Better, Faster, and Cheaper: What is Better Software?

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Come a little closer
Funeral services Bergemann & Sahn
Jonasstraße 7, 10551 Berlin Tiergarten, phone:

Defects

Quality for whom?

Defects

Definition?

Example

Not interested in SW anymore,

I want to publish a fantasy book!

Example: Market Analysis

- Theme: Kind of scary?
- Plot: Quest
- Characters: Fantastic Creatures

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- Add some philosophy?

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- Theme: Kind of scary?
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- Characters: Fantastic Creatures

- Add some philosophy?

Example: Consult

Example: Consult

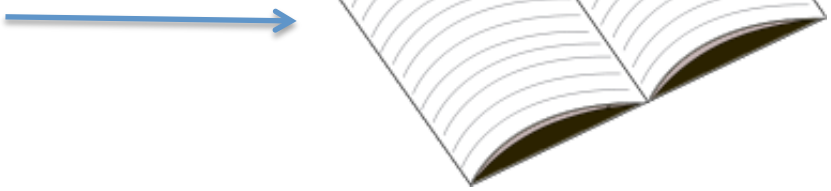
Example: Consult

Example: Design

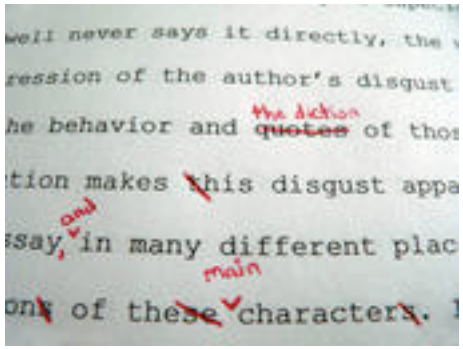
Example: Writing

Example: Co-author

Example: First draft



Example: Proof-read



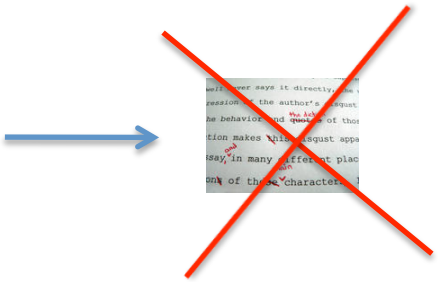
Example: Improve

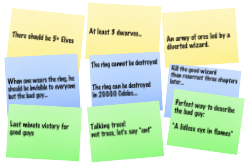
Example: Improve

Example: The Book

Ruler of the Disk

by
B. Turhan





Defects

Quality for vendor

?

Quality for end-user

RoboCup

“By mid-21st century, a team of fully autonomous humanoid robot soccer players shall win the soccer game, comply with the official rule of the FIFA, against the winner of the most recent World Cup.”

RoboCup

“In the league, all teams use identical (i.e. standard) robots. Therefore the teams concentrate on software development only, while still using state-of-the-art robots. The robots operate fully autonomously, i.e. there is no external control, neither by humans nor by computers.”

Cerberus
bogazici university, turkey

Quality Measure

$$perf_{TX} = \frac{1}{n}\sum_{i=1}^{n} gs_i - gc_i$$

Case study

Team A & Team B

Real-time, embedded, *competing*

Summary

metric	TA	TB
Standing (in 24)	1st	16th-24th
Avg. goals scored	>4	<1
Avg. goals conceded	<1	>3
Wins/draws/loses	7/1/0	0/1/2
Overall performance score	3.25	-3.00

Hypotheses

metric	H_0	H_A
cc	$CC_{TA} = CC_{TB}$	$CC_{TA} \neq CC_{TB}$
lcom	$LCOM_{TA} = LCOM_{TB}$	$LCOM_{TA} \neq LCOM_{TB}$
rfc	$RFC_{TA} = RFC_{TB}$	$RFC_{TA} \neq RFC_{TB}$
wmc	$WMC_{TA} = WMC_{TB}$	$WMC_{TA} \neq WMC_{TB}$
cbo	$CBO_{TA} = CBO_{TB}$	$CBO_{TA} \neq CBO_{TB}$
noc	$NOC_{TA} = NOC_{TB}$	$NOC_{TA} \neq NOC_{TB}$
dit	$DIT_{TA} = DIT_{TB}$	$DIT_{TA} \neq DIT_{TB}$
perf	$PERF_{TA} = PERF_{TB}$	$PERF_{TA} \neq PERF_{TB}$

Data

metric	#data		median		min		max	
	TA	TB	TA	TB	TA	TB	TA	TB
cc	534	31	8	45	0	0	883	1228
lcom	534	31	3	9	0	1	83	52
rfc	534	31	7	20	0	0	133	81
wmc	534	31	3	18	0	0	70	56
cbo	534	31	1	0	0	0	31	9
noc	534	31	0	0	0	0	24	0
dit	534	31	0	0	0	0	3	0
perf	8	3	4	-3	0	-6	5	0

Results

H_0	Reject	Direction	p-value
cc	**yes**	TA < TB	**<0.001**
lcom	**yes**	TA < TB	**< 0.001**
rfc	**yes**	TA < TB	**< 0.001**
wmc	**yes**	TA < TB	**< 0.001**
cbo	**yes**	TA > TB	**0.0115**
noc	no	TA = TB	0.0929
dit	**yes**	TA > TB	**0.0188**
perf	**yes**	TA > TB	**0.0189**

Limitations

- *bool* isComparable(TeamA, TeamB)
- *bool* winByChance(TeamX)
- *bool* apply(otherContext)

Summary & Conclusions

Using defects as a quality measure for the stakeholders who undertake the project is reasonable. However, it has limited/no value for capturing end-users perception for quality above the baseline.

Summary & Conclusions

The team that has achieved a significantly higher performance in the tournament also has significantly better design characteristics.

Summary & Conclusions

Robotic soccer may be a new source of data for the community.

Future Work

Is there an association between design and “quality”?
OR
Does good design necessarily lead to “good” products?

Thanks!

Q&A

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