Complementary material for "Compatibility Prediction of Eclipse Plug-ins Over New Eclipse Releases"

John Businge, Alexander Serebrenik, Mark van den Brand
Eindhoven University of Technology
Eindhoven, The Netherlands
{*j.businge,a.serebrenik,m.g.j.v.d.brand*}*@tue.nl*

This document presents tables and figures accompanying the paper "Compatibility Prediction of Eclipse Plug-ins Over New Eclipse Releases" by J. Businge, A. Serebrenik and M. G. J. van den Brand (to appear in 2012 IEEE 12th International Working Conference on Source Code Analysis and Manipulation (SCAM 2012), 23-24 September 2012—Riva del Garda, Trento, Italy).

					non-APIs from Eclipse Releases									
		Compatibility	# ETPs	Aggregation	1.0	2.0	2.1	3.0	3.1	3.2	3.3	3.4	3.5	3.6
ETPs Supported in Eclipse Releases	2.1	Failure	21	Median	2	1	0							
				Mean	3.7	2.9	0.1							
				Max	14	20	1							
				Min	0	0	0							
				Sum	77	60	3							
		Success	8	Median	1	0	0							
				Mean	2	0	0							
				Max	3	2	0							
				Min	1	0	0							
				Sum	12	2	0							
	3.0	Failure	29	Median	2	2	0	1						
				Mean	3.9	4.6	1.1	2						
				Max	24	24	11	17						
				Min	0	0	0	0						
				Sum	113	134	31	58						
		Success	19	Median	2	0	0	0						
				Mean	1.8	0.8	0.2	0.1						
				Max	5	6	2	1						
				Min	0	0	0	0						
				Sum	34	16	4	2						
	3.1	Failure	20	Median	4	3	0	2	0					
				Mean	4	5	1	3	1					
				Max	12	20	2	7	7					
				Min	0	0	0	0	0					
				Sum	75	93	13	50	12					
		Success	14	Median	1.5	0	0	0	0					
				Mean	1.6	0.4	0.1	0.5	0					
				Max	4	3	1	4	0					
				Min	0	0	0	0	0					
				Sum	23	5	1	7	0					
	3.2	Failure	24	Median	2.5	1	0	2	0	0				
				Mean	5.8	4.5	0.5	2.3	1.4	0.5				
				Max	32	20	2	8	11	4				
				Min	0	0	0	0	0	0				
				Sum	139	107	13	55	34	11				
		Success	16	Median	2	0	0	0	0	0				
				Mean	2.2	0.0	0.1	0.3	0.1	0				
				Max	8	3	1	2	1	0				
				Min	1	0	0	0	0	0				
				Sum	35	10	2	4	2	0				
	3.3	Failure	18	Median	5	2	0	3	1.5	0	0			
				Mean	5.2	3.4	0.6	6.2	3.8	1.4	1.4			
				Max	12	12	3	45	20	10	14			
				Min	0	0	0	0	0	0	0			
				Sum	93	62	11	111	68	26	26			
		Success	20	Median	2	0	0	0	0	0	0			
				Mean	2.9	0.6	0.2	0.3	0.2	0.1	0			
				Max	9	3	1	2	1	2	0			
				Min	0	0	0	0	0	0	0			
				Sum	58	12	4	5	3	2	0			
	3.4	Failure	8	Median	6	6.5	0	3.5	2	1	0	0		
				Mean	5.6	5.5	0.5	3.9	1.6	0.8	0	0.4		
				Max	12	10	2	8	4	2	0	2		
				Min	0	0	0	0	0	0	0			
				Sum	45	44	4	31	13	6	0	3		
		Success	28	Median	1.5	0	0	0	0	0	0	0		
				Mean	2.3	1.8	0.3	0.9	0.5	0.3	0.3	0.1		
				Max	13	15	2	5	7	6	5	2		
				Min	0	0	0	0	0	0	0	0		
				Sum	65	50	8	24	14	8	9	4		
	3.5	Failure	10	Median	1.5	0	0	0	0	0	0	0	0	
				Mean	2.3	1.8	0.3	0.9	0.5	0.3	0.3	0.1	0	
				Max	16	17	4	12	17	6	5	3	0	
				Min	0	0	0	0	0	0	0	0	0	
				Sum	65	50	8	24	14	8	9	4	0	
		Success	23	Median	1	0	0	0	0	0	0	0	0	
				Mean	2	2.3	0.1	1.5	0.9	0.1	0.1	0.1	0	
				Max	10	15	1	8	6	1	2	2	0	
				Min	0	0	0	0	0	0	0	0	0	
				Sum	45	53	3	34	20	3	2	2	0	
	3.6	Failure	2	Median	17	3	2	7	9	2	0	4	1	0
				Mean	17	3	2	7	9	2	0	4	1	0
				Max	20	5	4	13	17	3	0	7	1	0
				Min	14	1	0	1	1	1	0	0	0	0
				Sum	34	6	4	14	18	4	0	8	2	0
		Success	28	Median	1	1	0	0	0	0	0	0	0	0
				Mean	2	3	1	1	1	1	0	0	0	0
				Max	10	19	2	12	10	6	5	2	0	0
				Min	0	0	0	0	0	0	0	0	0	0
				Sum	64	77	14	38	27	16	6	4	0	0

Table I: The descriptive statistics of non-APIs in ETPs supported in the different Eclipse releases.

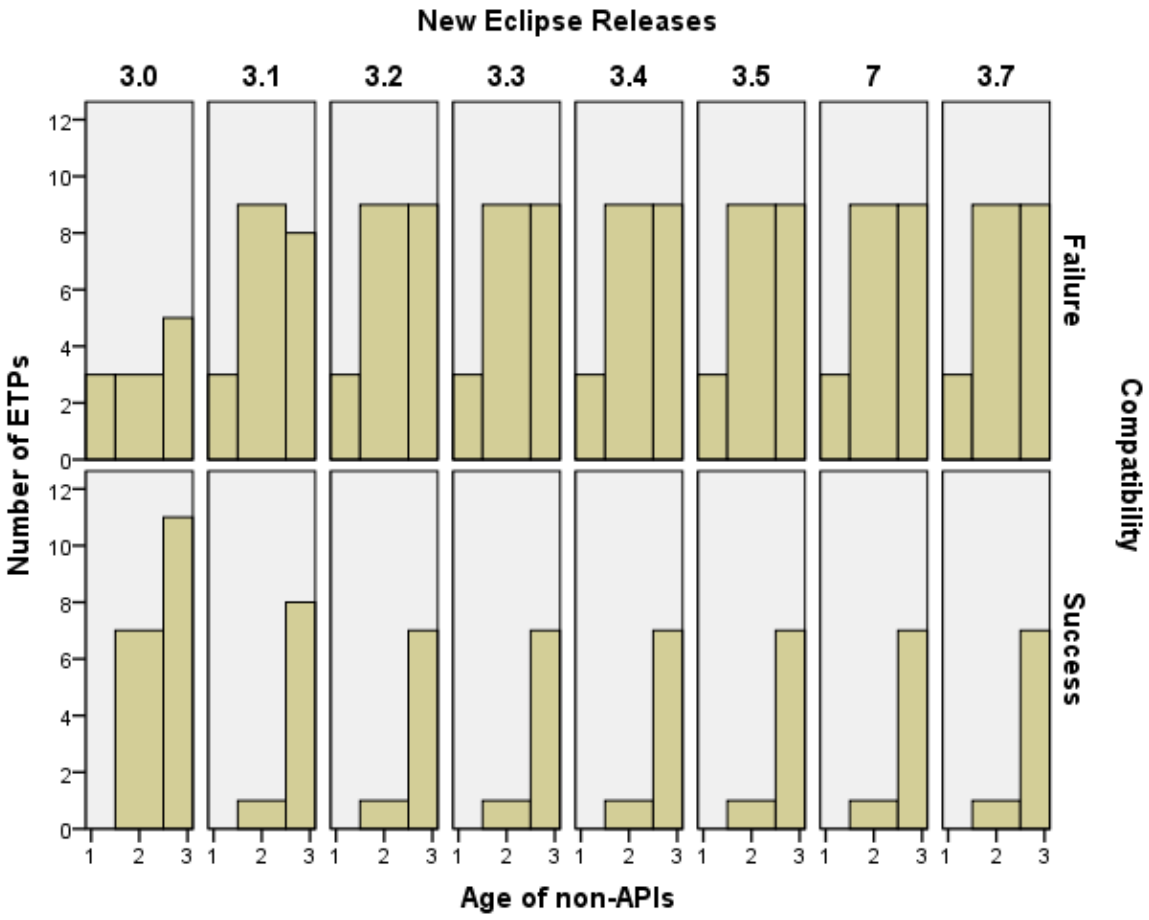

Figure 1: Histograms showing the source compatibility trends of ETPs supported in SDK 2.1

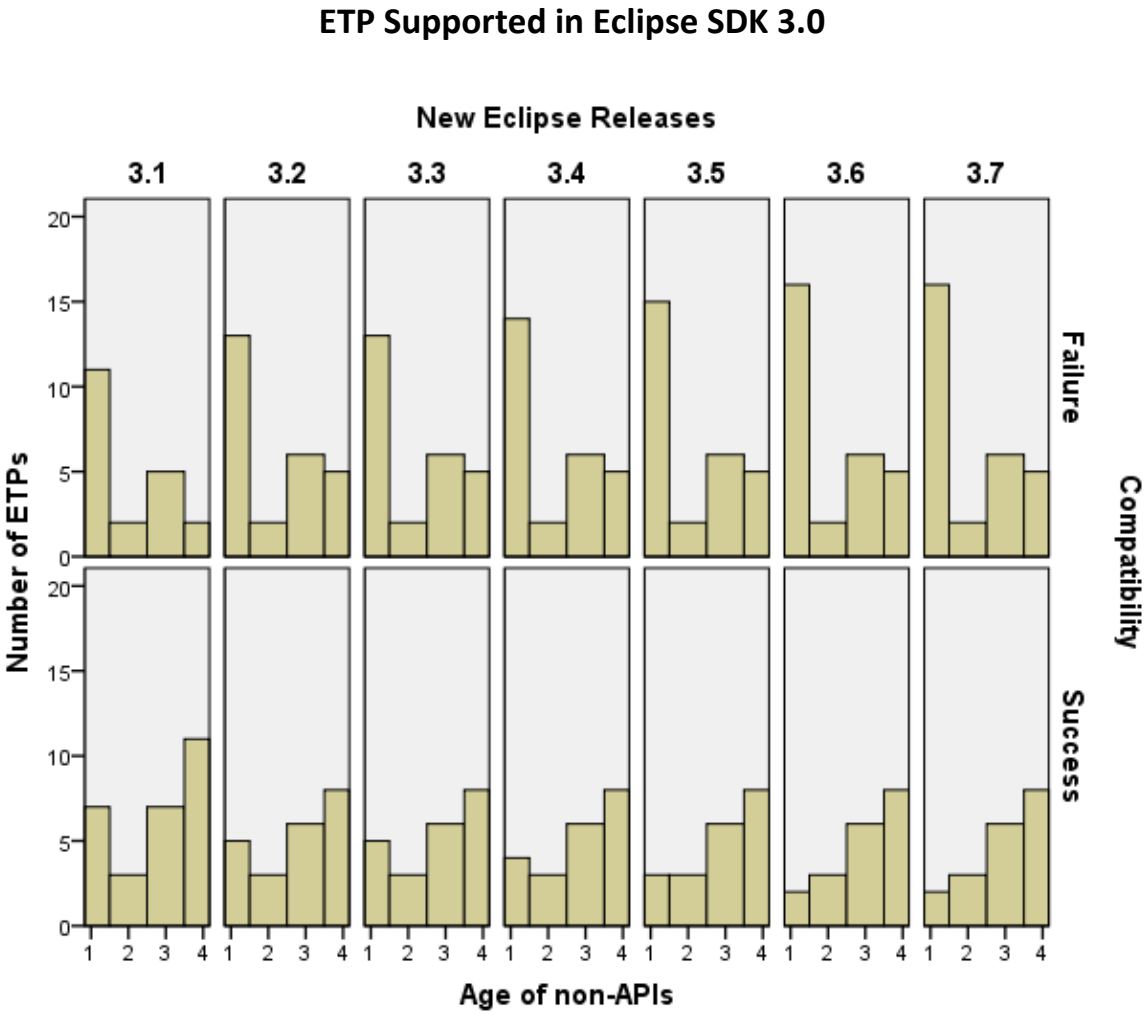

Figure 2: Histograms showing the source compatibility trends of ETPs supported in SDK 3.0

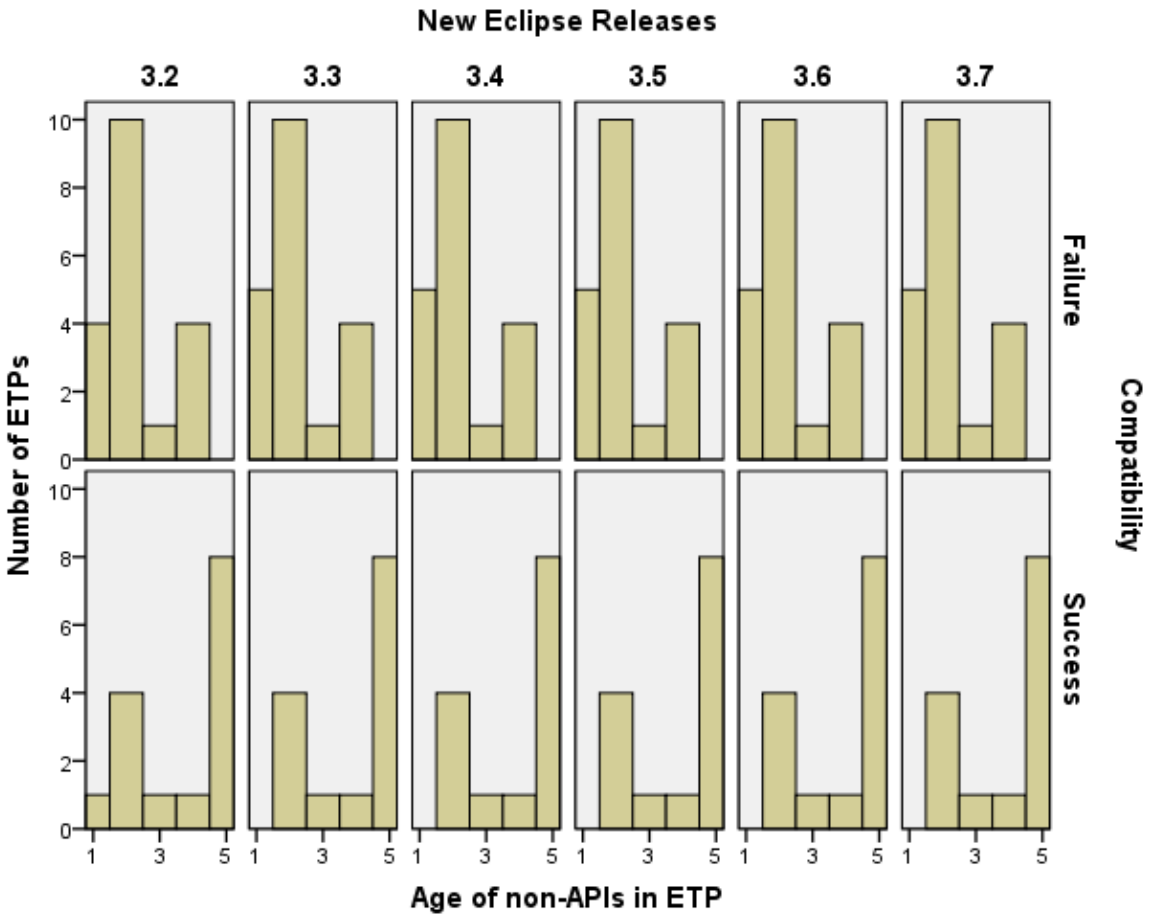

Figure 3: Histograms showing the source compatibility trends of ETPs supported in SDK 3.1

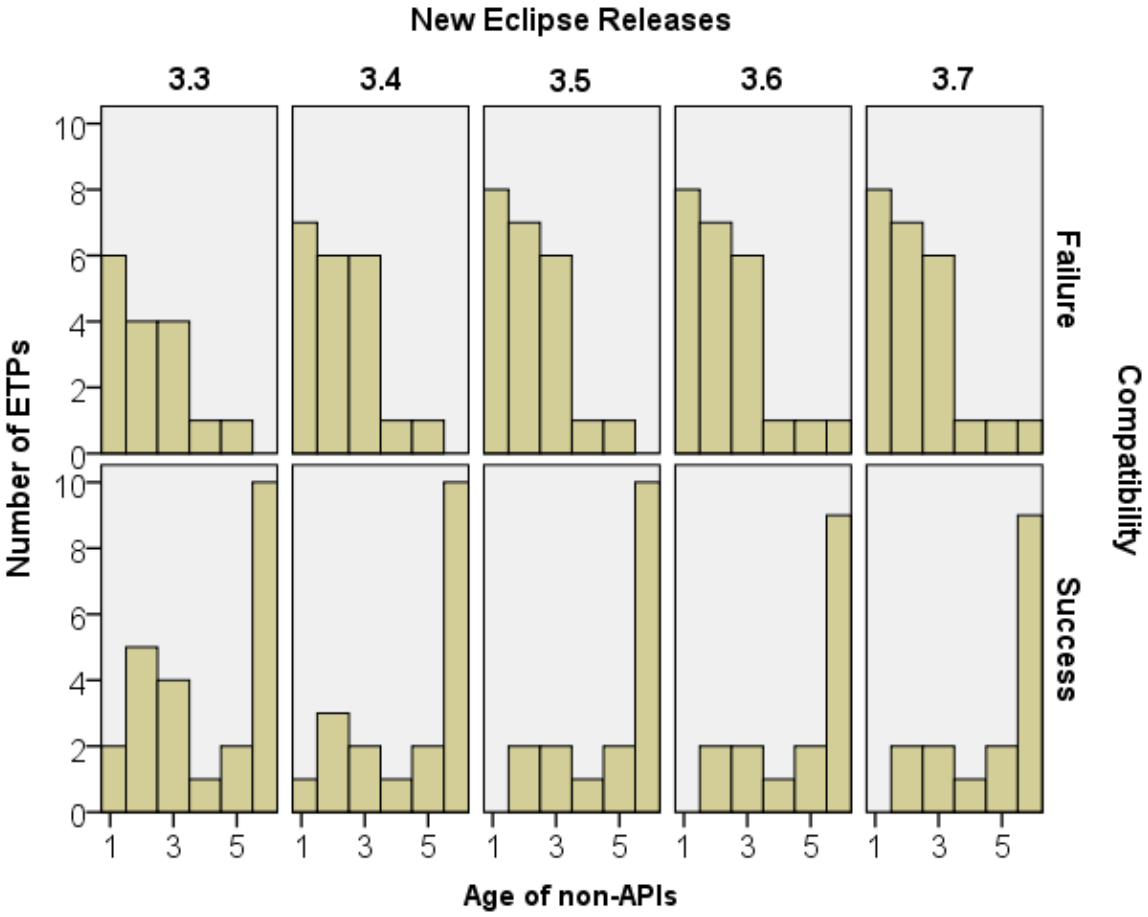

Figure 4: Histograms showing the source compatibility trends of ETPs supported in SDK 3.2

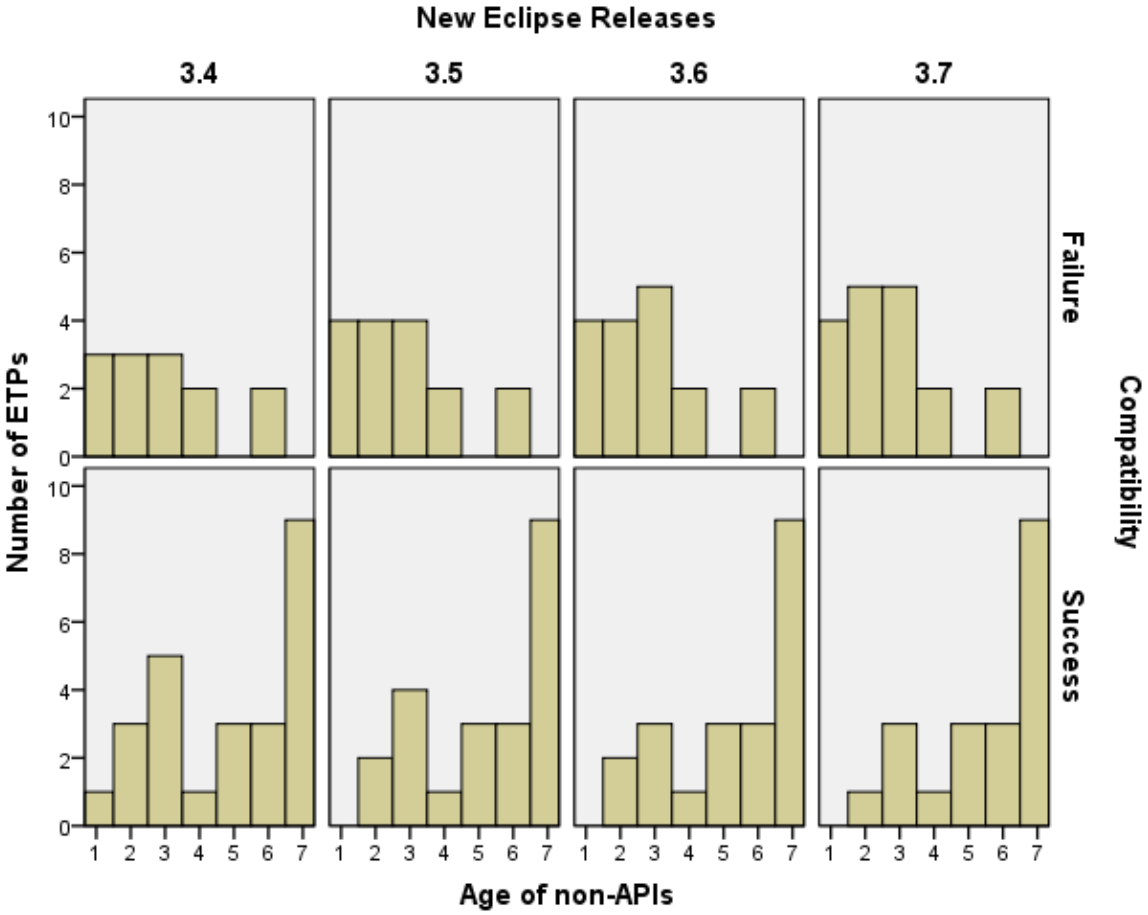

Figure 5: Histograms showing the source compatibility trends of ETPs supported in SDK 3.3

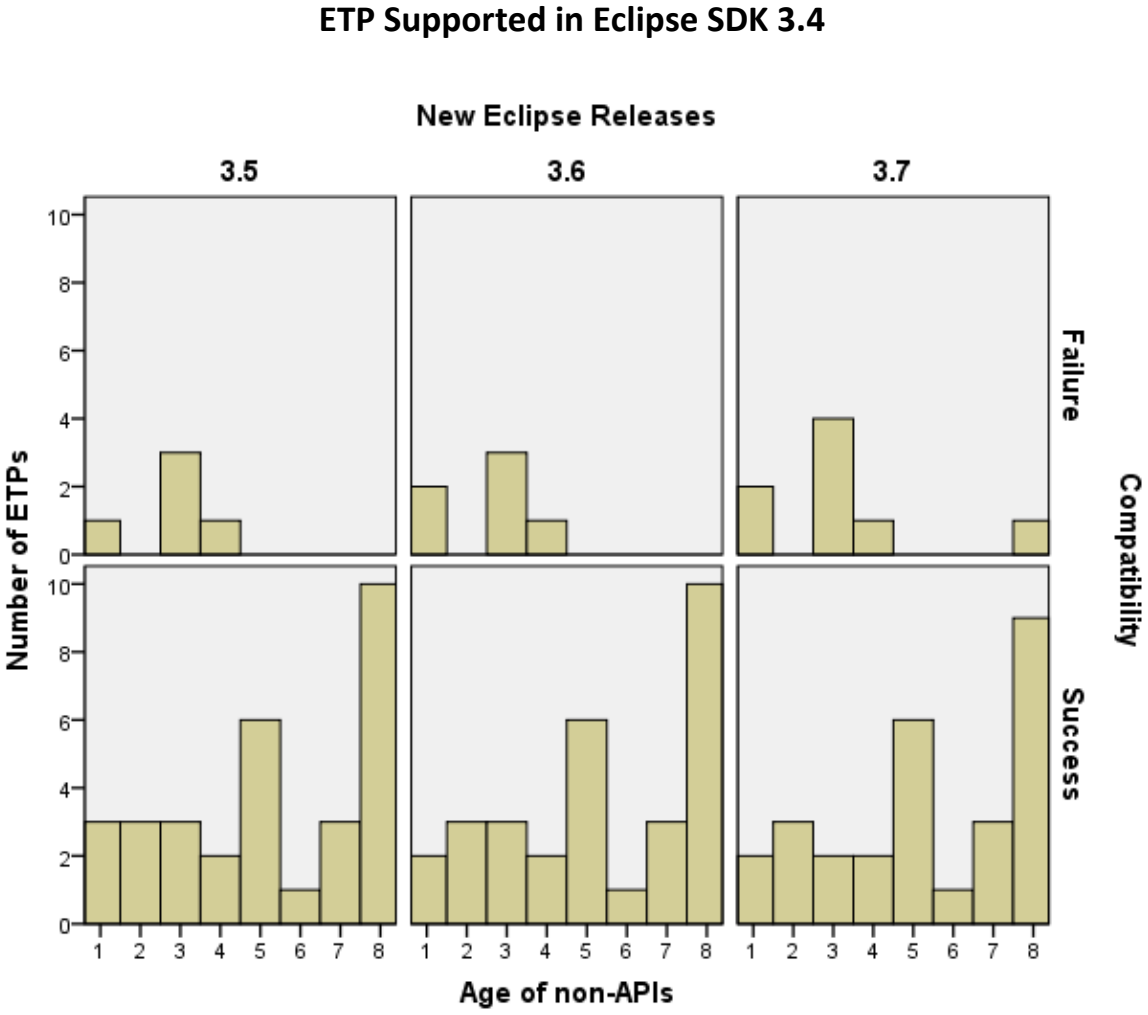

Figure 6: Histograms showing the source compatibility trends of ETPs supported in SDK 3.4

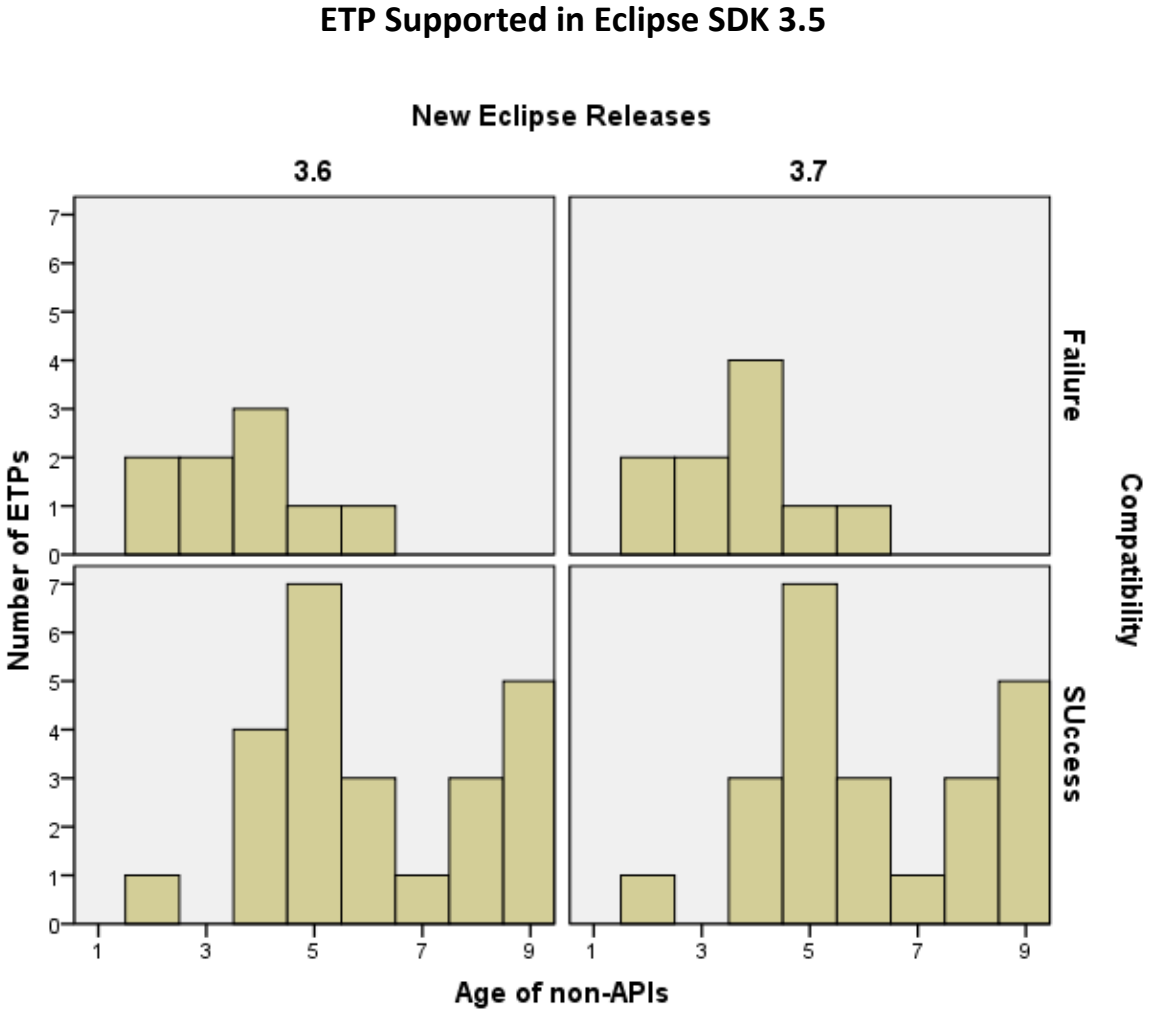

Figure 7: Histograms showing the source compatibility trends of ETPs supported in SDK 3.5

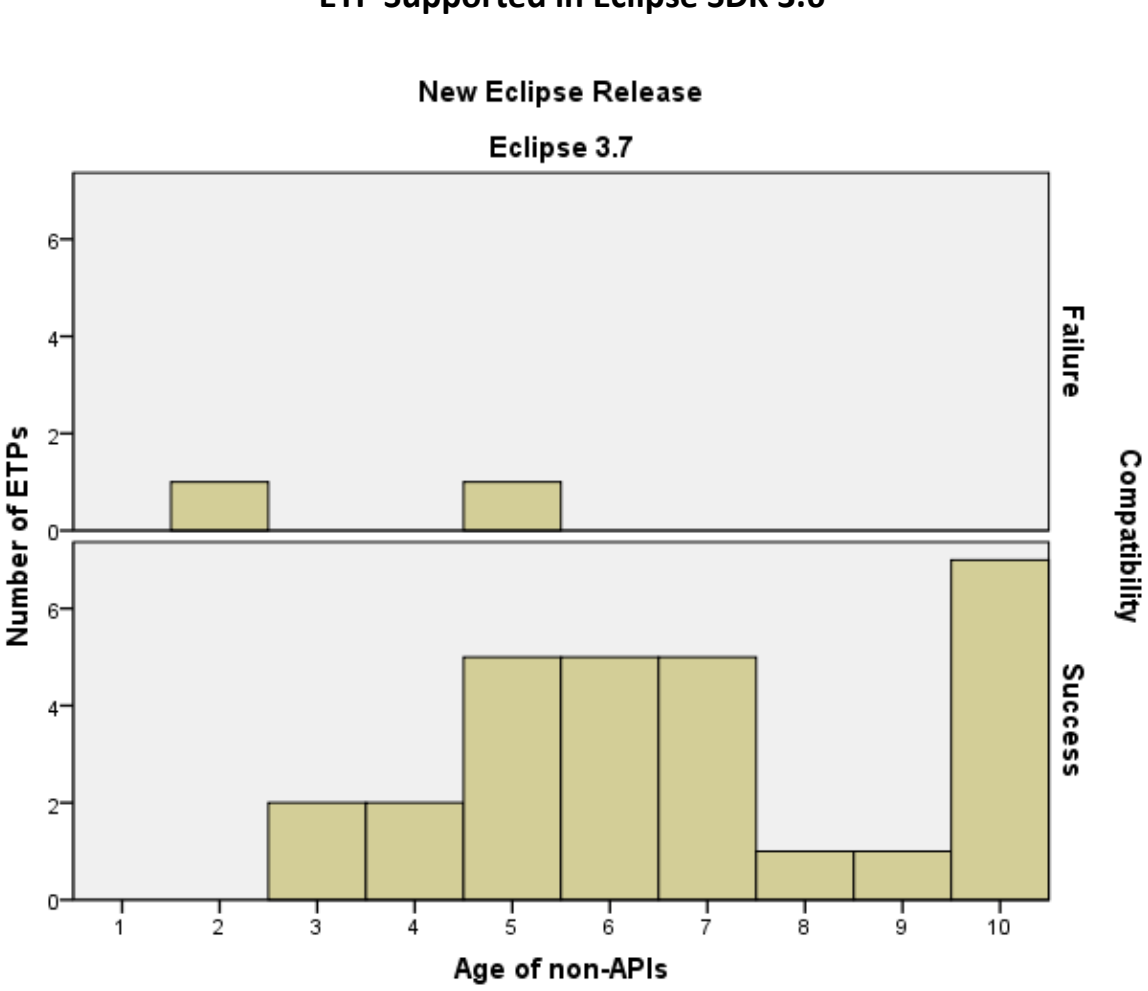

Figure 8: Histograms showing the source compatibility trends of ETPs supported in SDK 3.6

		Predictor variables								
SDK support	**New SDKs**	**1.0**	**2.0**	**2.1**	**3.0**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**
2.1	**3.0**	1	1	0						
	3.1	1	1	0						
	3.2	1	1	0						
	3.3	1	1	0						
	3.4	1	1	0						
	3.5	1	1	0						
	3.6	1	1	0						
	3.7	1	1	0						
3.0	**3.1**	1	1	0	0					
	3.2	1	1	0	0					
	3.3	1	1	0	0					
	3.4	0	1	0	1					
	3.5	0	1	0	1					
	3.6	0	1	0	1					
	3.7	0	1	0	1					
3.1	**3.2**	0	1	0	0	0				
	3.3	1	1	0	1	0				
	3.4	1	1	0	1	0				
	3.5	1	1	0	1	0				
	3.6	1	1	0	1	0				
	3.7	1	1	0	1	0				
3.2	**3.3**	1	1	0	0	1	1			
	3.4	1	0	1	0	0	1			
	3.5	0	0	0	1	0	0			
	3.6	0	0	0	1	0	0			
	3.7	1	0	0	1	0	0			
3.3	**3.4**	1	0	0	1	0	0	0		
	3.5	1	0	0	1	1	0	0		
	3.6	1	0	0	1	1	0	0		
	3.7	0	1	0	1	0	0	0		
3.4	**3.5**	1	0	0	1	0	0	0	0	
	3.6	1	0	0	1	0	0	0	0	
	3.7	0	0	0	1	0	0	0	0	
3.5	**3.6**	0	0	1	0	0	1	0	0	0
	3.7	1	1	0	1	0	1	0	0	0
Selected significant		**25**	**24**	**2**	**20**	**3**	**4**	**0**	**0**	**0**
Total selected		**35**	**35**	**35**	**27**	**20**	**14**	**9**	**5**	**2**
Percentage		**71,4**	**68,6**	**5,7**	**74,1**	**15,0**	**28,6**	**0,0**	**0,0**	**0,0**

Each SDK support has got a model in the new SDKs

1 = predictor variable significant in the model

0 = predictor variable insignificant in the model

Percentage = Selected Significant/Total Selected %

Figure 9: The frequency of the predictor variables in the models. Significant–number of times a predictor variable was considered significant, Total–number of times a predictor was used to build the model.

		3.0		3.1		3.2-3.7	
		β	Sig	β	Sig	β	Sig
2.1	1.0	**-0.318**	**.089**	**-0.747**	**.122**	**-0.592**	**.160**
	2.0	**-0.388**	**.101**	**-1.133**	**.175**	**-0.886**	**.227**
	2.1	–	–	–	–	–	–
	const	**2.301**	**.008**	**1.472**	**.149**	**0.899**	**.327**

Table II: Prediction variables for ETPs supported in Eclipse 2.1 in in new Eclipse releases

		3.1		3.2-3.3		3.4		3.5		3.6-3.7	
		β	Sig	β	Sig	β	Sig	β	Sig	β	Sig
3.0	1.0	**-0.342**	**.021**	**-0.257**	**.086**	-0.183	.252	-0.124	.459	-0.275	.062
	2.0	**-0.248**	**.033**	**-0.399**	**.021**	**-0.420**	**.028**	**-0.431**	**.028**	**-0.430**	**.032**
	2.1	0.098	.798	0.388	.353	0.282	.529	0.068	.891	.350	.487
	3.0	-0.028	.926	-0.302	.362	**-0.702**	**.071**	**-1.315**	**.033**	**-1.669**	**.031**
	const	**1.924**	**.002**	**1.270**	**.025**	**0.944**	**.044**	**1.057**	**.032**	**1.008**	**.042**

Table III: Prediction variables for ETPs supported in Eclipse 3.0 in in new Eclipse releases

		3.2		3.3-3.7	
		β	Sig	β	Sig
3.1	1.0	-0.320	.211	**-1.178**	**.027**
	2.0	**-0.786**	**.017**	**-1.262**	**.015**
	2.1	-1.418	.198	-1.018	.387
	3.0	-0.220	.532	**-1.102**	**.065**
	3.1	0.383	.677	–	–
	const	**0.972**	**.071**	**5.409**	**.010**

Table IV: Prediction variables for ETPs supported in Eclipse 3.1 in in new Eclipse releases

		3.3		3.4		3.5		3.6-3.7	
		β	Sig	β	Sig	β	Sig	β	Sig
3.2	1.0	**-0.366**	**.025**	**-0.324**	**.033**	-0.184	.351	-0.130	.473
	2.0	**-0.368**	**.106**	-0.021	.836	-0.107	.649	-0.092	.651
	2.1	-1.169	.222	**-2.588**	**.012**	-1.280	.223	-1.075	.292
	3.0	0.755	.149	0.111	.810	**-2.025**	**.002**	**-1.804**	**.004**
	3.1	**1.503**	**.050**	0.318	.394	0.128	.892	0.034	.970
	3.2	**-2.550**	**.038**	**-2.944**	**.027**	–	–	–	–
	const	**2.201**	**.004**	**2.234**	**.004**	**1.349**	**.018**	**1.047**	**.048**

Table V: Prediction variables for ETPs supported in Eclipse 3.2 in in new Eclipse releases

		3.4		3.5		3.6		3.7	
		β	Sig	β	Sig	β	Sig	β	Sig
3.3	1.0	**-0.397**	**.009**	**-0.302**	**.073**	**-0.252**	**.128**	-0.237	.183
	2.0	-0.005	.995	-0.023	.978	0.039	.878	**-0.905**	**.039**
	2.1	-0.669	.527	-0.344	.778	-0.131	.920	1.024	.505
	3.0	**-0.457**	**.034**	**-0.681**	**.038**	**-0.884**	**.027**	**-1.522**	**.029**
	3.1	0.265	.371	**-0.666**	**.109**	**-0.617**	**.155**	-0.397	.489
	3.2	-0.145	.746	0.091	.867	0.431	.464	0.499	.633
	3.3	-1.729	.344	–	–	–	–	–	–
	const	**3.267**	**.001**	**3.241**	**.003**	**3.008**	**.003**	**3.033**	**.002**

Table VI: Prediction variables for ETPs supported in Eclipse 3.3 in in new Eclipse releases. Variable 3.3 was omitted in 3.5-3.7 since it had very high S.E (indicates multi-collinearity between the predictors)

		3.5		3.6		3.7	
		β	Sig	β	Sig	β	Sig
3.4	1.0	**-0.462**	**.064**	**-0.235**	**.106**	-0.119	.336
	2.0	-0.840	.708	-0.109	.459	-0.086	.490
	2.1	-1.240	.382	0.137	.886	0.343	.649
	3.0	**-0.788**	**.065**	**-0.575**	**.035**	**-0.603**	**.008**
	3.1	0.903	.225	0.126	.729	-0.131	.717
	3.2	–	–	-0.009	.983	0.115	.782
	3.3	–	–	–	–	–	–
	3.4	–	–	–	–	–	–
	const	**6.770**	**.023**	**4.091**	**.001**	**2.480**	**.000**

Table VII: Prediction variables for ETPs supported in Eclipse 3.4 in in new Eclipse releases. Variable 3.3 was omitted in 3.5-3.7 since it had very high S.E (indicates multi-collinearity between the predictors)

		3.6		3.7	
		β	Sig	β	Sig
3.5	1.0	-0.139	.393	**-0.927**	**.067**
	2.0	-0.141	.243	**-0.528**	**.077**
	2.1	**-2.042**	**.068**	0.422	.904
	3.0	-0.050	.930	**0.867**	**.147**
	3.1	0.056	.883	-0.564	.373
	3.2	**-3.018**	**.028**	**-3.583**	**.088**
	3.3	1.274	.370	1.701	.554
	3.4	-0.973	.316	-1.309	.381
	3.5	–	–	–	–
	const	**3.293**	**.005**	**6.025**	**.020**

Table VIII: Prediction variables for ETPs supported in Eclipse 3.5 in in new Eclipse releases. None of the non-APIs present in the ETPs was introduced in Eclipse 3.5

		New SDK releases															
		3.0		3.1		3.2		3.3		3.4		3.5		3.6		3.7	
		S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
2.1	S	16	2	6	3	5	3	5	3	5	3	5	3	5	3	5	3
	F	4	7	1	19	2	19	2	19	2	19	2	19	2	19	2	19
3.0	S			24	4	16	6	16	6	17	4	16	4	16	3	16	3
	F			7	13	10	16	10	16	7	20	7	21	7	22	7	22
3.1	S					12	3	12	2	12	2	12	2	12	2	12	2
	F					6	13	1	19	1	19	1	19	1	19	1	19
3.2	S							22	2	15	4	14	3	13	3	13	3
	F							5	11	3	18	3	20	4	20	4	20
3.3	S									22	3	20	2	20	1	18	2
	F									6	7	3	13	3	14	3	15
3.4	S											30	1	29	1	26	2
	F											2	3	3	3	5	3
3.5	S													24	0	23	0
	F													4	5	1	9

Table IX: Classification results for model training. S–Compatibility, F–Incompatibility

	3.0			3.1			3.3			3.3			3.4			3.5			3.6			3.7		
	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R
2.1	79	89	80	86	67	86	83	63	71	83	63	71	83	63	71	83	63	71	83	63	71	83	63	71
3.0				77	86	77	67	73	62	67	73	62	77	81	71	77	80	70	79	84	70	79	84	70
3.1							74	80	67	91	86	92	91	86	92	91	86	92	91	86	92	91	86	92
3.2										83	92	81	83	79	83	85	82	82	83	81	76	83	81	76
3.3													76	88	79	87	95	87	89	95	87	87	90	86
3.4																92	97	94	89	97	91	81	93	84
3.5																			88	100	86	97	100	96

Table X: Error analysis for model training. A–Accuracy, P–Precision and R–Recall

			New SDK releases									
			3.3		3.4		3.5		3.6		3.7	
			S	F	S	F	S	F	S	F	S	F
3.2	OSP	S	41	3	37	6	35	7	35	6	35	6
		F	0	1	0	2	0	3	0	4	0	4
	AP	S	41	3	38	5	31	11	31	10	31	10
		F	0	1	0	2	0	3	0	4	0	4
3.3	OSP	S			61	1	59	0	56	1	53	4
		F			3	3	5	4	6	5	5	6
	AP	S			61	1	59	0	56	1	53	4
		F			3	3	4	5	6	5	2	9
3.4	OSP	S					82	0	79	0	79	0
		F					5	0	6	2	6	2
	AP	S					81	1	79	0	79	0
		F					3	2	6	2	4	4
3.5	OSP	S							102	6	96	9
		F							4	0	4	3
	AP	S							97	11	96	9
		F							3	1	3	4

Table XI: Classification results for model testing. S–Compatibility, F–Incompatibility, OSP–Only significant predictors, AP–all predictors ignoring the significance.

		3.3			3.4			3.5			3.6			3.7		
		A	P	R	A	P	R	A	P	R	A	P	R	A	P	R
3.2	OSP	93	93	100	87	86	100	84	83	100	87	86	100	87	86	100
	AP	91	93	98	89	88	100	76	74	100	76	76	100	76	76	100
3.3	OSP				94	98	95	93	100	92	90	98	90	87	93	91
	AP				94	98	95	94	100	94	90	98	90	91	93	96
3.4	OSP							94	100	94	93	100	93	93	100	93
	AP							95	98	96	93	100	93	95	100	95
3.5	OSP										91	94	96	88	91	96
	AP										88	90	97	89	91	97

Table XII: Error analysis for model testing. A–Accuracy, P–Precision and R–Recall, OSP–Only significant predictors, AP–all predictors ignoring the significance.