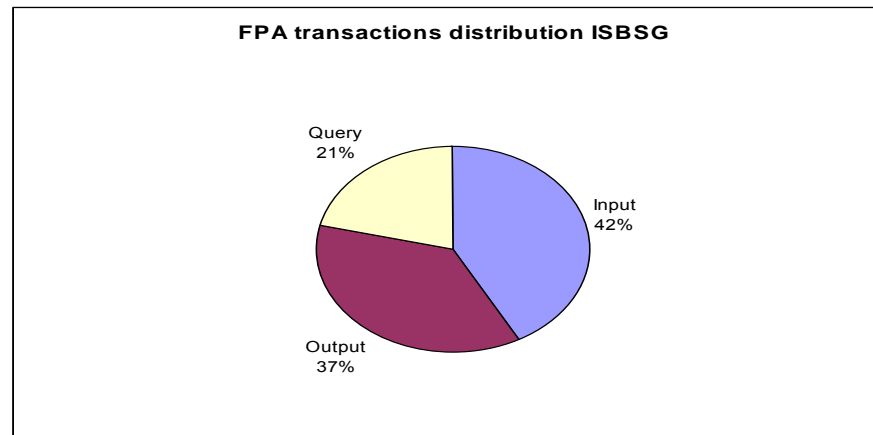


Figure 2: ISBSG transaction size distribution (N=3,161)



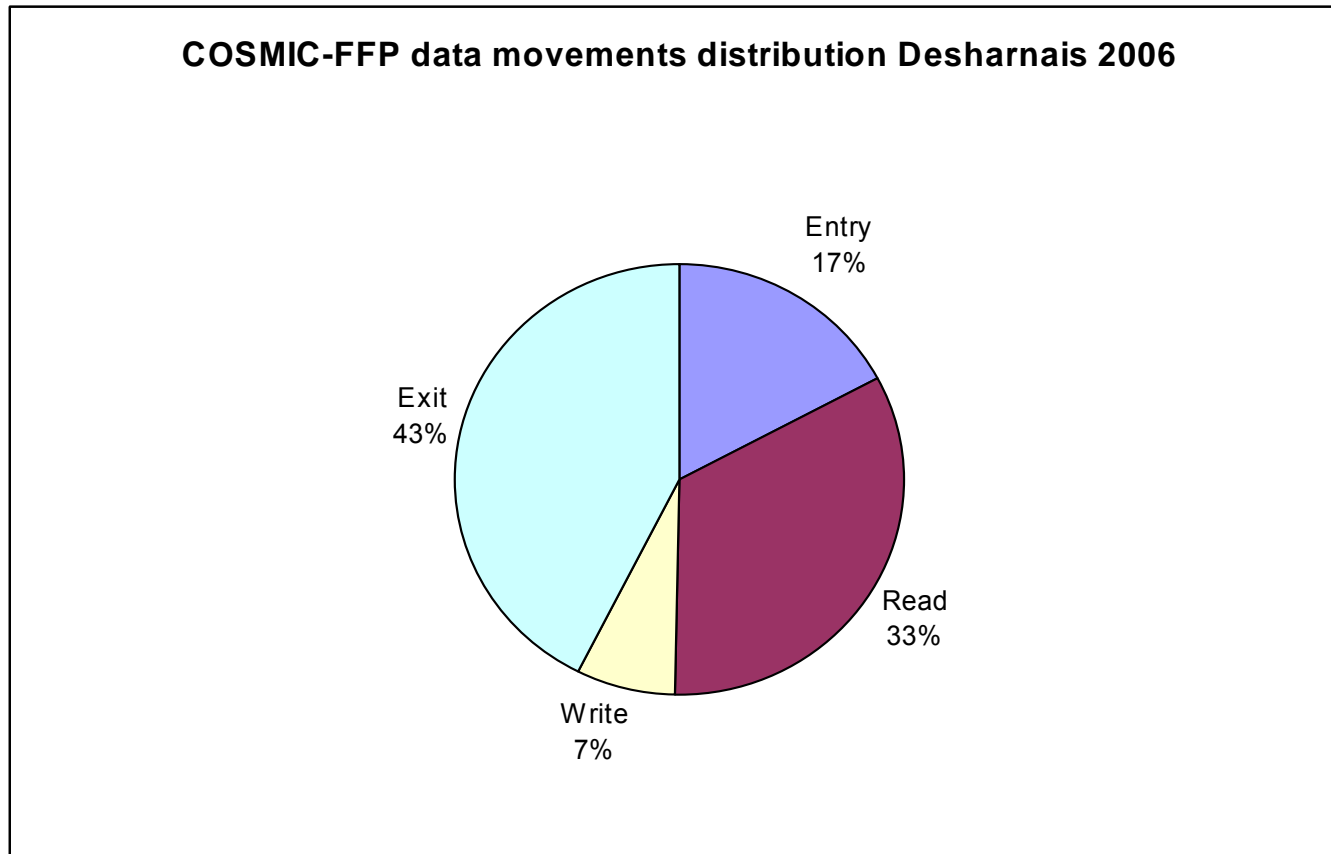


Figure 3: COSMIC-FFP data movement distribution (14 projects)



Project number	FPA TX points	COSMIC 2.2 (2)	With convertibility formula (3)	% diff (4) = (3) - (2)	(5) = (4)/(2)
1	271	364	369	5	1%
2	430	565	585	20	4%
3	302	398	411	13	3%
4	144	188	196	8	4%
5	295	448	401	-47	-10%
6	73	88	99	11	13%
7	55	115	75	-40	-35%
8	217	298	295	-3	-1%
9	404	579	549	-30	-5%
10	239	291	325	34	12%
11	212	294	288	-6	-2%
12	209	248	284	36	15%
13	87	114	118	4	4%
14	342	467	465	-2	0%

**Table 3 : Convertibility comparison on FPA transaction size only (N=14)**



<b>Project number</b>	<b>Total FPA size</b>	<b>Data size</b>	<b>Data / Total FPA</b>
1	383	112	29%
2	646	217	34%
3	400	98	25%
4	205	61	30%
5	372	77	21%
6	126	53	42%
7	111	56	50%
8	287	70	24%
9	500	96	19%
10	344	105	31%
11	317	105	33%
12	258	49	19%
13	113	26	23%
14	447	105	23%
All	4 509	1 230	27%

**Table 4 : Ratio of FPA data file size over FPA total size (N=14 projects)**



## Projects with larger convertibility errors:

- ☞ Functional profile far from average functional profile (% function types)
- ☞ Some functional process with:
  - a larger number of data movements
  - a smaller number of data movements
- ☞ Error messages:
  - Once in IFPUG
  - Once in each COSMIC functional process



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*Thank You !*



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