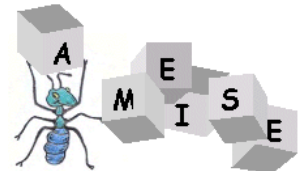


Project Assessment

1st AMEISE Simulation Run

TUKE / Software Quality
WS 2013/14

Andreas Bollin, Elke Hochmüller
Jan. 14th 2014

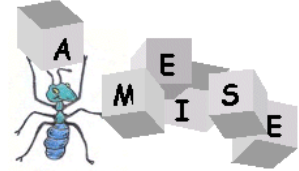


Congratulation !!!

- For nearly every simulation run it holds:
 - A product was delivered, there was feedback from the customer
 - Employees had something to do, turnover, ...
 - Individual comments during the simulation:
 - It was more complex than expected
 - It is not only staffing, whao, I really underestimated that
- ➔ Results were produced ... and we can learn a lot.

	Duration	Costs(€)	AFP C (%)	# E / LOC	APF Man. (%)	# E / Page
Results	239	239448	90.7	24.73	92.02	0.49
Goals	270	225000	95.0	12.00	95.00	0.50

Goal Achievements



Group	Duration	Costs(€)	AFP C (%)	# E / LOC	APF Man. (%)	# E / Page
tuke-301	274	216420	95.57	12.86	91.20	0.70
tuke-302	254	204220	97.69	10.50	96.25	0.23
tuke-303	214	214060	94.25	19.08	93.60	0.56
tuke-304	218	193460	96.79	9.45	96.76	0.19
tuke-305	148	179220	93.44	20.44	94.07	0.42
tuke-306	242	178380	97.35	10.96	95.69	0.29
tuke-307	232	207580	95.94	13.77	93.49	0.55
tuke-308	204	229980	95.76	13.37	95.83	0.32
tuke-309	277	252900	87.16	43.12	91.20	0.68

Objectives:

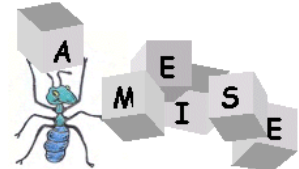
Duration: < 270 days AFP Code: > 95 % AFP Manual: > 95 %
 Costs: < 225 000 € Error/KLOC: < 12 Error/Page: < 0,5

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Goal Achievements



Group	Duration	Costs(€)	AFP C (%)	# E / LOC	APF Man. (%)	# E / Page
tuke-310	214	211940	95.98	13.55	96.91	0.23
tuke-311	323	386180	96.23	14.04	96.64	0.27
tuke-312	226	229500	96.81	10.18	95.79	0.26
tuke-313	262	208980	89.98	29.81	92.88	0.55
tuke-314	218	221540	90.22	26.80	96.34	0.41
tuke-315	361	317500	84.50	34.87	90.94	0.71
tuke-316	206	244620	90.43	24.94	91.20	0.67
tuke-317	266	254740	91.81	24.23	89.31	0.90
tuke-318	224	228740	92.46	29.78	93.07	0.63

Objectives:

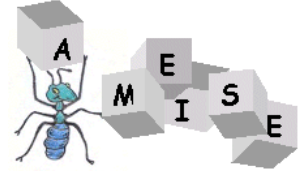
Duration: < 270 days AFP Code: > 95 % AFP Manual: > 95 %
 Costs: < 225 000 € Error/KLOC: < 12 Error/Page: < 0,5

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Goal Achievements



Group	Duration	Costs(€)	AFP C (%)	# E / LOC	AFP Man. (%)	# E / Page
tuke-319	158	138380	89.26	30.95	0.00	0.00
tuke-320	294	242700	93.98	20.11	95.73	0.26
tuke-401	126	189900	92.28	27.74	93.43	0.57
tuke-402	273	220020	96.47	13.79	96.34	0.32
tuke-403	204	305620	94.15	24.39	93.21	0.55
tuke-404	234	221580	93.52	23.79	96.20	0.38
tuke-405	319	416060	93.59	18.89	92.68	0.56
tuke-406	289	263220	94.96	22.15	95.72	0.35
tuke-407	289	351100	94.42	19.69	94.54	0.38

Objectives:

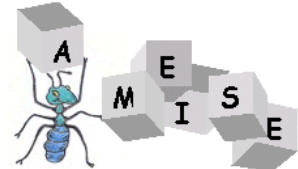
Duration: < 270 days AFP Code: > 95 % AFP Manual: > 95 %
 Costs: < 225 000 € Error/KLOC: < 12 Error/Page: < 0,5

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Goal Achievements



Group	Duration	Costs(€)	AFP C (%)	# E / LOC	AFP Man. (%)	# E / Page
tuke-408	273	322260	85.28	50.51	91.20	0.70
tuke-409	211	169100	91.54	34.74	96.09	0.31
tuke-410	290	329700	92.52	27.56	91.20	0.73
tuke-411	232	187980	95.57	10.95	92.64	0.47
tuke-413	242	278620	91.08	24.43	93.14	0.65
tuke-414	273	230060	95.98	13.34	96.63	0.28
tuke-415	268	264940	93.15	17.01	93.36	0.56
tuke-416	205	245100	96.44	12.01	96.44	0.45
tuke-417	275	404820	87.26	45.63	91.20	0.76

Objectives:

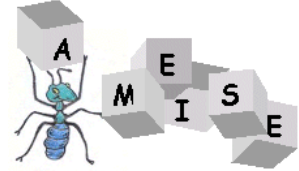
Duration: < 270 days AFP Code: > 95 % AFP Manual: > 95 %
 Costs: < 225 000 € Error/KLOC: < 12 Error/Page: < 0,5

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Goal Achievements



Group	Duration	Costs(€)	AFP C (%)	# E / LOC	APF Man. (%)	# E / Page
tuke-418	261	313340	79.62	63.42	0.00	0.00
tuke-419	276	270900	82.26	57.92	91.20	0.70
tuke-420	240	194180	93.12	23.89	93.65	0.47
tuke-421	241	183140	96.67	10.40	96.69	0.28
tuke-422	261	257340	94.20	15.21	91.94	0.75
tuke-423	213	175940	91.76	27.90	96.92	0.34
tuke-424	203	200420	95.35	15.34	97.11	0.32
tuke-425	262	217260	9.91	31.97	91.20	0.70
tuke-426	191	190740	88.94	31.30	91.20	0.72

Objectives:

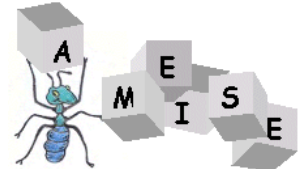
Duration: < 270 days AFP Code: > 95 % AFP Manual: > 95 %
 Costs: < 225 000 € Error/KLOC: < 12 Error/Page: < 0,5

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Goal Achievements



Group	Duration	Costs(€)	AFP C (%)	# E / LOC	APF Man. (%)	# E / Page
tuke-427	168	150860	86.42	49.14	4.63	0.46
tuke-428	151	152060	92.09	21.84	96.17	0.27
tuke-429	211	226220	89.76	39.28	91.20	0.72

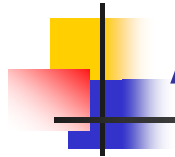
Objectives:

Duration: < 270 days AFP Code: > 95 % AFP Manual: > 95 %
 Costs: < 225 000 € Error/KLOC: < 12 Error/Page: < 0,5

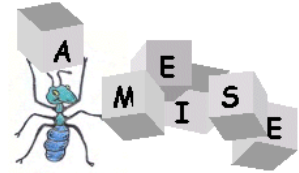
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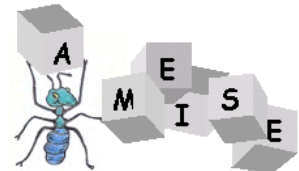
Assessment 1: Costs



- Costs depend on:
 - Number of employees
 - Productivity of employees / Hire/Release strategy
 - Additional expenses (communication overhead)



Assessment 1: Costs



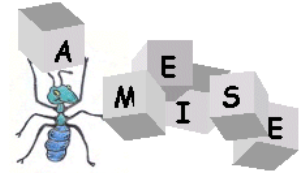
- Number of employees (authors) per document/phase:

Group	S	E	MS	C	HB	MT	IT	ST
tuke-302	2	3	2	2	1	2	2	1
tuke-304	2	2	3	2	1	2	2	2
tuke-305	1	2	2	5	2	1	0	0
tuke-401	3	4	4	5	2	0	0	0
tuke-402	2	2	2	2	1	1	0	0
tuke-403	3	2	3	4	2	2	2	0
tuke-421	1	2	2	2	1	2	2	1
Practitioner	1	1	2	2	2	2	2	2

S ... Specification
 E ... Design (System design)
 MS ... Module design
 C ... Coding

HB ... Manuals
 MT ... Module Test
 IT ... Integration Test
 ST ... System Test

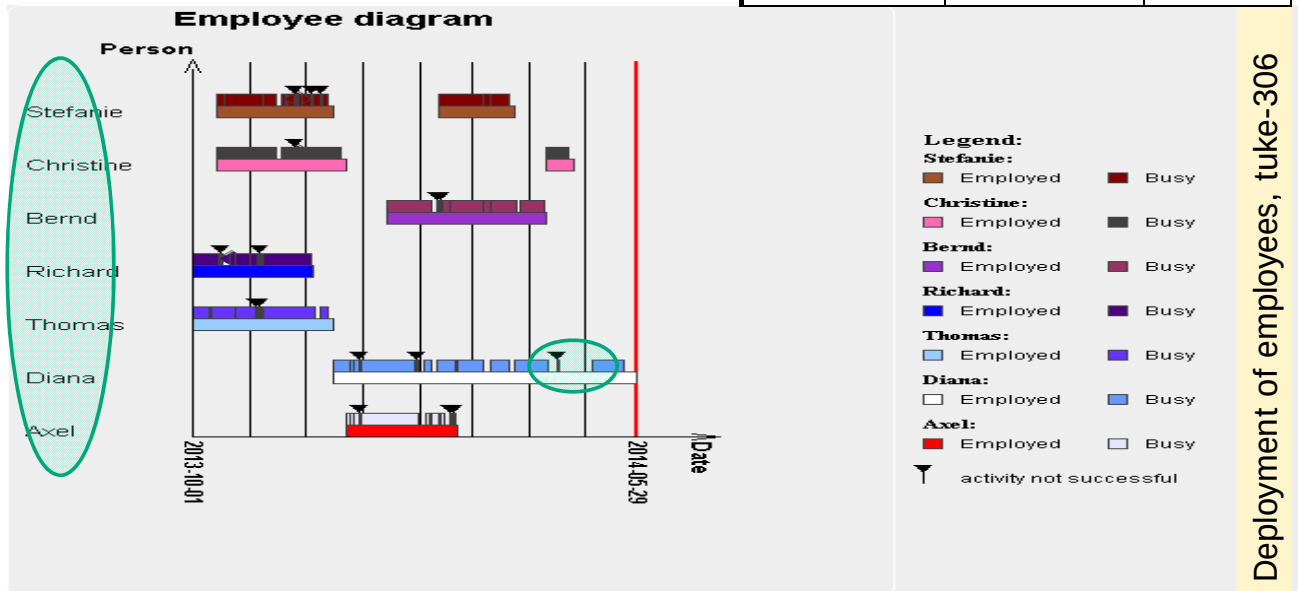
Assessment 1: Costs



tuke-306

178,380 €

23.81

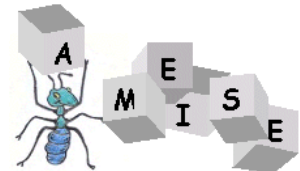


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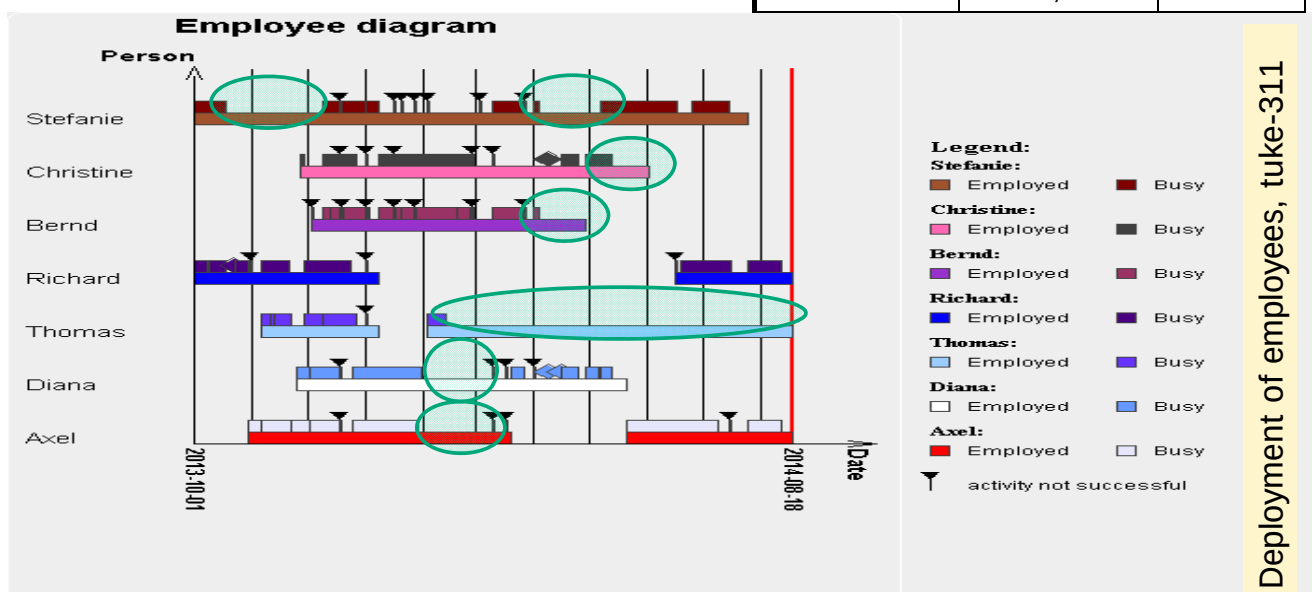
Assessment 1: Costs



tuke-311

386,180 €

25.78

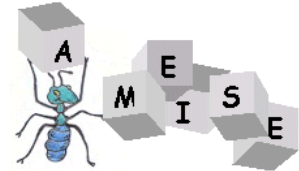


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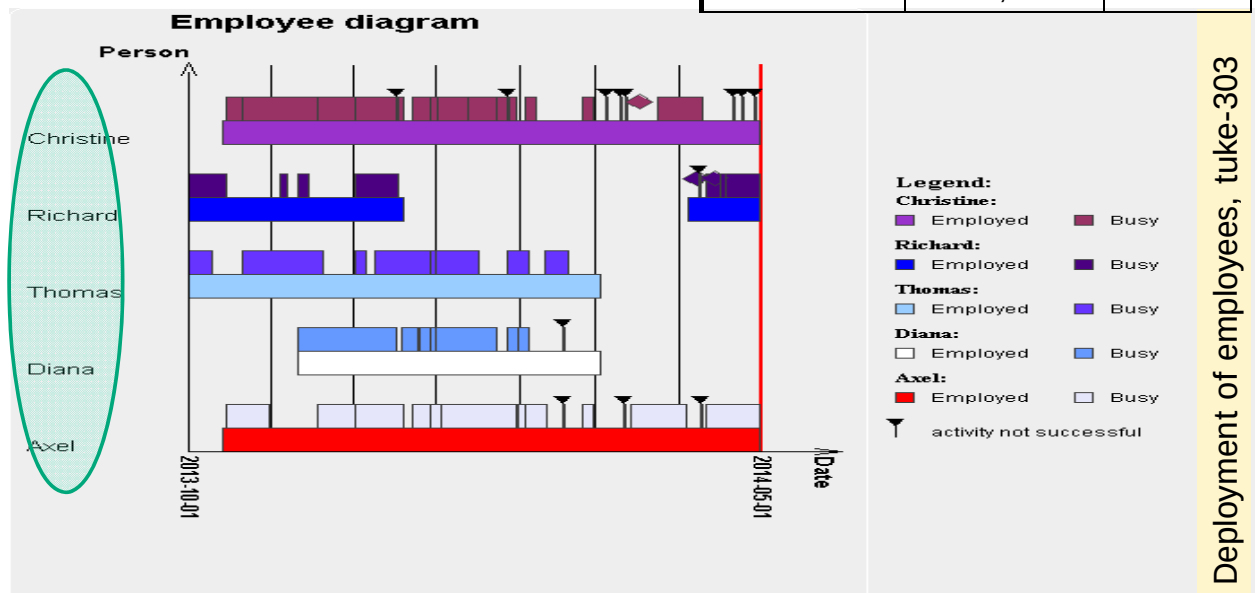
Assessment 1: Costs



tuke-303

214,060 €

18.52

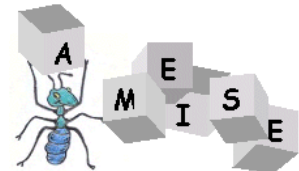


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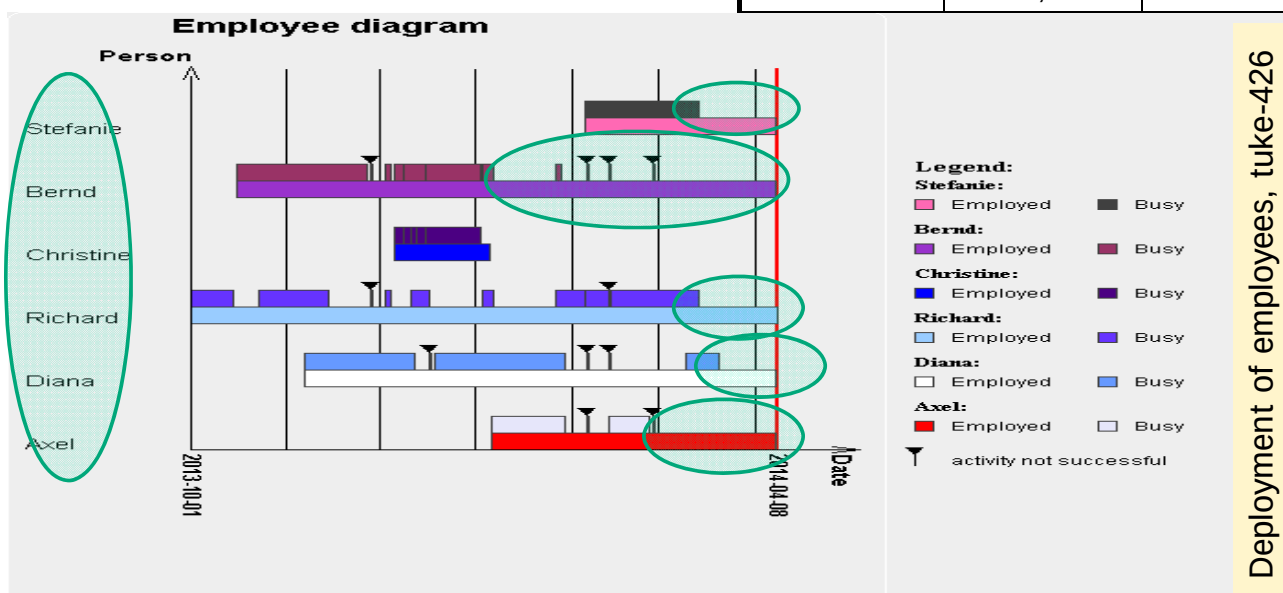
Assessment 1: Costs



tuke-426

190,740 €

12.84



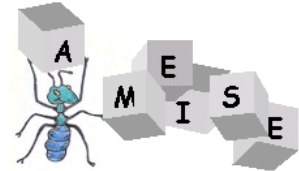
(c) AMEISE, 2014

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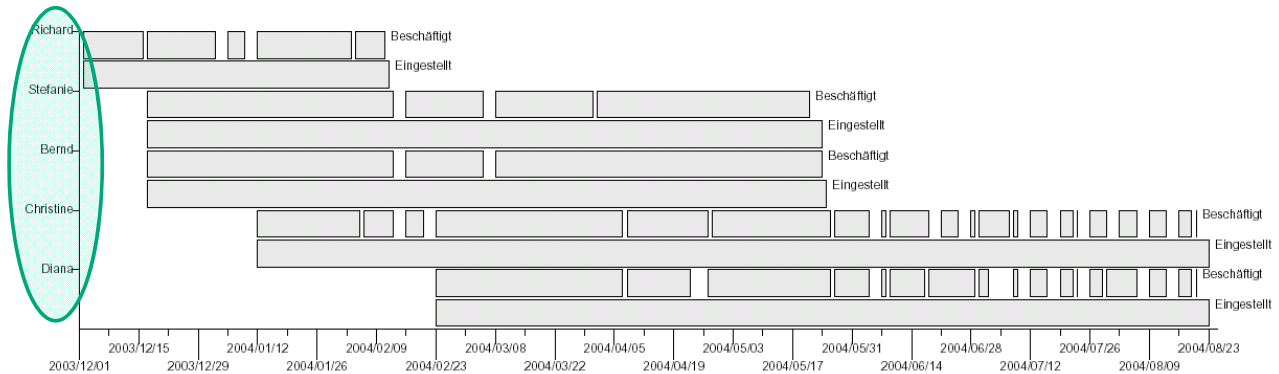
14/37



Assessment 1: Costs



Practitioner	217,180	21.64
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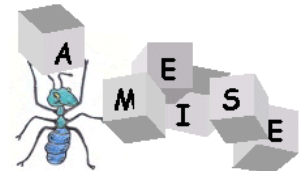
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Assessment 1: Costs



- It is the non-productive time that counts!
→ How big is the influence?

Group	K	A	k
tuke-303	214,060	18.52	11561.40
tuke-306	178,380	23.81	7493.06
tuke-311	386,180	25.78	14978.50
tuke-426	190,740	12.84	14851.70
Practitioner	217,180	21.64	10,036.00

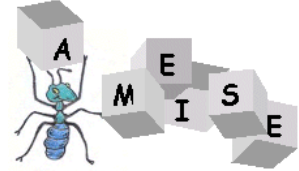
K ... Total costs of the project (in €)
A ... Total expenditure (in personal months)
k ... Costs per personal months (in €)

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Assessment 2: Duration

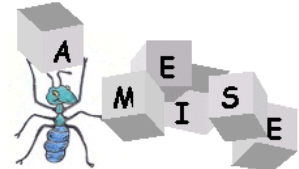


- The duration is influenced by the team (size, skills)
- Example: writing the SW specification (including effort for familiarization with the project)

Group	Author(s)	Spec. (hours)	Working Days
tuke-421	Richard	79.25	10
tuke-316	Axel, Richard	114.77	8
tuke-403	Richard, Thomas, Christine	152,74	7

- Also important: Team size during correction → small teams

Assessment 3: Quality



- Influence of the review team (e.g. the „Specification“ document)

Group	Author	#E	Reviewer(s)	found # E	Corrector	corr. # E	Remain. # E
sep-A	Richard	113	Thomas, Stefanie	52	Diana	30	83

Reviewing skills:

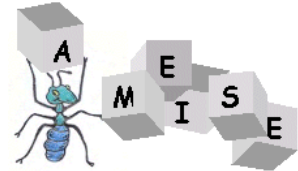
Bernd and Stefanie → high
 Richard → low
 The rest → medium

Specification:

Richard → excellent
 Diana → bad
 The rest → medium



Assessment 3: Quality



- Influence of the review team (e.g. the „Specification“ document)

Group	Author	#E	Reviewer(s)	found # E	Corrector	corr. # E	Remain. # E
sep-B	Richard	114	Christine, Stefanie	35	Christine, Richard, Stefanie	25	89

Reviewing skills:

Bernd and Stefanie → high
Richard → low
The rest → medium

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Specification:

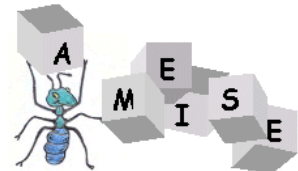
Richard → excellent
Diana → bad
The rest → medium

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Assessment 3: Quality



- Another example from the course

Group	Author	#E	Reviewer(s)	found # E	Corrector	corr. # E	Remain. # E
sep-C	Richard	116	Bernd, Stefanie, Customer	67	Richard	61	55
			----- Bernd, Stefanie, Customer	26	Stefanie	17	38

Reviewing skills:

Bernd and Stefanie → high
Richard → low
The rest → medium

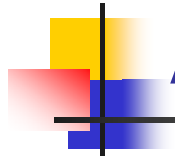
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Specification:

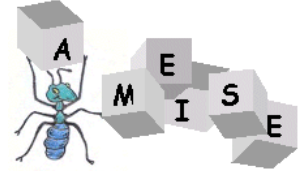
Richard → excellent
Diana → bad
The rest → medium

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Assessment 3: Quality



- It still can be improved:

Group	Author	#E	Reviewer(s)	found # E	Corrector	corr. # E	Remain. # E
sep-D	Richard	112	Bernd, Stefanie, Customer	67	Richard	62	24
			----- Bernd, Stefanie, Customer	27		25	
			----- Bernd, Stefanie	1		1	

Reviewing skills:

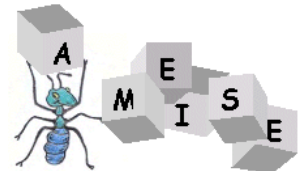
Bernd and Stefanie → high
Richard → low
The rest → medium

Specification:

Richard → excellent
Diana → bad
The rest → medium



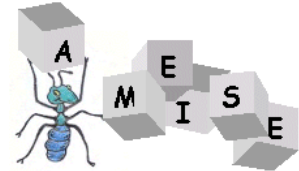
Assessment 3: Quality



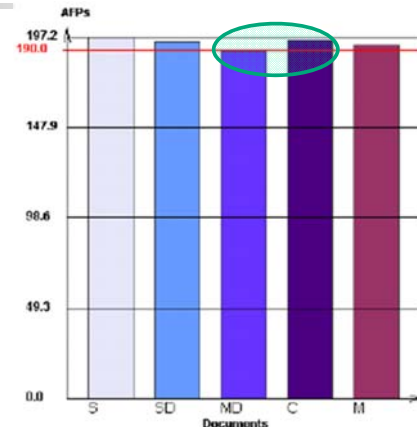
Influence of the review team (e. g. „Specification“):

- Skills of employees have enormous influence on the errors found / corrected
- Our example:
 - sep-A: Diana corrects only 57% of errors (not author!)
 - sep-C: Richard corrects 90% of errors (is author!)
- Involvement of Customer!
 - Identifies other types of errors than developers (approx. 35%)
 - Is for free (usually)!
Useful for specification and manual

Assessment 3: Quality



- Invested effort for writing the specification and for conducting the tests
- Usually, quality can also be improved by an excessive testing strategy
- Usually, it is much cheaper to guarantee the quality of predecessor documents



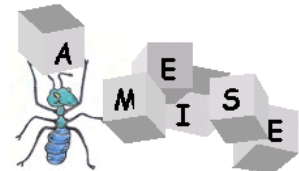
Gruppe	S (AFP)	Code (AFP)	S (PM)	S (€)	Tests (PM)	Tests (€)	Total (€)
tuke-301	197.67	191.97	1.46	15136.59	8.97	92926.64	108063.24
tuke-312	199.35	192.80	1.87	19455.48	5.05	52595.67	72051.14

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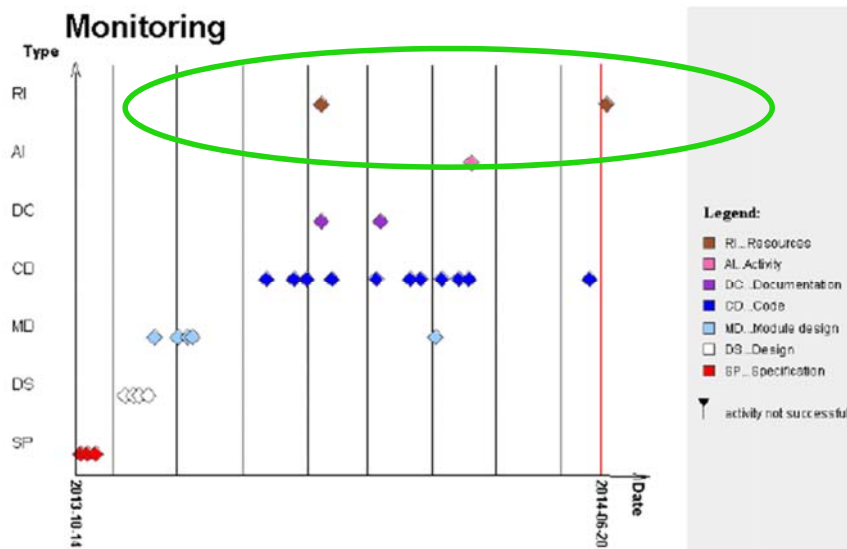
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23/37

Assessment 4: Control



- Periodically check the activities and the budget (tuke-301):

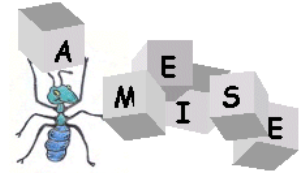


(c) AMEISE, 2014

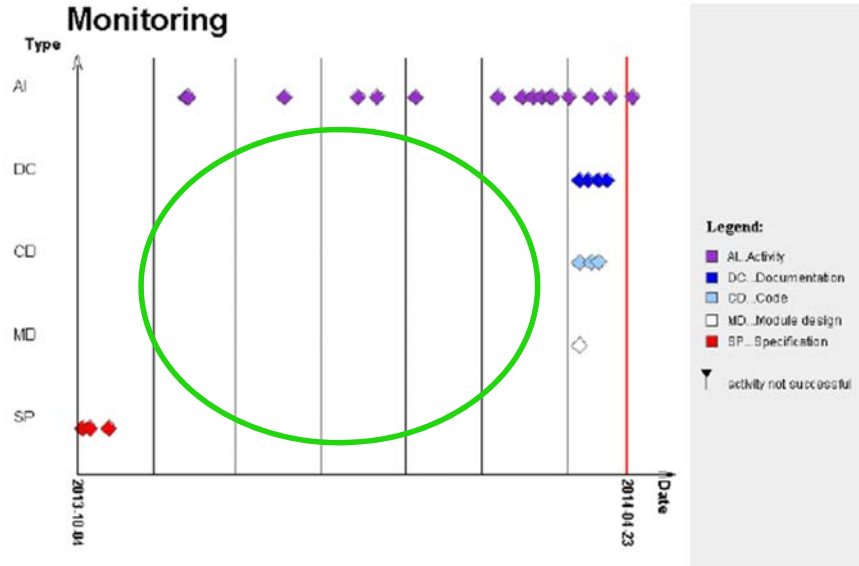
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Assessment 4: Control



- Either a good plan or ... (tuke-303):

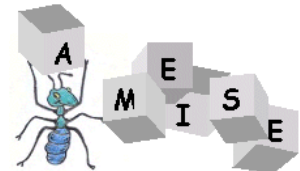


(c) AMEISE, 2014

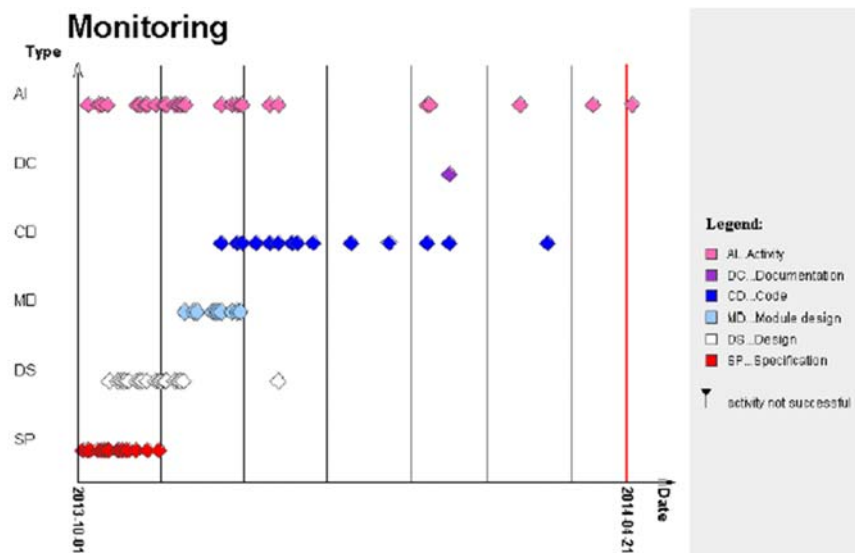
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Assessment 4: Control



- Checking too often costs time in real life ... (tuke-409):



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Assessment 5: Consistency/Propagation

- Consider consistencies between documents!
 - Remaining errors are propagated! Correction might also introduce new errors!

TUKE group-417						
Document	Analysis	Sys.Des.	Mod.Des.	Code	Manual	Total
Spec.	99.0	-	-	-	-	99.0
Sys.Des.	64.0	24.0	-	-	-	88.0
Mod.Des.	109.0	52.0	66.0	-	-	227.0
Code	105.0	44.0	55.0	188.0	-	392.0
Manual	121.0	-	-	-	62.0	183.0

TUKE group-304						
Document	Analysis	Sys.Des.	Mod.Des.	Code	Manual	Total
Spec.	45.0	-	-	-	-	45.0
Sys.Des.	46.0	18.0	-	-	-	64.0
Mod.Des.	56.0	17.0	50.0	-	-	112.0
Code	38.0	9.0	13.0	30.0	-	90.0
Manual	25.0	-	-	-	25.0	50.0

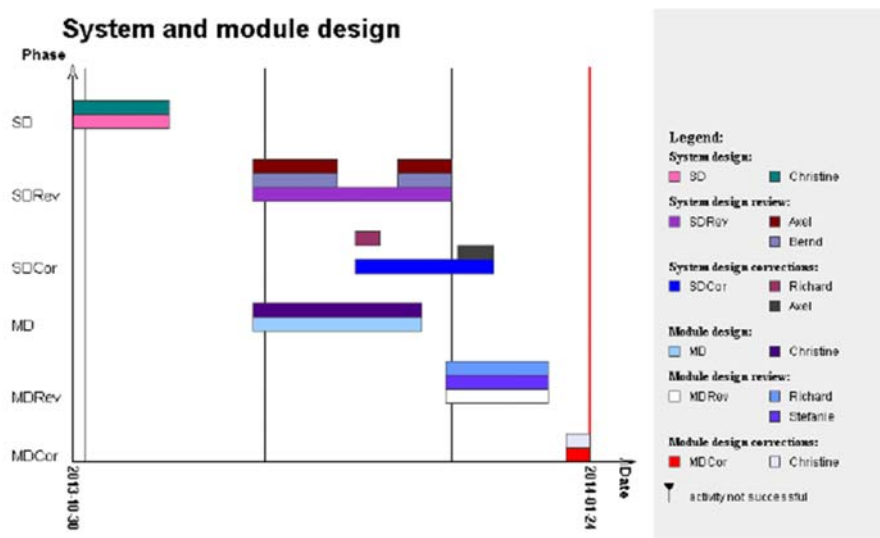
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Assessment 5: Consistency/Propagation

- Consider consistencies between documents (tuke-406)!



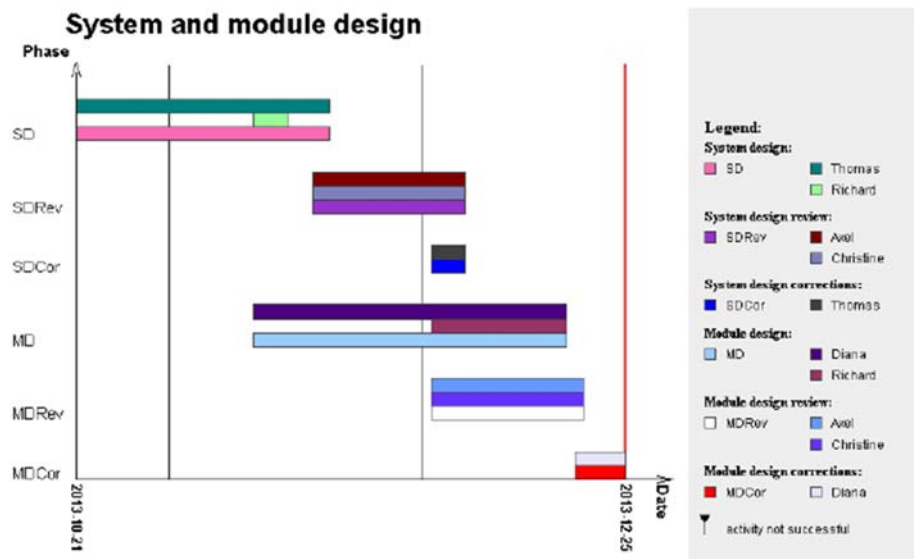
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Assessment 5: Consistency/Propagation

- Consider consistencies between documents (tuke-303)!



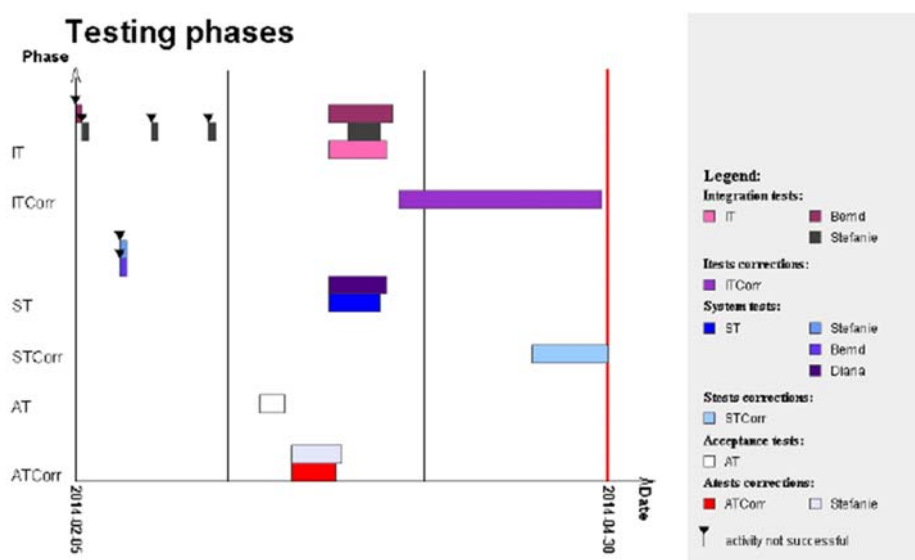
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Assessment 5: Consistency/Propagation

- Consider consistencies between phases (tuke-310)!

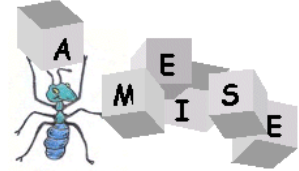


(c) AMEISE, 2014

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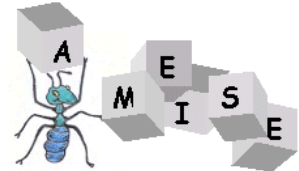
30/37

Notes ⁽¹⁾



- Lack in code quality due to problem with specification and design documents
- To be observed:
 - Loss of quality from specification to system design
 - In most cases the quality of code increased a bit
 - ➔ Quality was “tested-in” (very expensive!)
 - ➔ Better solution: keep quality of intermediate documents as high as possible

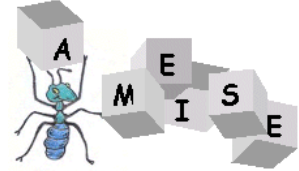
Notes ⁽²⁾



- Customer not always part of the review team
- Erroneous documents are taken as basis for subsequent documents.
 - ➔ error propagation
 - Missing project overview
 - When documents are corrected, do not forget to correct the other documents

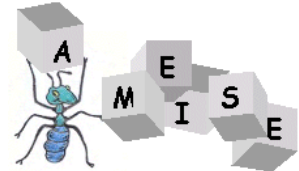
Correct all ↔ let the authors correct THEIR documents

Notes ⁽³⁾

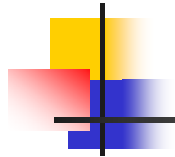


- Big issues in PM are to keep the overview, ... and to find qualified employees
 - Reviews are incomplete due to less capable reviewers
 - Correction of all documents has been forgotten (→ propagation of errors)
 - Correction has no effect when there has not been a review before
 - Review has no effect when the document has not been corrected

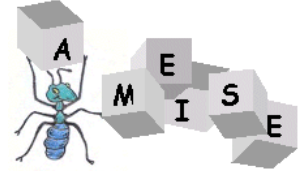
Recommendations ⁽¹⁾



- QA-EURO-Model is based on the Waterfall model!
 - At least 50 % of a document has to exist in order to subsume (in parallel) with follow-up activities
- Employees:
 - Find suitable employees for a given activity
 - Release passive employees (after a check)
 - Keep the number of developers at a minimum (→ communication effort)



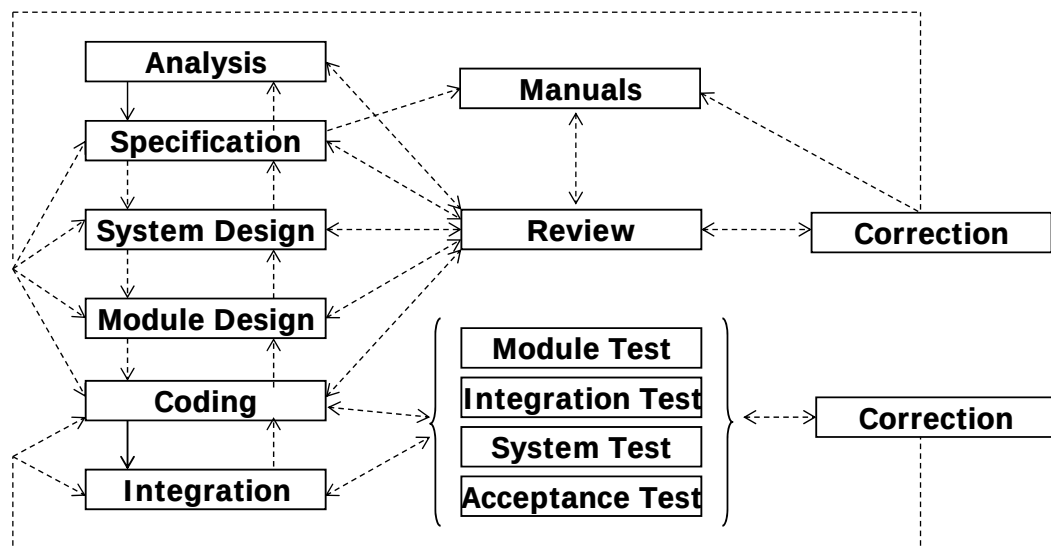
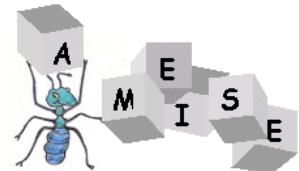
Recommendations ⁽²⁾

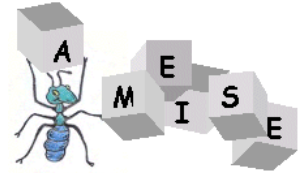
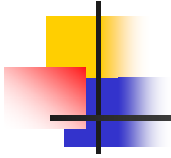


- **Review:**
 - Authors should not be in the review team
 - Do not forget to correct. Use a check-list!
Author is best suitable for corrections.
 - Customer-participation at reviews
 - Start doing the manuals at early project phases
- **In general:**
 - Be careful with „Proceed n“
 - Do not loose track of the project progress
→ structured notes (Project Log)
 - Watch for developers' responses and interpret them carefully!



Recommendations ⁽³⁾





QUESTIONS?