

APPENDIX I

Appendix I shows details of the data used in developing and validating Modifiability and Flexibility Measurement Model for object oriented design. The first column in Table I.1 shows the Projects detail, the next eleven columns shows the metrics values and the last two columns shows the mean of the subject's rank Modifiability and Flexibility.

Table I.1: Summary of Tryout Data [Genero et al. (2001)]

Class Diagram Number	NC	NA	NM	NAssoc	NAgg	NDep	NGen	NAggH	NGenH	Max Hagg	Max DIT	Modifiability	Flexibility
D0	2	4	8	1	0	0	0	0	0	0	0	1	10.639
D1	3	6	12	1	1	0	0	1	0	1	0	2	15.353
D2	4	9	15	1	2	0	0	1	0	2	0	2	15.464
D3	3	7	12	3	0	0	0	0	0	0	0	3	13.39
D4	5	14	21	1	3	0	0	2	0	2	0	2	17.969
D5	3	6	12	2	0	0	0	0	0	0	0	2	15.513
D6	4	8	12	3	0	1	0	0	0	0	0	3	11.107
D7	6	10	14	2	2	0	2	1	1	2	1	3	22.593
D8	3	9	12	1	0	1	0	0	0	0	0	2	8.504
D9	7	14	20	2	3	0	2	1	1	2	1	3	-27.38
D10	9	18	26	2	3	0	4	1	2	3	1	3	32.169

D11	7	18	37	3	3	0	2	1	1	3	1	3	57.849
D12	8	22	35	3	2	1	2	1	1	2	1	3	44.077
D13	5	9	26	0	0	0	4	0	1	0	2	2	63.968
D14	8	12	30	0	0	0	10	0	1	0	3	3	77.971
D15	11	17	38	0	0	0	18	0	1	0	4	4	96.688
D16	20	42	76	10	6	2	10	2	3	2	2	6	106.229
D17	23	41	88	10	6	2	16	2	3	4	3	6	147.924
D18	21	45	94	6	6	1	20	2	2	4	4	6	163.64
D19	29	56	98	12	7	3	24	3	4	4	4	7	148.77
D20	9	28	47	1	5	0	2	2	1	4	1	3	57.90
D21	18	30	65	3	5	0	19	1	2	3	4	5	130.13
D22	26	44	79	11	6	0	21	2	5	4	3	6	120.36
D23	17	32	69	1	5	0	19	1	1	2	5	5	146.10
D24	23	50	73	9	7	2	11	3	4	4	1	5	69.27
D25	22	42	84	14	4	4	16	2	3	2	3	6	137.00
D26	14	34	77	4	9	0	7	2	2	3	4	5	148.11
D27	17	34	47	6	6	0	11	3	2	2	2	4	56.573

Flexibility value of the projects has been calculated using the model given by
Abdullah et al. (2015)

Table I.2: Group wise Project Class Diagram Details for MMM^{OOD}

Group	Project Class Diagram Details
System A	D0, D1, D7
System B	D11, D12, D14, D19
System C	D8, D9, D10

Table I.3: Group wise Project Class Diagram Details for FMM^{OOD}

Group	Project Details
System D	D7, D8, D10, D11
System E	D0, D17, D19, D22, D25
System F	D1, D2, D4, D5, D12, D20, D27

APPENDIX II

Table II.1: Industry Data and Testability Score

Design Metrics ↓	Project No.									
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Encapsulation	4.7	3.4	4.2	5.8	4.9	4.6	5.0	4.6	5.5	3.9
Inheritance	0.9	0.8	0.6	0.5	0.9	0.8	0.7	0.6	0.5	0.8
Coupling	2.6	2.5	2.3	3.4	3.1	3.1	3.4	3.0	3.7	3.2
Cohesion	1.2	1.7	0.6	1.0	1.8	1.7	1.5	1.9	1.3	1.4
	Evaluators Testability Scores									
Evaluator 1	2.4	3.5	2.3	2.5	4.0	3.9	3.7	3.4	2.7	4.2
Evaluator 2	2.9	3.5	2.2	2.6	4.1	3.9	4.3	3.2	3.7	4.8
Evaluator 3	5.1	4.9	4.2	4.3	5.9	5.4	5.6	4.6	5.2	5.8
Evaluator 4	3.6	2.9	2.5	2.4	4.8	4.2	3.9	3.0	3.2	5.1
Evaluator 5	2.4	2.9	1.5	1.8	4.1	3.9	3.4	2.0	3.2	4.4

Table II.2: Group wise Project Details for TMM^{OOD}

Group	Project Details
System G	P5, P7
System H	P2, P6, P8
System I	P3, P4

APPENDIX III

Table III.1: Spearman's Rank Correlation Coefficient

n (number of pairs)	Probability that your result occurred by chance				
	0.1	0.05	0.025	0.01	0.005
4	1.0000	1.0000	1.0000	1.0000	1.0000
5	0.7000	0.9000	0.9000	1.0000	1.0000
6	0.6571	0.7714	0.8286	0.9429	0.9429
7	0.5714	0.6786	0.7857	0.8571	0.8929
8	0.5476	0.6429	0.7381	0.8095	0.8571
9	0.4833	0.6000	0.6833	0.7667	0.8167
10	0.4424	0.5636	0.6485	0.7333	0.7818
11	0.4182	0.5273	0.6091	0.7000	0.7545
12	0.3986	0.5035	0.5874	0.6713	0.7273
13	0.3791	0.4780	0.5604	0.6484	0.6978
14	0.3670	0.4593	0.5385	0.6220	0.6747
15	0.3500	0.4429	0.5179	0.6000	0.6536
16	0.3382	0.4265	0.5029	0.5824	0.6324
17	0.3271	0.4124	0.4821	0.5577	0.6055
18	0.3170	0.4000	0.4683	0.5425	0.5897
19	0.3077	0.3887	0.4555	0.5285	0.5751
20	0.2992	0.3783	0.4438	0.5155	0.5614
21	0.2914	0.3687	0.4329	0.5034	0.5487
22	0.2841	0.3598	0.4227	0.4921	0.5368
23	0.2774	0.3515	0.4132	0.4815	0.5256
24	0.2711	0.3438	0.4044	0.4716	0.5151
25	0.2653	0.3365	0.3961	0.4622	0.5052
26	0.2598	0.3297	0.3882	0.4534	0.4958
27	0.2546	0.3233	0.3809	0.4451	0.4869
28	0.2497	0.3172	0.3739	0.4372	0.4785
29	0.2451	0.3115	0.3673	0.4297	0.4705
30	0.2407	0.3061	0.3610	0.4226	0.4629