Sub-panel 11
Computer-Science and Informatics
REF Analysis

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SP11 Submissions

- 89 Institutions
- 2158 Staff
- 455 Early Career Researchers
- 7665 Outputs
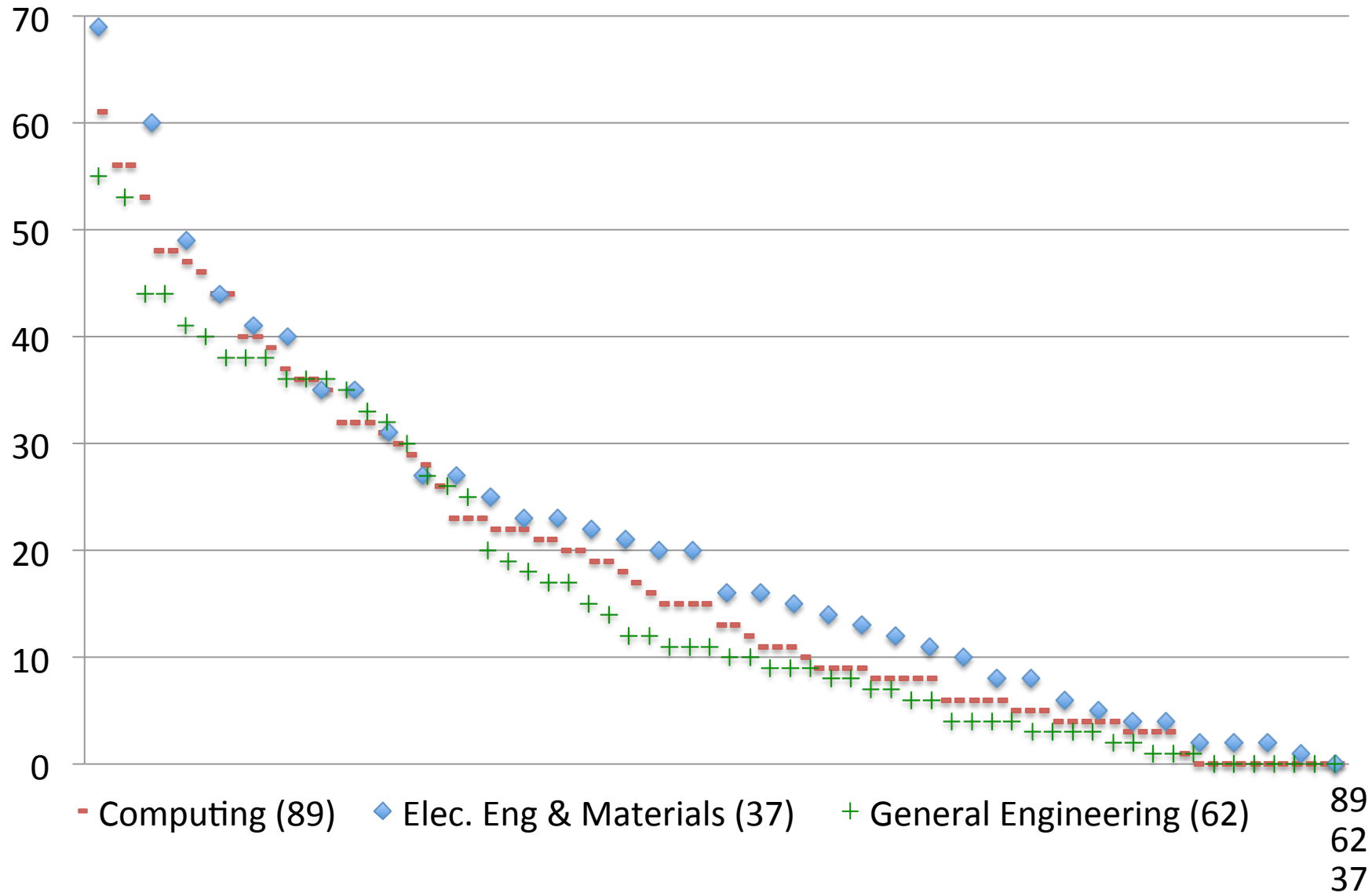- 280 Impact case studies
- Everything assessed by 3 assessors

SP11 Overall

Submission	% 4*	% 3*	% 2*	%1*	% 0	GPA	2014	2008
SP 11 Weighted Average	26	44	24	5	1	2.89		
University College London	61	35	4	0	0	3.57	1	5
Warwick	56	41	3	0	0	3.53	2	29
Imperial College London	56	38	6	0	0	3.50	3	2
Manchester	48	46	6	0	0	3.42	4	5
Sheffield	47	45	8	0	0	3.39	5	29
Cambridge	48	41	10	1	0	3.36	6	1
Oxford	53	34	9	2	2	3.34	7	5
York	44	46	10	0	0	3.34	8	16
Newcastle upon Tyne	46	41	13	0	0	3.33	9	21
Liverpool	35	62	3	0	0	3.32	10	12
Queen Mary	39	52	8	1	0	3.29	11	12
Lancaster University	36	55	8	1	0	3.26	12	10
Nottingham	37	51	11	1	0	3.24	13	8
King's College London	32	56	12	0	0	3.20	14	36
Edinburgh	40	45	11	2	2	3.19	15	2
Glasgow	36	48	14	2	0	3.18	16	8
Southampton	44	35	16	5	0	3.18	17	2

Overall GPA Comparison

- Computing (89)   ◆ Elec. Eng & Materials (37)   + General Engineering (62)

89
62
37
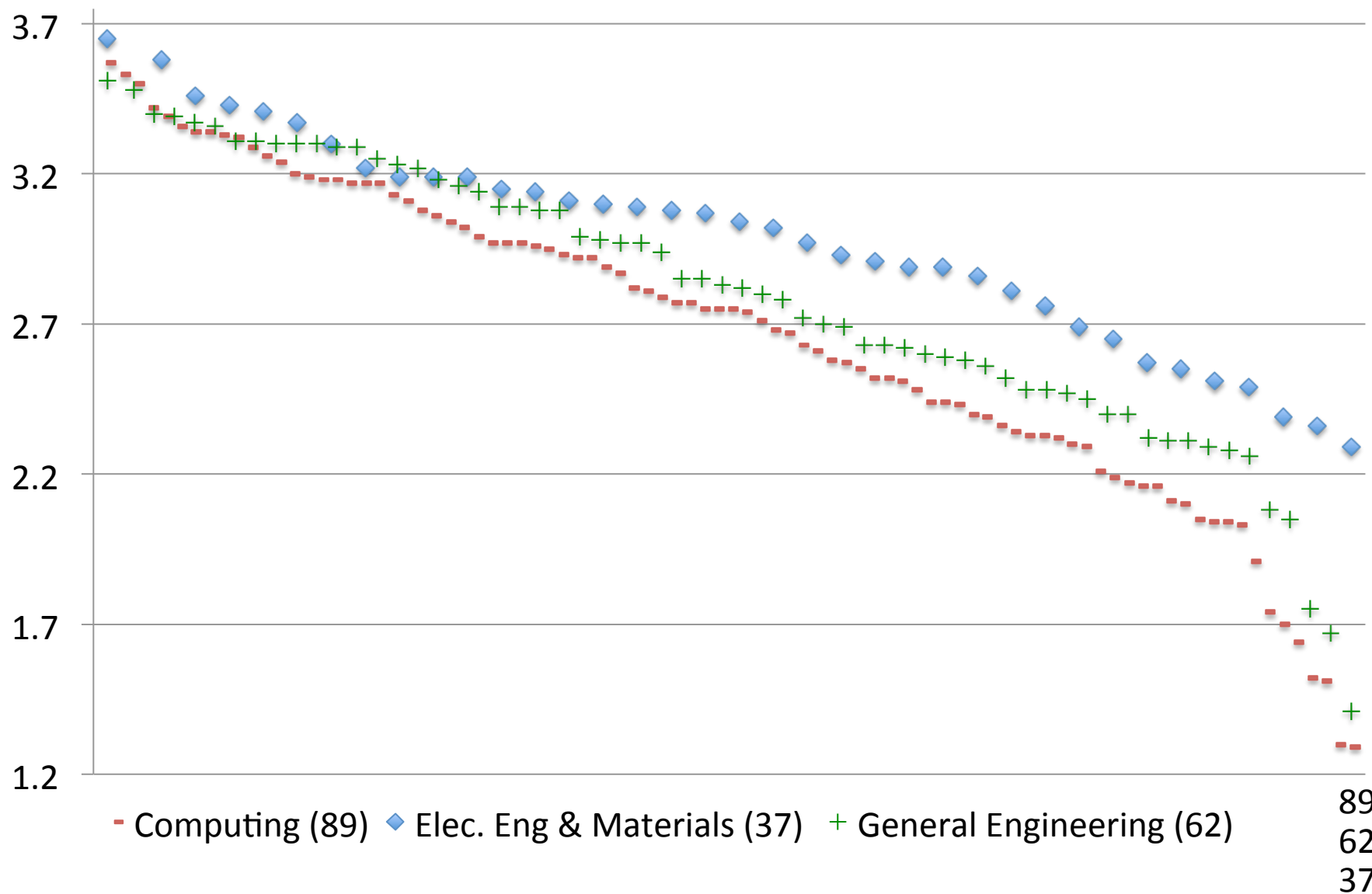
Overall 4* Percentage Comparison

- Computing (89)   ◆ Elec. Eng & Materials (37)   + General Engineering (62)

89
62
37

Output Evaluation

- Outputs assigned to assessors using about 30 topics from ACM classification, using automated constraint solver from Nottingham

- 3 – 10 assessors per UoA

- Major differences reconciled by discussion

- Scores were algorithmically normalised to compensate for calibration differences, and then combined using a maximum likelihood estimate to give a combined score for each output.

Output Types

2014 REF

Output Type	Total	%	* Rating					% Within output Type for REF			
			4	3	2	1	0	4	3	2	1
Journal	5560	72.5%	1360	2651	1361	170	18	24.5%	47.7%	24.5%	3.1%
Conference	1903	24.8%	328	900	528	146	1	17.2%	47.3%	27.7%	7.7%
Chapter in book	112	1.5%	2	34	41	35	0	1.8%	30.4%	36.6%	31.3%
Authored book	32	0.4%	5	11	12	4	0	15.6%	34.4%	37.5%	12.5%
Exhibition	12										
Patent	12										
Research report	9										
Software	8										
Other	20										
Totals	7668		22.1%	47.2%	25.7%	4.7%	0.2%				

2008 RAE

| Total	%	% Within output Type for RAE			
		4	3	2	1
4970	66.3%	21.9%	47.0%	26.9%	4.2%
1990	26.6%	16.3%	40.4%	32.7%	10.5%
199	2.7%	5.0%	37.7%	37.2%	19.6%
75	1.0%	49.3%	34.7%	9.3%	6.7%
19					
18					
5					
33					
3					
7492		20.0%	45.0%	28.5%	6.4%

Journals
- 1270 Different journals
- 648 (50%) only 1 submission
- 1049 (82%) <= 5 submissions
- Highest number of submissions = 100

Conferences
- 637 Different conferences
- 392 (62%) only 1 submission
- (87%) <= 5 submissions
- Highest number of submissions = 151

REF & RAE % 4* Outputs
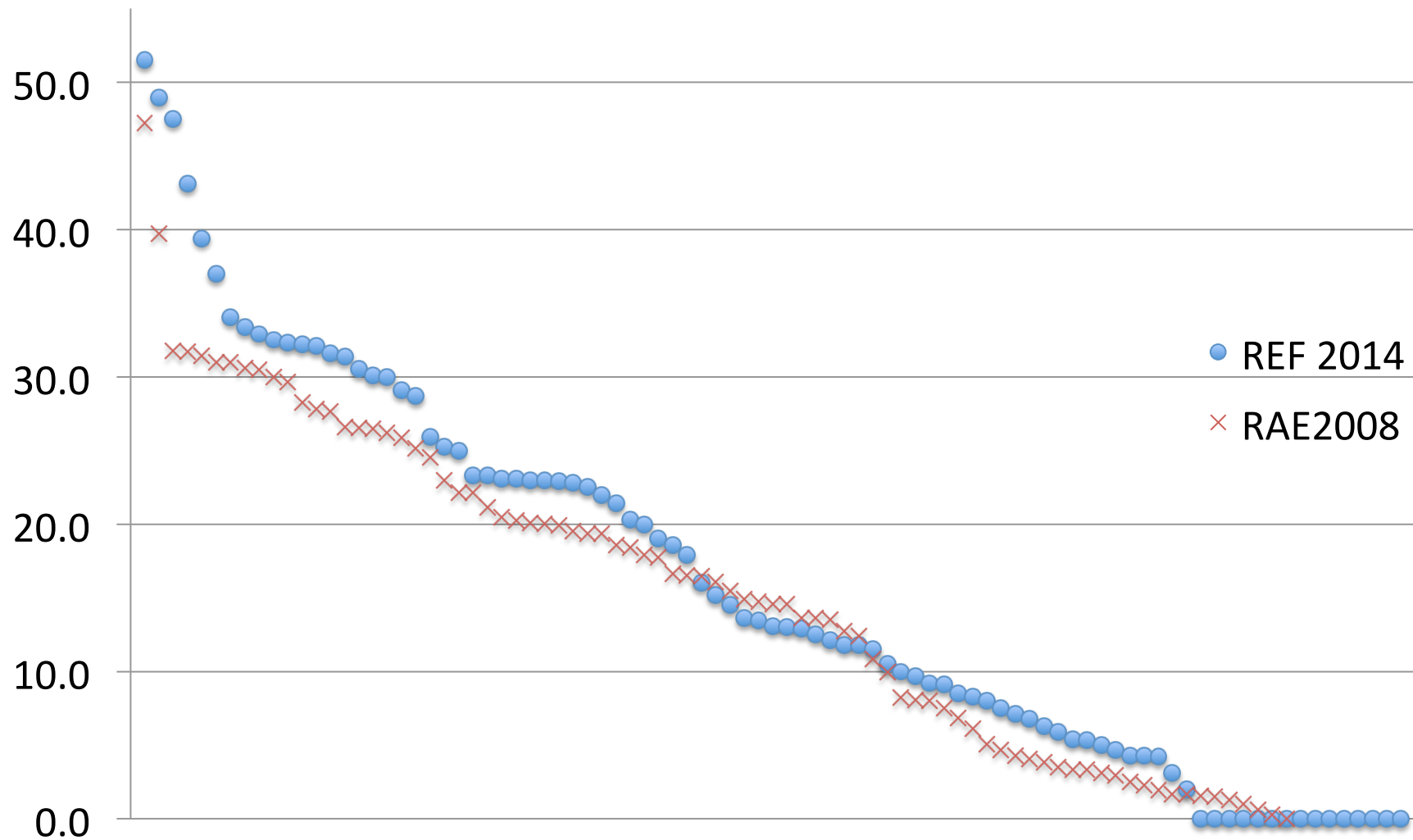
Output Topic Analysis

Topics	Topic No.	Total Outputs	% of Outputs	% Rating within Topics				
				4	3	2	1	GPA
Cryptography	18	55	0.7%	45.5%	38.2%	10.9%	5.5%	3.2
Real-time and fault-tolerant systems	3	22	0.3%	40.9%	31.8%	22.7%	4.5%	3.1
Logic	11	305	4.0%	33.4%	50.5%	16.1%	0.0%	3.2
Computer vision	23	431	5.6%	33.2%	45.2%	19.3%	2.3%	3.1
Algorithms / Theory / Methodologies	12	416	5.4%	32.2%	48.6%	16.3%	2.9%	3.1
Computer graphics	26	205	2.7%	27.8%	43.9%	25.9%	2.4%	3.0
Models of computation / formal languages / complexity / Semantics	10	455	5.9%	27.3%	51.4%	20.7%	0.7%	3.1
Security services / hardware / systems	19	207	2.7%	26.1%	40.1%	29.5%	4.3%	2.9
(Applied computing) Life and medical sciences	28	517	6.7%	25.7%	48.9%	21.1%	4.3%	3.0
Artificial intelligence	22	1011	13.2%	25.3%	48.5%	22.3%	4.0%	3.0
Software notations & tools / Parallel programming	8	178	2.3%	25.3%	48.9%	24.2%	1.7%	3.0
Computer systems organization	2	201	2.6%	22.4%	52.7%	19.4%	5.5%	2.9
Machine learning	24	402	5.2%	21.9%	49.5%	25.9%	2.7%	2.9
Software organization and properties	7	340	4.4%	20.9%	52.1%	19.1%	7.9%	2.9
Mathematics of computing	13	296	3.9%	19.9%	48.0%	28.0%	4.1%	2.8
Information systems	15	220	2.9%	19.5%	40.9%	31.4%	8.2%	2.7
Software creation and management	9	192	2.5%	18.2%	50.0%	26.6%	5.2%	2.8
Information Retrieval / Document management, text processing	17	153	2.0%	17.6%	43.1%	33.3%	5.9%	2.7
World Wide Web	16	125	1.6%	17.6%	36.0%	36.8%	9.6%	2.6
Networks (properties & services)	6	218	2.8%	17.0%	39.9%	34.9%	8.3%	2.7
Hardware	1	235	3.1%	16.2%	57.4%	23.0%	3.4%	2.9
Networks (algorithms)	5	104	1.4%	14.4%	39.4%	35.6%	10.6%	2.6
Applied computing	27	140	1.8%	14.3%	37.9%	45.0%	2.9%	2.6
Networks (protocols)	4	121	1.6%	14.0%	52.9%	27.3%	5.8%	2.8
Modeling and simulation	25	94	1.2%	13.8%	50.0%	33.0%	3.2%	2.7
Human-centered computing / Visualization	20	568	7.4%	10.0%	48.9%	34.3%	6.7%	2.6
Collaborative and social computing	21	160	2.1%	8.8%	46.9%	36.3%	8.1%	2.6
Other Topics: OR, History, Education etc	30-33	102	1.3%	5.9%	31.4%	44.1%	18.6%	2.2
Applied computing: law, humanities, education, art	29	176	2.3%	5.1%	38.1%	43.2%	13.6%	2.3
Total		**7668**		**22.1%**	**47.2%**	**25.7%**	**4.7%**	

Journals with Most Submissions

Journal	Submissions
Theoretical Computer Science	100
Artificial Intelligence	84
IEEE Transactions on Visualization and Computer Graphics	72
IEEE Transactions on Software Engineering	68
Pattern Recognition	59
IEEE Transactions on Pattern Analysis and Machine Intelligence	57
IEEE Transactions on Evolutionary Computation	53
Bioinformatics	49
Journal of Artificial Intelligence Research	48
ACM Transactions on Graphics	46
IEEE Transactions on Fuzzy Systems	46
Formal Aspects of Computing	45
Information Sciences	45
Logical Methods in Computer Science	43

Journal SJR and Impact Factor
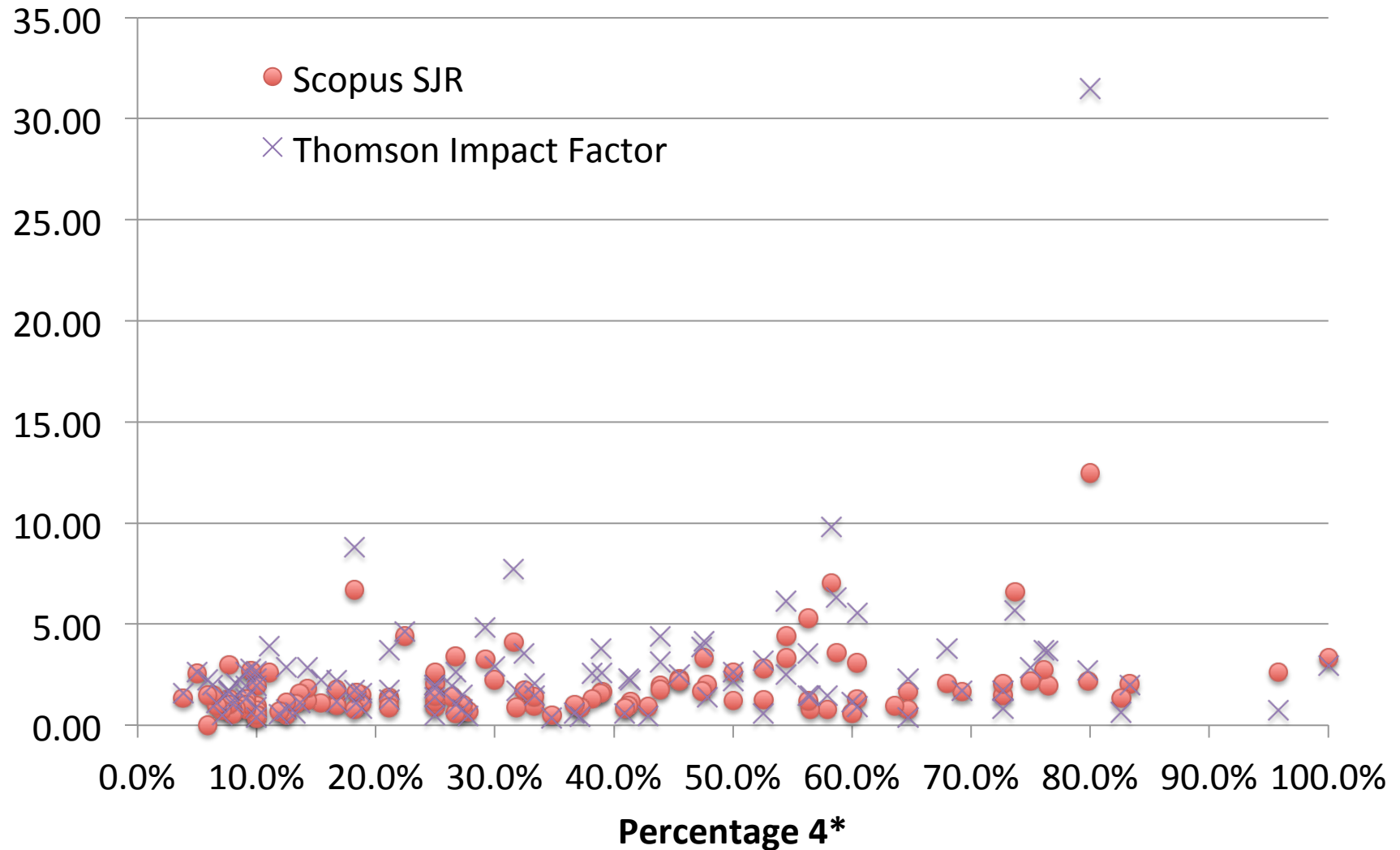
Conferences with most submissions

Conference	Submissions
CHI Human Factors in Computing Systems	151
POPL Principles of Programming Languages	41
LICS Logic in Computer Science	40
IJCAI Joint Conference on Artificial Intelligence	32
AAMAS Autonomous Agents and Multiagent Systems	31
ICALP Automata, Languages and Programming	27
ICSE Software Engineering	27
ACL Association for Computational Linguistics	23
SIGIR Research and Development in Information Retrieval	22
UbiComp Pervasive and Ubiquitous Computing	22
NIPS Advances in Neural Information processing Systems	18
CVPR Computer Vision and Pattern Recognition	17
ICAPS Automated Planning and Scheduling	17

Citations
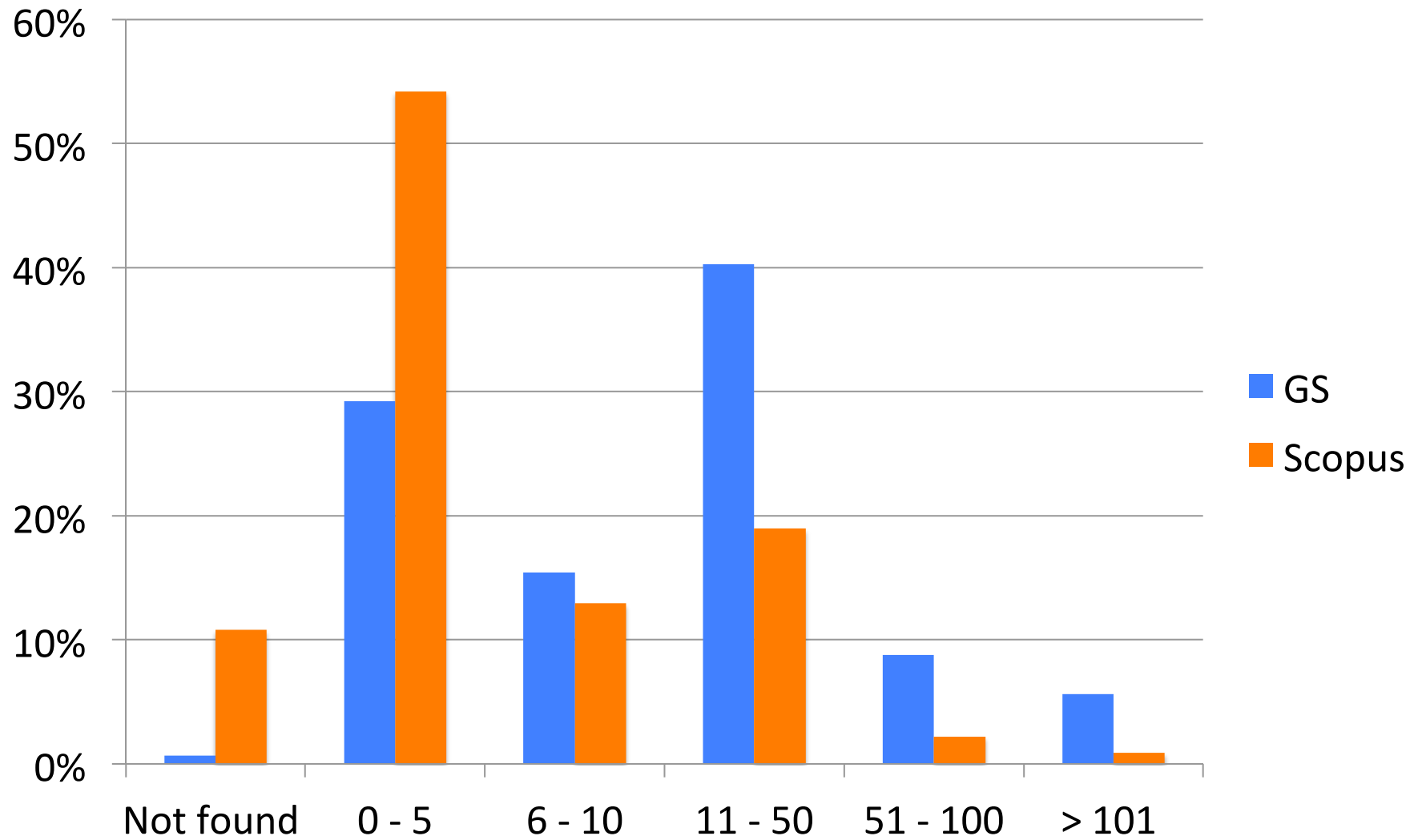
# Ratio GS to Scopus Citations p.a.
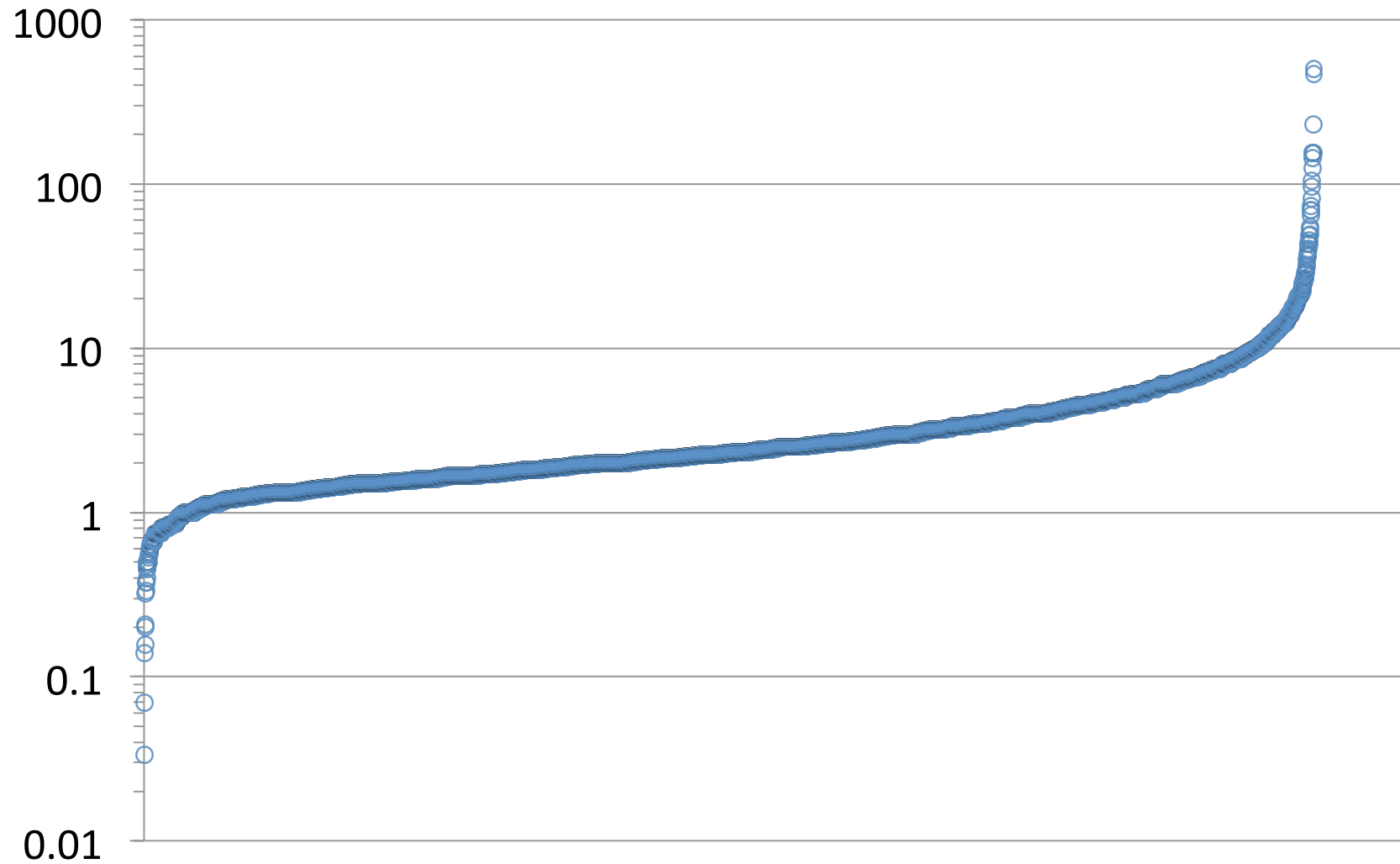
Output Ratings vs Google Scholar and Scopus Citations per annum

GS pa	1st quartile	2nd quartile	3rd quartile	4th quartile
% 4* in quartiles	6.5%	14.1%	22.5%	56.9%
% 3* in quartiles	19.9%	29.9%	29.9%	20.2%
% 2* in quartiles	44.2%	28.7%	17.9%	9.2%
% 1* in quartiles	65.2%	19.7%	8.0%	7.1%

Scopus pa	1st quartile	2nd quartile	3rd quartile	4th quartile
% 4* in quartiles	14.9%	13.5%	18.4%	53.3%
% 3* in quartiles	23.6%	30.0%	26.6%	19.8%
% 2* in quartiles	36.7%	36.6%	18.8%	7.9%
% 1* in quartiles	49.8%	32.9%	8.7%	8.7%

REF Score vs GS p.a.
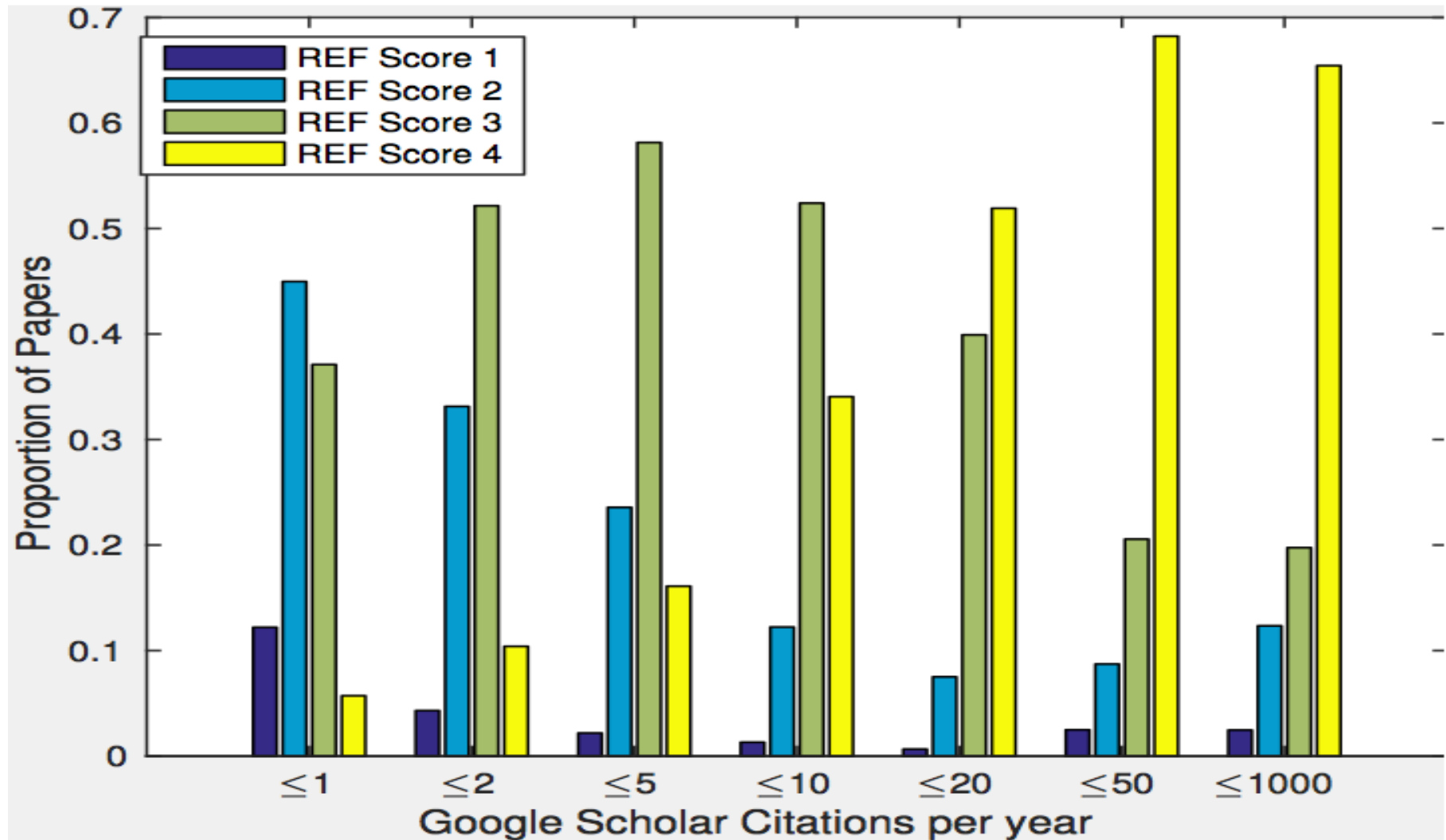
Environment Scores

% 4*   GPA

● % 4 REF*   + % 4* RAE   ✕ GPA REF
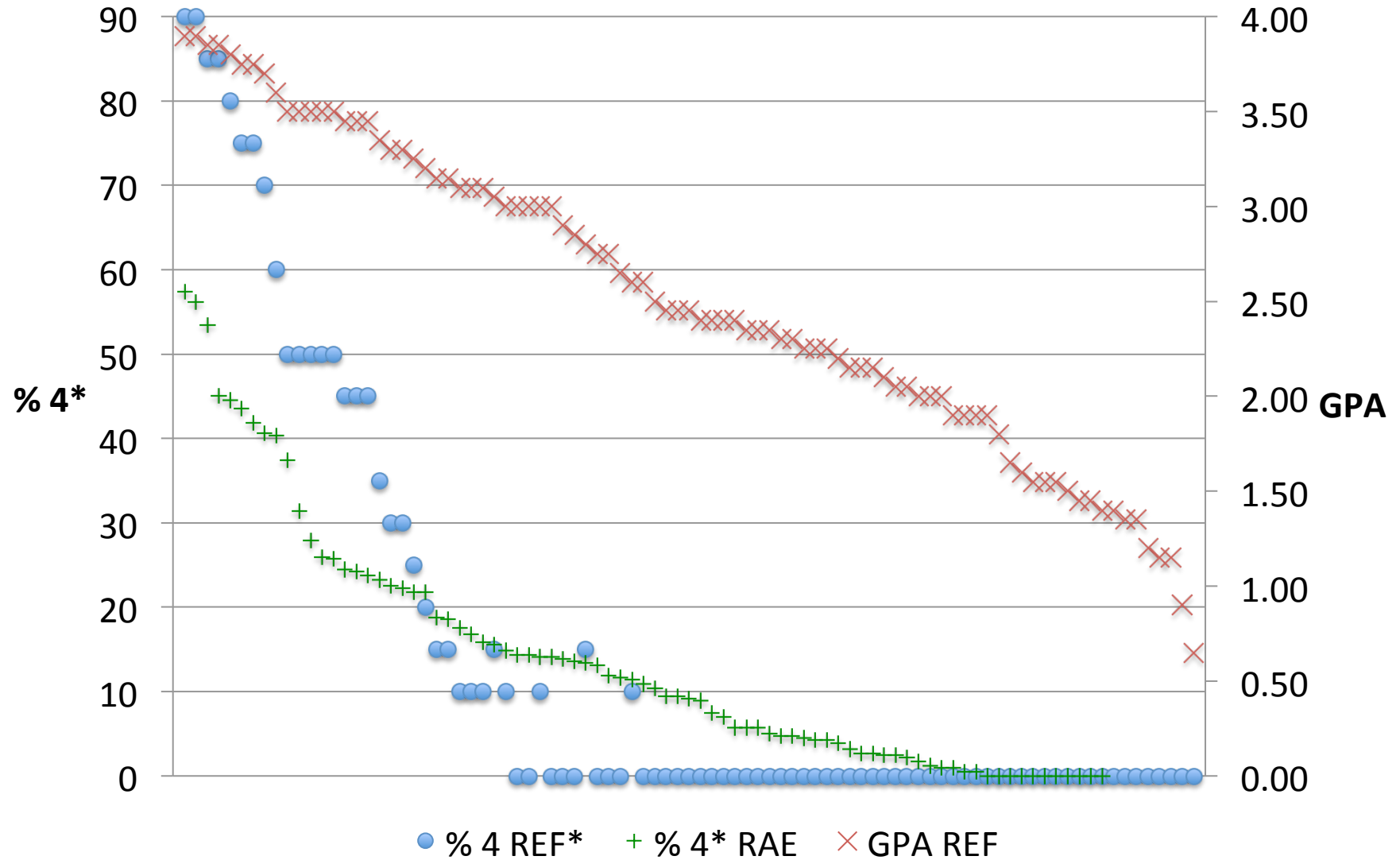
Income/FTE vs Environment GPA

$y = 202.87x - 240.24$
$R^2 = 0.78938$
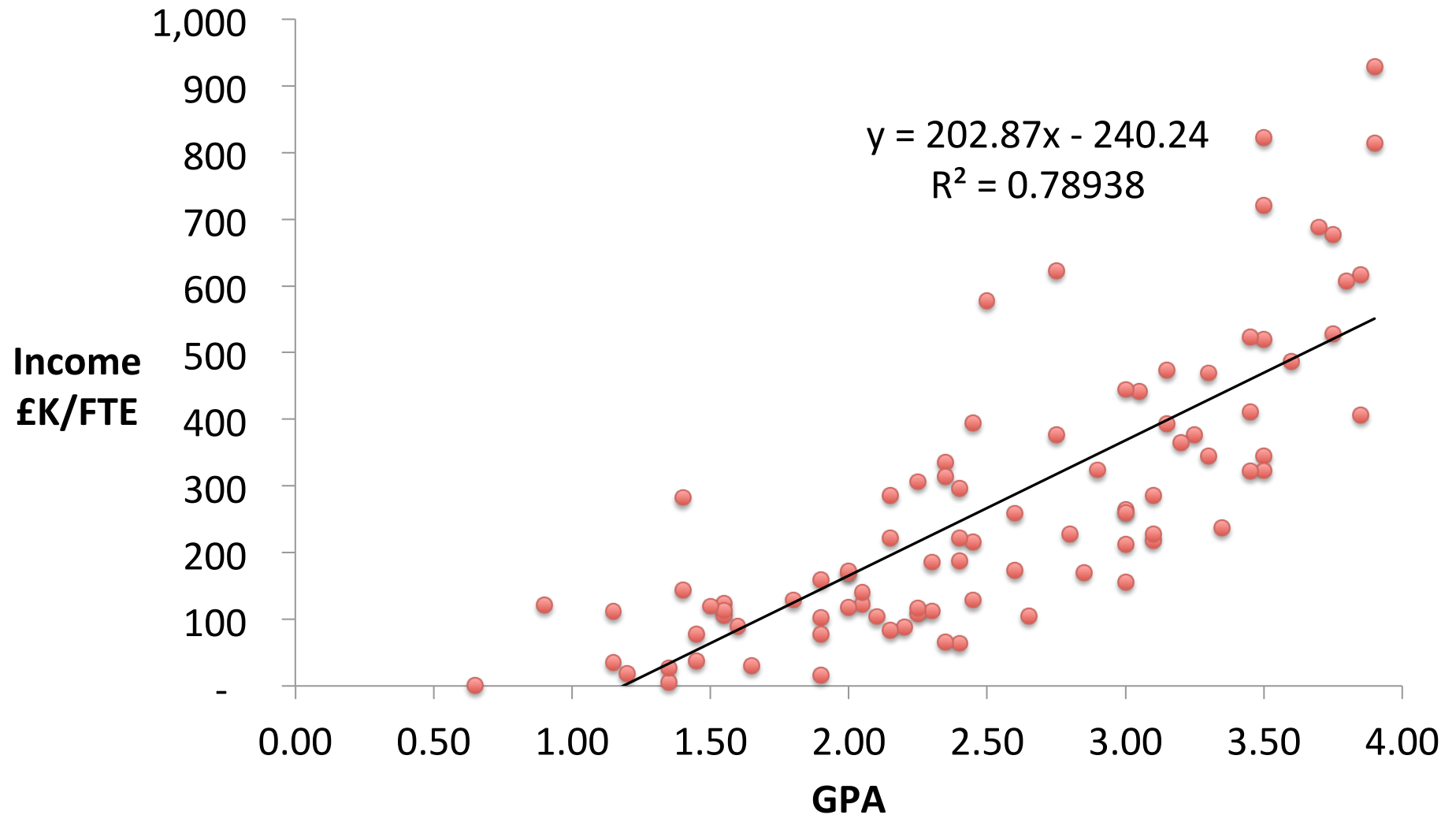
PhD/FTE vs Environment GPA
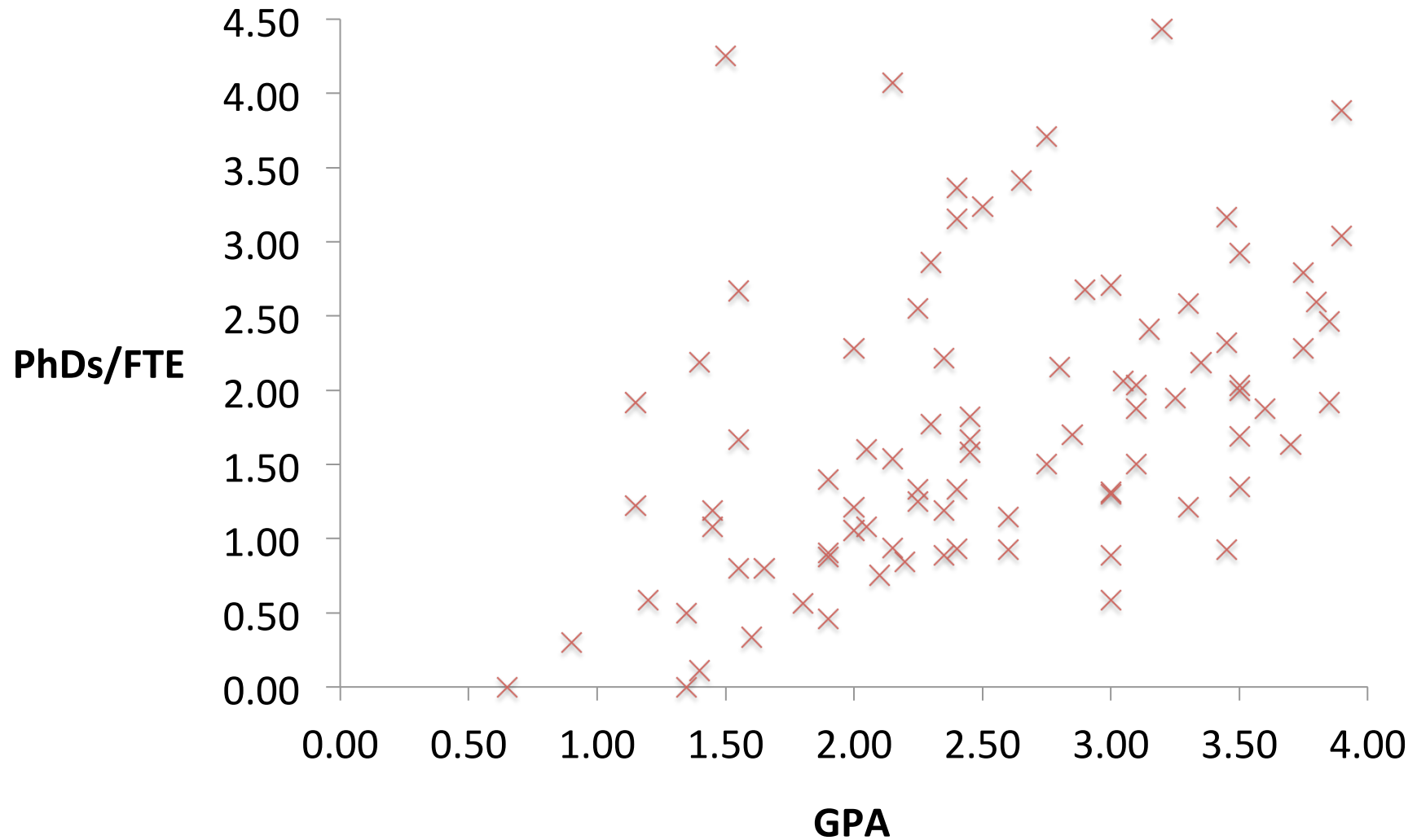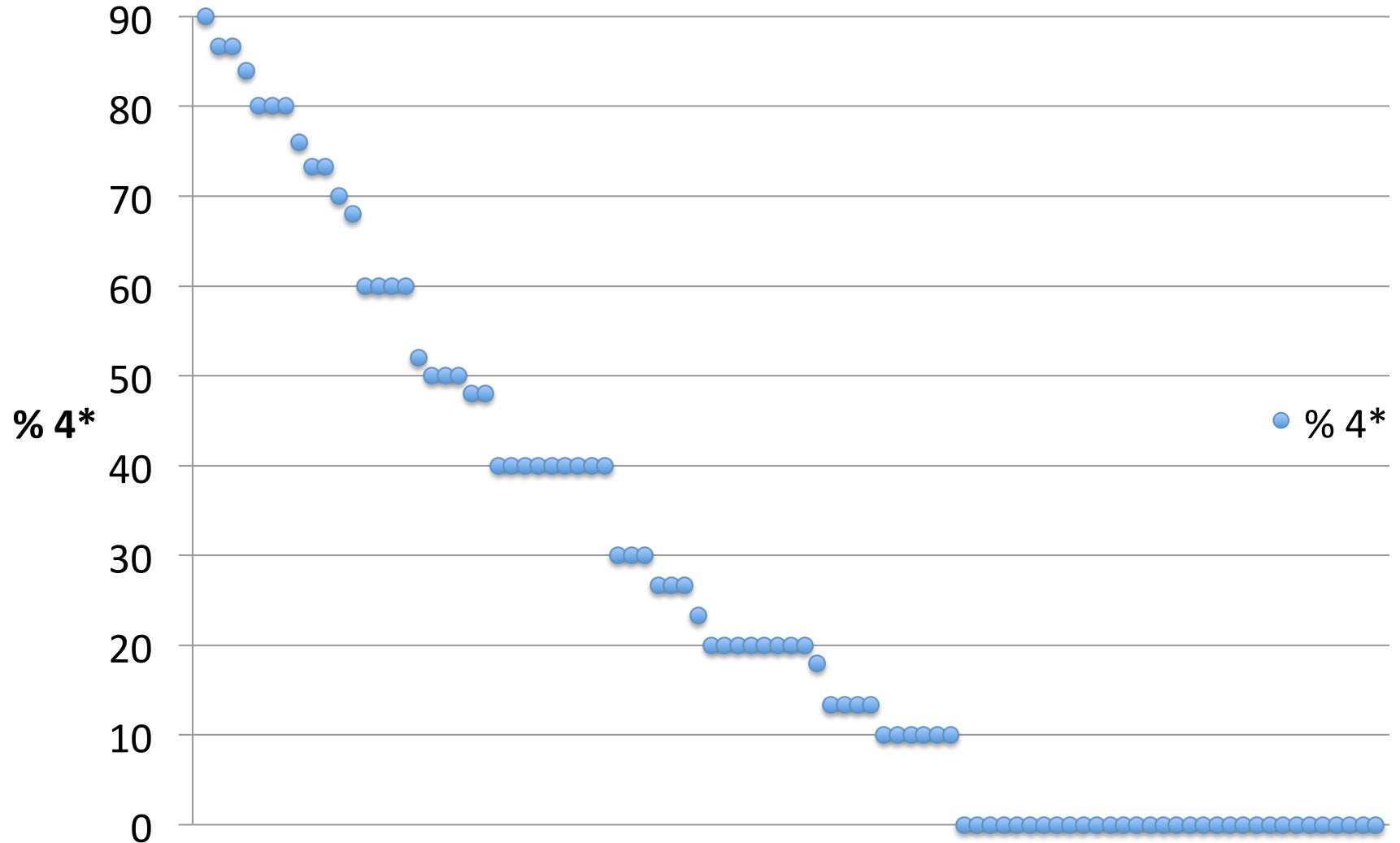
Impact Case Studies

- Wide range of case studies:
  Spinouts, social policy, exhibitions, standards, healthcare, industry and open source software tools etc.

- CPHC & UKCRC will do a report & web site on REF case studies

- Good case studies from Post 92 and other non Russell Group Universities.

Conclusions

- UK Computer Science is doing very well
- Excellent, world-leading publications in the best venues, often reflecting the inter-disciplinarity of the subject, with applications in life sciences, medicine, psychology, geoscience and physics
- Substantial inter-disciplinary research, particularly in life and medical science
- Many universities provide an outstanding environment conducive to world leading research. Good numbers of ECRs and PhDs awarded
- Computing research has had substantial impact on UK and other industries as well as societal impact e.g. via healthcare applications