1 Assessment Outcomes

The tables below present the outcomes of our assessments on the different cases. Note that we present the assessments of three cases here, while in the paper we only discuss two of our cases.

Table 1: Coupling metrics of M1 and M2.

refactor	service A	service B	\mathbf{CC}	$\mathrm{CC}_{\mathrm{A} o\mathrm{B}}$	$CC_{B o A}$	support	\mathbf{sc}
pre M1	S2.2.1	S2.2.2	0.67	0.82	0.58	258	-
pre M2	S2.3.1	S2.3.3	0.74	0.68	0.81	78	-
pre M2	S2.3.2	S2.3.3	0.48	0.76	0.35	34	-
pre M2	S2.3.2	S2.3.1	0.45	0.8	0.32	36	-

Table 2: Average metric values for entire application (M1 and M2)

refactor	avg CC	avg SC	avg LOC	avg WSIC	avg SIDC	avg CF
pre M1	0.31	-	34540.90	-	-	27.34
pre M2	0.31	-	34540.90	-	-	27.34

Table 3: Cohesion and size metrics of M1 and M2

refactor	service	\mathbf{LOC}	WSIC	SIDC	CF
pre M1	S2.2.1	36745	24	0.0054	46.36
pre M1	S2.2.2	175942	-	-	87.21
pre M2	S2.3.1	14021	-	-	15.93
pre M2	S2.3.2	1155	2.00	0.5	4.52
pre M2	S2.3.3	2167	-	-	11.37

Table 4: Coupling metrics of D1 and D2

refactor	service A	service B	CC	$\mathrm{CC}_{\mathrm{A} o\mathrm{B}}$	$\mathrm{CC}_{\mathrm{B} o\mathrm{A}}$	support	$\overline{\mathbf{sc}}$
pre D1	-	-	-	-	-	-	-
post D1	S1.1.3	S1.1.2	0,60	0,93	$0,\!45$	14	0,75
pre D2	-	-	-	-	-	-	-
post $D2$	S2.4.2	S2.4.3	0,3	0,52	0,21	12	-
post $D2$	S2.4.1	S2.4.3	$0,\!25$	$0,\!56$	$0,\!16$	9	-
post D2	S2.4.2	S2.4.1	$0,\!15$	0,13	0,19	3	-

Table 5: Average metric values for the entire application (D1 and D2)

refactor	avg CC	avg SC	avg LOC	avg WSIC	avg SIDC	avg CF
pre D1	1.00	-	632.50	-	-	1.00
post D1	0.60	-	399.00	-	-	1.93
pre D2	0.31	-	37696.39	-	-	34.24
post $D2$	-	-	-	-	-	-

Table 6: Cohesion and size metrics of D1 and D2

refactor	service	LOC	WSIC	SIDC	CF
pre D1	S1.1.1	417.00	4.00	0.5	9
post D1	S1.1.3	93.00	-	-	1.07
post D1	S1.1.2	279.00	4.00	0.5	2.8
pre D2	S2.4.1	166981.00	-	-	154.36
post $D2$	S2.4.1	172167.00	-	-	84
post $D2$	S2.4.2	4396.00	-	-	82
post $D2$	S2.4.3	19417	-	-	201

Table 7: Coupling metrics for H1, R2.1 and H2

refactor	service A	service B	CC	$CC_{A o B}$	$CC_{B o A}$	support	\mathbf{sc}
pre H1	S1.2.2	S1.2.1	0.66	0.64	0.7	7	0
pre/post R2.1	see GitHub page	-					
pre H2	S2.5.1	S2.5.2	0.89	0.91	0.89	201	-
post H2	S2.5.1	S2.5.2	0.92	0.86	1	6	-
post H2	S2.5.2	S2.5.3	0.92	1	0.86	6	-
post H2	S2.5.1	S2.5.3	0.85	0.86	0.86	6	-

Table 8: Average metric values for entire application (H1, R2.1 and H2)

refactor	avg CC	avg SC	avg LOC	avg WSIC	avg SIDC	avg CF
pre H1	0.66	0	951.50	-	_	2.05
pre $R2.1$	0.14	-	37.349.75	-	-	24.86
post $R2.1$	0.31	-	34.540.90	-	-	27.34
pre H2	0.31	-	34.540.90	-	-	27.34
post H2	-	-	-	-	-	-

Table 9: Cohesion and size metrics for H1, R2.1 and H2 $\,$

refactor	service	LOC	WSIC	SIDC	CF
pre H1	S1.2.2	1189.00	-	-	1.3
pre H1	S1.2.1	714.00	4.00	0.5	2.8
pre $R2.1$	S2.1.1	1510.00	-	-	6.61
pre $R2.1$	S2.1.2	38910.00	-	-	69.83
pre $R2.1$	S2.1.3	1.584.00	-	-	2.33
pre $R2.1$	S2.1.4	13.241.00	6	0.5	26.44
pre $R2.1$	S2.1.5	319	-	-	0.44
pre $R2.1$	S2.1.6	11345	8	0	1.11
pre $R2.1$	S2.1.7	74673	-	-	47.28
pre $R2.1$	S2.1.8	157216	-	-	44.83
post R2.1	S2.1.9	175942	-	-	87.21
post $R2.1$	S2.1.1	2544	-	-	26.5
post $R2.1$	S2.1.2	3370	-	-	91
post $R2.1$	S2.1.3	2640	18	0.5621	14.44
post $R2.1$	S2.1.10	2231	19	0.1023	16.25
post $R2.1$	S2.1.6	3533	24	0.0054	46.36
post R2.1	S2.1.7	2497	-	-	10.04
post $R2.1$	S2.1.8	3611	16	0.55	37.5
pre H2	S2.5.1	75592	29	0.2875	172
pre H2	S2.5.2	176040	-	-	170.73
post H2	S2.5.1	75943	29	0.2875	332.14
post H2	S2.5.2	171476	-	-	159.43
post H2	S2.5.3	383006	6	0.5	469.43

Table 10: Coupling metrics for a selection of the service pairs of Spinnaker

service A	service B	\mathbf{CC}	$\mathrm{CC}_{\mathrm{A}\to\mathrm{B}}$	$\mathrm{CC}_{\mathrm{B}\to\mathrm{A}}$	support
S3.0.4	S3.0.1	0,79	0,82	0,77	1582
S3.0.1	S3.0.3	0,77	0,69	0,87	1424
S3.0.4	S3.0.3	0,76	0,70	0,83	1355
S3.0.10	S3.0.2	$0,\!42$	0,50	$0,\!36$	288
S3.0.6	S3.0.9	$0,\!42$	0,38	$0,\!47$	223

Table 11: Cohesion and size metrics for the services S3.0.4, S3.0.1 and S3.0.3

service	LOC	WSIC	SIDC	\mathbf{CF}
S3.0.4	302131.00	-	-	67.13
S3.0.1	277895.00	-	-	143.72
S3.0.3	158256.00	-	-	63.44

Table 12: Average metric values for entire Spinnaker application

avg CC	avg SC	avg LOC	avg WSIC	avg SIDC	avg CF
35.89	-	96424.36	=	=	33.85

2 Validation

The tables below present the alignment between our assessment outcomes and the expected outcomes based on the observations from the experts.

Table 13: Framework supporting the interpretation of the metric values in different refactor contexts.

Metric	Merge	Decomposition
CC	pre: if the CC value between two services was 0.66 or more, this was regarded as evidence in favour of merging these ser- vices.	post: a CC value was considered to suggest that the decomposition of service A into services B and C had been beneficial for maintainability if the CC value between service B and C was 0.33 or less.
SC	pre: due to the lack of thresholds proposed in the literature to base the classification of SC values on, we can only reason about the alignment of the evolution of SC during a refactor and the evolution in maintainability experienced by the expert. In the case of a merge, one would expect the average SC to decrease as the number of entities to contribute to coupling decreases. An SC which is higher than the system average was regarded as evidence in favour of merging the involved services.	post: due to the lack of thresholds proposed in the literature to base the classification of SC values on, we can only reason about the alignment of the evolution of SC during a refactor and the evolution in maintainability experienced by the expert. In case of a decomposition, if the resulting services had an under-average SC, the refactor was regarded as beneficial for the maintainability of the system.
WSIC	pre: a WSIC was considered to contradict the suggestion of merging services A and B to be beneficial for maintainability if the WSIC of either service A or B fell within the lower 50% intervals as proposed by [?], i.e., if the WSIC was higher than 15.	pre: considering the thresholds calculated by [?], we regarded WSICs higher than 15 as supporting evidence for decomposing a service. post: services resulting from a decomposition were expected to have lower WSICs than their ancestor.

Table 13 continued from previous page SIDC pre: a SIDC value was considpre: considering the thresholds ered to contradict the suggescalculated by [?], we regarded tion of merging services A and SIDC values lower than 0.64 as B to be beneficial for maintainsupporting evidence for decomability if the SIDC of either serposing a service. vice A or B fell within the lower post: services resulting from a 50% intervals as proposed by decomposition were expected to [?], i.e., if the SIDC was lower have higher SIDCs than their than 0.64. ancestor. LOC pre: a LOC value was considpre: a LOC value of a service ered to contradict the suggeswhich was higher than the LOC tion of merging services A and of an average service in the sys-B to be beneficial for maintaintem was considered as support ability if the LOC value of eifor the decomposition of that ther service A or B was higher service. than the average LOC value of post: services resulting from all services in the system. a decomposition were expected to have lower LOC values than their ancestor. CF a CF was considered pre: if the CF of a service was to contradict the suggestion of higher than the average CF of merging services A and B to be all services in the system, this beneficial for maintainability if was considered as support for the CF of either service A or B the decomposition of that serwas higher than the average CF of all services in the system. post: services resulting from a decomposition were expected to have lower CFs than their an-

Table 14: Relation between the assessment outcomes and the expert's observations for the analysed merges.

cestor.

Metric	Assessment observations	Expectations based on expert's experiences
CC	Pre-M2: two of the services had a strong bidirectional change coupling, while the service pairs which included the third ser- vice had a lower change cou- pling which we classified as of regular strength.	Strong bidirectional change couplings were expected between the services.

Table 14 continued from previous page -M1: a strong change cou-

	Pre-M1: a strong change coupling was observed for the service pair involved in this refactor.	
SC	Pre-M2: SC could not be measured due to the event-driven nature of the system. Pre-M1: SC could not be measured due to the event-driven nature of the system.	Above-average SC values were expected between the services.
WSIC	Pre-M2: only S2.3.2 offered an interface, which had a WSIC of 2. Pre-M1: only S2.2.1 offered an interface, which had a WSIC of 24.	The WSIC of each service was expected to be lower than 15.
SIDC	Pre-M2: only S2.3.2 offered an interface, which had a SIDC of 0.5. Pre-M1: only S2.2.1 offered an interface, which had a SIDC of 0.0054.	The SIDC value of each service was expected to be higher than 0.64.
LOC	Pre-M2: each service had an under-average LOC value. Pre-M1: both services had a LOC value which was higher	The LOC value of each service was expected to be under average.
CF	than the average of the system. Pre-M2: each service had an under-average CF. Pre-M1: both services had a CF which was higher than the average of the system.	The CF of each service was expected to be under average.

Table 15: Relation between the assessment outcomes and the expert's observations for the analysed decompositions.

Metric	Assessment observations	Expectations based on expert's experiences
CC	Post-D1: the CC value of the service pair resulting from the decomposition is 0.6, which we classified as of regular strength rather than weak. Post-D2: the CC values of the service pairs resulting from the decomposition could all be classified as weak.	Post-refactor, weak bidirectional change couplings were expected between the services.
SC	Post-D1: the SC between the resulting service pair was 0.75, but as we lacked averages due to this being the only service pair in the system, this value was not conclusive. Post-D2: SC could not be measured due to the event-driven nature of the system.	Post-refactor, under-average SC values were expected between the services.
WSIC	Pre-D1: the service had a WSIC of 4. Post-D1: only one of the services has an interface, also with a WSIC of 4. Pre- and post-D2: neither of the involved services offered an interface, so no WSIC could be determined.	Pre-refactor, a WSIC higher than 15 was considered an indication for decomposing. Post-refactor, the WSICs of the services resulting from the refactor were expected to be lower than the WSIC of the pre-refactor service.
SIDC	Pre-D1: the service had a SIDC of 0.5. Post-D1: only one of the services has an interface, also with a SIDC of 0.5. Pre- and post-D2: neither of the involved services offered an interface, so no SIDC could be determined.	Pre-refactor, a SIDC lower than 0.64 was considered an indication for decomposing. Post-refactor, the SIDC values of the services resulting from the refactor were expected to be higher than the SIDC of the pre-refactor service.

Table 15 continued from previous page

LOC

Pre-D1: the service had an under-average LOC.

Post-D1: the LOC values of the services resulting from the decomposition were lower than the LOC of the pre-refactor service.

Pre-D2: the service had a LOC value which was above average. Post-D2: the LOCs of the services resulting from the decomposition were lower than the LOC of the pre-refactor service, except for the LOC of S2.4.1, which is only lower when only considering lines of Java.

CF Pre-D1: the service had an under-average CF.

Post-D1: the CFs of the services resulting from the decomposition were lower than the CF of the pre-refactor service.

Pre-D2: the service had a CF which was above average.

Post-D2: the CFs of the services resulting from the decomposition were lower than the CF of the pre-refactor service, except for the CF of the source-docs-policy.

Pre-refactor, an above-average LOC was considered an indication for decomposing.

Post-refactor, the LOC values of the services resulting from the refactor were expected to be lower than the LOC value of the pre-refactor service.

Pre-refactor, an above-average CF was considered an indication for decomposing.

Post-refactor, the CFs of the services resulting from the refactor were expected to be lower than the CF of their ancestor.

Table 16: Relation between the assessment outcomes and the expert's observations for the analysed hybrid refactors.

Metric	Assessment observations		Expectations based on expert's experiences
CC	Pre-H1: the two involved services exhibited strong bidirectional change couplings. Pre-H2: a strong change coupling was observed for the service pair involved in this refactor.	Post-H1: this measurement was not feasible as H1 was never implemented. Post-H2: strong change coupling values, higher than the change coupling of the pre-refactor service-pair, were observed between the services.	Pre-refactor, regular to strong bidirectional change couplings were expected between the services. Post-refactor, the bidirectional change couplings between the services were expected to decrease.
SC	Pre-H1: the SC of 0 of the service-pair is equal to the average SC, as the average is only based on this single service pair. Pre-H2: SC could not be measured due to the event-driven nature of the system.	Post-H1: - Post-H2: -	Pre-refactor, above-average SC values were expected between the services Post-refactor, the SC values between the services were expected to decrease.
WSIC	Pre-H1: the single service that did offer an interface, had a WSIC of 4. Pre-H2: only S2.5.1 offered an interface, which had a WSIC of 29. Post-H2: S2.5.1 still had a WSIC of 29, and the new service (S2.5.3) had a WSIC of 6.	Post-H1: - Post-H2: the S2.5.1 still had a WSIC of 29, and the new service (S2.5.3) had a WSIC of 6.	Pre-refactor, a WSIC higher than 15 was considered an indication for decomposing. Post-refactor, the WSIC of each service was expected to decrease.

Table 16	${\bf continued}$	${\bf from}$	previous	page
----------	-------------------	--------------	----------	------

SIDC Pre-H1: the single service that did offer an interface, had a SIDC of 0,5. Pre-H2: only the S2.5.1 offered an interface, which had a SIDC of 0,2875. LOC H1: one service had an under-average LOC and one an above-average LOC value which was higher than the average on services, naturally one services, naturally offer an interface, while the other one had a CF higher than the average. Pre-H2: both while the other one had a CF higher than the average. Pre-refactor with still had a SIDC of 0,2875, and the new service (\$2.5.3) had an indication for decomposing. Post-refactor, an indication for decomposing. Post-refactor, the SIDC value of each service was expected to increase. Pre-refactor, an above-average LOC was considered an indication for decomposing. Post-refactor, the LOC value of each service was expected to decreased. While the CF of services. Pre-H2: both service (\$2.5.3) had higher than the winvolved while the CF of while the other one had a CF higher than the average. Pre-H2: both services.			mued mom previous	
offer an interface, had a SIDC of 0,2875, and the new service (S2.5.3) had a SIDC of 0,2875, and the new service (S2.5.3) had a SIDC of 0,5. Pre-H2: only the S2.5.1 offered an interface, which had a SIDC of 0,2875. LOC H1: one service had an under-average LOC and one an above-average LOC. Pre-H2: both services had a LOC value which was higher than the average of the system. CF Pre-H1: as the system-average is calculated over the two involved services, naturally one service had an under-average CF while the other one had a CF higher than the average. Pre-H2: both Pre-H2: both SIDC value of each service was expected to increase. Pre-refactor, an above-average LOC was considered an indication for decomposing. Post-H1: - Post-H1: new service was expected to decrease. Services. Pre-refactor S2.5.2 decreased, while the CF of services, naturally one service had an under-average CF while the other one had a CF higher than the average. Pre-H2: both SIDC value of each service was expected to increase. Pre-refactor, an above-average LOC was considered an indication for decomposing. Pre-refactor, the LOC value of each service was expected to decrease. Service S2.5.3) had a SIDC of 0,5. Post-H1: - Pre-refactor, the LOC value of each service was expected to decrease. Service was expected to decrease. Pre-refactor, an above-average LOC was considered an indication for decomposing. Post-H1: - Pre-refactor, an above-average CF was considered an indication for decomposing. Post-H2: both service was expected to decrease. SIDC of 0,5. Pre-refactor, an above-average LOC was considered an indication for decomposing. Post-H2: bre CF of service was expected to decrease. Service was expected to decrease. SIDC of 0,5. Pre-refactor, an above-average CF was considered an indication for decomposing. Post-H2: bre CF of service was expected to decomposing. Post-H2: bre CF of service was expected to decrease.	SIDC	_		
had a SIDC of 0,5. Pre-H2: only the S2.5.1 offered an interface, which had a SIDC of 0,2875. LOC H1: one service had an under-average LOC and one an above-average LOC. Pre-H2: both Figher than the system-average is calculated over the two involved services, naturally one service had an under-average cF while the other one had a CF higher than the average. Pre-H2: both S2.5.1 offered an interface, which had a SIDC of 0,5. Post-refactor, the SIDC value of each service was expected to increase. Post-H1: - Post-H1: - Post-H1: - Post-H1: - Post-H1: - Post-H1: - Post-H2: the CF of services, naturally one service had an under-average CF while the other one had a CF higher than the average. Pre-H2: both services.		service that did		SIDC lower than
Pre-H2: only the S2.5.1 offered an interface, which had a SIDC of 0,2875. LOC H1: one service had an under-average LOC and one an above-average LOC. Pre-H2: both services had a LOC value which was higher than the average of services, naturally one service had an under-average is calculated over the two involved services had an under-average is calculated over the two involved while the other one had a CF higher than the average. Pre-H2: both while the other one had a CF higher than the average. Pre-H2: both services. Pre-H2: only the SIDC value of each service was expected to increase. Pre-refactor, an above-average LOC was considered an indication for decomposing. Pre-refactor, the LOC value of each service was expected to decrease. Pre-refactor decomposing. Pre-refactor, an indication for decomposing. Pre-refactor, the LOC value of each service was expected to decrease. Pre-refactor, an above-average CF was considered an indication for decomposing. Pre-refactor, the LOC value of each service was expected to decrease. Pre-refactor, the SIDC value of each service was considered an indication for decomposing. Pre-refactor, the LOC value of each service was expected to decomposing. Pre-refactor, an above-average CF was considered an indication for decomposing. Pre-refactor, the LOC value of each service was expected to decomposing. Pre-refactor, the LOC value of each service was expected to decrease. Pre-refactor, the LOC value of each service was expected to decrease.		offer an interface,	still had a SIDC of	0,64 was considered
S2.5.1 offered an interface, which had a SIDC of 0,5. H1: one service had an under-average LOC and one an above-average LOC. Pre-H2: both LOC of S2.5.1 decomposing. services had a LOC value which was higher than the average of services. CF Pre-H1: as the system-average is calculated over the two involved while the other one had a CF higher than the average. Pre-H2: both S2.5.1 offered an interfactor, the SIDC value of each service was expected to increase. Pre-refactor, an above-average LOC was considered an indication for decomposing. Brown a SIDC of 0,5. SIDC value of each service was considered an indication for decomposing. Pre-refactor, the LOC of S2.5.1 decomposing. Brown a SIDC of 0,5. SIDC value of each service was considered an indication for decomposing. Pre-refactor decrease. Post-refactor, the expected to decrease. S2.5.2 decreased, was considered an indication for decrease. Services. Pre-refactor, an above-average CF was considered an indication for decrease. Service was expected to decrease. Pre-refactor, the post-H1: - Pre-refactor, an above-average CF was considered an indication for decrease. Services.		had a SIDC of 0,5.	0,2875, and the new	an indication for
interface, which had a SIDC of 0,2875. LOC H1: one service had an under-average LOC and one an above-average LOC. Pre-H2: both services had a LOC value which was higher than the average of the system-average is calculated over the two involved while the other one had a CF higher than the average. Pre-H2: both services, a CF Pre-H2: bath calculated over the had a CF higher than the average. Pre-H2: both services. SIDC value of each service was expected to increase. Pre-Fre-Fre-Factor, an above-average LOC was considered an indication for decomposing. How indication for decomposing. Post-refactor, the cach of the expected to decrease. Pre-Factor decomposing. Post-refactor decrease. Pre-Factor above-average CF was considered an indication for decomposing. Post-refactor, an each of the expected to decrease. Pre-Factor above-average CF indication for decomposing. Pre-Factor above-average CF decomp		Pre-H2: only the	service (S2.5.3) had	decomposing.
a SIDC of 0,2875. LOC H1: one service had an under-average Post-H1: - Pre-refactor, an above-average LOC. LOC and one an above-average LOC. Pre-H2: both LOC of S2.5.2 was considered an indication for decomposing. Services had a LOC increased. The new value which was higher than the average of the system. CF Pre-H1: as the system-average is calculated over the two involved while the CF of while the other one had a CF higher than the average. Pre-H2: both COC of S2.5.1 decomposing. Post-refactor, the LOC value of each indication for decrease. Pre-H2: both Service (S2.5.3) had LOC value of each service was expected to decrease. Pre-Feactor decrease. Service was Expected to indication for decrease. Service was Expected to indication for decrease. Services. Service was Expected to decomposing. Fre-H2: both Service was Expected to indication for decomposing. Fre-H2: both Service was Expected to indication for decomposing. Fre-Feactor, the LOC value of each service was Expected to decrease. Expected to decrease.		S2.5.1 offered an	a SIDC of 0,5.	Post-refactor, the
LOC H1: one service had an under-average LOC and one an above-average LOC decreased, while the respected to increase. Pre-refactor, an above-average LOC decreased, while the indication for decomposing. Pre-H2: both LOC of S2.5.1 decomposing. Services had a LOC increased. The new value which was service (S2.5.3) had higher than the a LOC larger than average of the each of the system. Pre-H1: as the pre-refactor decrease. CF Pre-H1: as the system-average is calculated over the two involved while the CF of services, naturally one service had an under-average CF while the other one had a CF higher than the average. Pre-H2: both services.		interface, which had		SIDC value of each
LOC H1: one service had an under-average Post-H2: only the LOC and one an above-average LOC. Pre-H2: both Evalue which was average of the system. CF Pre-H1: as the System-average is calculated over the two involved to involved while the CF of services, naturally one service had an under-average CF while the char one had a CF higher than the average. Pre-H2: both services.		a SIDC of $0,2875$.		service was
H1: one service had an under-average Post-H2: only the LOC and one an above-average LOC. Pre-H2: both LOC of S2.5.2 was considered an indication for decomposing. Post-H2: higher than the average of the system-average is calculated over the two involved while the CF of services, naturally one service had an two involved while the other one had a CF higher than the average. Pre-H2: both carbon than the average. Pre-H2: both was each of the each of the two involved while the CF of than the cach of the expected to decrease. Services.				expected to
an under-average LOC and one an above-average LOC. Pre-H2: both services had a LOC higher than the average is calculated over the two involved services, naturally one services, naturally one service had an two involved while the other one than the average is calculated over the under-average CF while the other one had a CF higher than the average. Post-H2: only the LOC of S2.5.2 was considered an indication for decomposing. Post-refactor, the LOC value of each service was expected to decrease. Pre-refactor, an above-average LOC was considered an indication for decomposing. Pre-refactor, an above-average CF was considered an indication for decomposing. Post-H2: the CF of services, naturally one service had an two involved while the CF of under-average CF while the other one had a CF higher than the average. Pre-H2: both services.				increase.
LOC and one an above-average LOC. decreased, while the Pre-H2: both LOC of S2.5.1 decomposing. services had a LOC increased. The new value which was service (S2.5.3) had higher than the a LOC larger than average of the system. pre-refactor pre-refactor services. CF Pre-H1: as the Post-H1: - Pre-refactor, an system-average is calculated over the two involved while the CF of services, naturally one service had an under-average CF (S2.5.3) exhibited a CF higher each of the expected to decrease. CF Services. Pre-H1: as the Post-H1: - Pre-refactor, an above-average CF was considered an indication for decomposing. Post-refactor, the LOC value of each while the other one CF higher than service was each of the expected to decrease. Pre-H2: both services.	LOC	H1: one service had	Post-H1: -	Pre-refactor, an
LOC and one an above-average LOC. decreased, while the Pre-H2: both LOC of S2.5.1 decomposing. services had a LOC increased. The new value which was service (S2.5.3) had higher than the a LOC larger than average of the system. pre-refactor pre-refactor services. CF Pre-H1: as the Post-H1: - Pre-refactor, an system-average is calculated over the two involved while the CF of services, naturally one service had an under-average CF (S2.5.3) exhibited a CF higher each of the expected to decrease. CF Services. Pre-H1: as the Post-H1: - Pre-refactor, an above-average CF was considered an indication for decomposing. Post-refactor, the LOC value of each while the other one CF higher than service was each of the expected to decrease. Pre-H2: both services.		an under-average	Post-H2: only the	above-average LOC
Pre-H2: both services had a LOC increased. The new value which was service (S2.5.3) had higher than the a LOC larger than average of the each of the system. CF Pre-H1: as the services. CF Pre-H1: as the system-average is calculated over the two involved while the CF of services, naturally one service had an tunder-average CF (S2.5.3) exhibited a while the other one had a CF higher than the average. Pre-H2: both Post-H2: the CF of the cecomposing decomposing. CF Nere-H2: both the the cecomposing decomposing. CF Nere-H2: both the the cecomposing decomposing decomposing. CF Nere-H2: both the cecomposing decomposing decomposing than the average. Pre-refactor decrease.		_	LOC of S2.5.2	
services had a LOC value which was service (S2.5.3) had higher than the a LOC larger than service was average of the system. CF Pre-H1: as the services. CF Pre-H1: as the system-average is calculated over the two involved while the CF of services, naturally one service had an under-average CF (S2.5.3) exhibited a while the other one had a CF higher than the average. Pre-H2: both services. CF Pre-H1: as the service (S2.5.3) had LOC value of each service was expected to decrease. Pre-refactor, an above-average CF was considered an indication for decomposing. Post-refactor, the LOC value of each service was expected to decrease. Pre-H2: both services.		above-average LOC.	decreased, while the	indication for
value which was higher than the a LOC larger than service was average of the each of the system. CF Pre-H1: as the post-H1: - Pre-refactor, an system-average is calculated over the two involved while the CF of services, naturally one service had an under-average CF (S2.5.3) exhibited a while the other one had a CF higher than the average. Pre-H2: both value which was service (S2.5.3) had a LOC value of each service was expected to decrease. EVEN THE LOC value of each services. LOC value of each decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease. EVEN THE LOC value of each service was expected to decrease.		Pre-H2: both	LOC of S2.5.1	decomposing.
higher than the a LOC larger than service was average of the each of the expected to decrease. System. pre-refactor decrease. CF Pre-H1: as the Post-H1: - Pre-refactor, an system-average is Post-H2: the CF of calculated over the two involved while the CF of services, naturally S2.5.1 increased. decomposing. One service had an The new service post-refactor, the under-average CF (S2.5.3) exhibited a while the other one had a CF higher each of the expected to than the average. Pre-H2: both services.		services had a LOC	increased. The new	Post-refactor, the
higher than the a LOC larger than service was average of the each of the expected to decrease. System. pre-refactor decrease. CF Pre-H1: as the Post-H1: - Pre-refactor, an system-average is Post-H2: the CF of calculated over the two involved while the CF of services, naturally S2.5.1 increased. decomposing. One service had an The new service post-refactor, the under-average CF (S2.5.3) exhibited a while the other one had a CF higher each of the expected to than the average. Pre-H2: both services.		value which was	service (S2.5.3) had	LOC value of each
system. Pre-refactor services. CF Pre-H1: as the Post-H1: - Pre-refactor, an system-average is calculated over the two involved while the CF of services, naturally S2.5.1 increased. one service had an The new service under-average CF (S2.5.3) exhibited a while the other one had a CF higher each of the		higher than the		service was
Services. CF Pre-H1: as the system-average is calculated over the two involved while the CF of services, naturally one service had an under-average CF (S2.5.3) exhibited a while the other one had a CF higher than the average. Pre-H2: both Services. Pre-refactor, an above-average CF was considered an indication for decomposing. Post-refactor, the was considered an indication for decomposing. Post-refactor, the LOC value of each service was expected to decrease. Pre-H2: both services.		average of the	each of the	expected to
CF Pre-H1: as the system-average is Post-H2: the CF of calculated over the two involved while the CF of services, naturally one service had an under-average CF (S2.5.3) exhibited a while the other one had a CF higher each of the		system.	pre-refactor	decrease.
system-average is calculated over the calculated over the calculated over the solution involved while the CF of was considered an indication for services, naturally solution in the new service was had a CF higher than the average. Pre-H2: both services. Post-H2: the CF of was considered an indication for decomposing. Post-H2: the CF of was considered an indication for decomposing. Post-H2: the CF of was considered an indication for decomposing. Post-H2: the CF of was considered an indication for decomposing. Post-H2: the CF of was considered an indication for decomposing. Post-R4: the CF of indication for decomposing. Post-refactor, the LOC value of each service was expected to decrease. Pre-H2: both services.			services.	
calculated over the two involved while the CF of indication for services, naturally S2.5.1 increased. decomposing. one service had an The new service Post-refactor, the under-average CF (S2.5.3) exhibited a LOC value of each while the other one CF higher than service was had a CF higher each of the expected to than the average. Pre-H2: both services.	CF	Pre-H1: as the	Post-H1: -	Pre-refactor, an
two involved while the CF of indication for services, naturally S2.5.1 increased. decomposing. one service had an The new service Post-refactor, the under-average CF (S2.5.3) exhibited a LOC value of each while the other one CF higher than service was had a CF higher each of the expected to than the average. Pre-H2: both services.		system-average is	Post-H2: the CF of	above-average CF
services, naturally S2.5.1 increased. decomposing. one service had an The new service Post-refactor, the under-average CF (S2.5.3) exhibited a LOC value of each while the other one CF higher than service was had a CF higher each of the expected to than the average. Pre-H2: both services.		calculated over the	S2.5.2 decreased,	was considered an
one service had an under-average CF (S2.5.3) exhibited a LOC value of each while the other one had a CF higher each of the each of the than the average. Pre-H2: both Post-refactor, the LOC value of each service was expected to decrease.		two involved	while the CF of	indication for
under-average CF (S2.5.3) exhibited a LOC value of each while the other one CF higher than service was had a CF higher each of the expected to than the average. Pre-H2: both services.		services, naturally	S2.5.1 increased.	decomposing.
while the other one CF higher than service was had a CF higher each of the expected to than the average. pre-refactor decrease. Pre-H2: both services.		one service had an	The new service	Post-refactor, the
had a CF higher each of the expected to than the average. pre-refactor decrease. Pre-H2: both services.		under-average CF	(S2.5.3) exhibited a	LOC value of each
than the average. pre-refactor decrease. Pre-H2: both services.		while the other one	CF higher than	service was
than the average. pre-refactor decrease. Pre-H2: both services.		had a CF higher		expected to
		than the average.	pre-refactor	decrease.
		Pre-H2: both	services.	
services had a CF		services had a CF		
which was higher		which was higher		
than the average of		than the average of		
the system.		_		