

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

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to

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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?



Example: Market Analysis

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



Example: Consult



Example: Consult



Example: Consult

A photograph of a hand holding a restaurant receipt. The receipt is white with black text and a yellow highlight on the total amount. The background is dark and textured.

1 MARE MONTE SPAGHETTI	\$39.00
1 RIGATONI SICILIANA	\$36.00
1 MILANESA	\$55.00
1 INSALA CARCIOFI	\$18.00
2 PARMESAN CHUNKS	\$28.00
1 LG WATER	\$12.00
5 TAINY 40	\$275.00
2 TRUFFLE CARPACCIO	\$200.00
2 ASPARAGUS NELLO	\$60.00
3 CAPPUCCINO	\$27.00
2 CALAM. FRITTI	\$40.00
2 PROSC. MOZZARELLA	\$88.00
2 ESPRESSO	\$15.00
1 TIRAMISU	\$15.00
1 MINISTRONE VERO	\$18.00
3 LA TACHE ROMANEE CO	\$15000.00
2 CHATEAU PETRUS	\$10000.00
2 J.W. BLUE	\$150.00
3 TRUFFLE TAGLIOLINI	\$585.00
2 CRISTAL ROSE magnum	\$10000.00

	\$36841.00
TAX	: \$3251.89
SUB-TOTAL	: \$39892.89
20% GRAT	: \$7328.20
TOTAL	\$47221.09

THANK YOU

Example: Design

There should be 5+ Elves

At least 3 dwarves...

An army of orcs led by a diverted wizard.

When one wears the ring, he should be invisible to everyone but the bad guy...

~~The ring cannot be destroyed~~

The ring can be destroyed in 20000 Celcius....

Kill the good wizard then resurrect three chapters later...

Last minute victory for good guys

Talking trees!
not trees, let's say "ent"

Perfect way to describe the bad guy:

"A lidless eye in flames"

Example: Writing



Example: Co-author



Example: First draft



Example: Proof-read



well never says it directly, the
ression of the author's disgust
he behavior and ^{the diction} ~~quotes~~ of those
tion makes ~~this~~ disgust appe
ssay, ^{and} in many different plac
^{main} on of these ~~character~~s.

Example: Improve

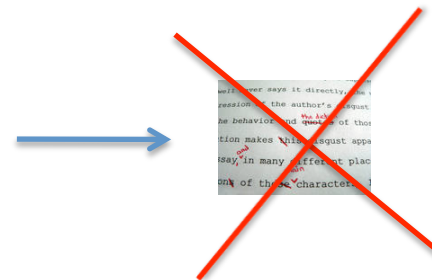


Example: Improve



Example: The Book

Ruler of the Disk
by
B. Turhan



There should be 9-Elves
At least 9 deserves...
An army of ones led by a
described without...
All the good without
the number nine chapters
how...
Perfect way to describe
the bad guy:
"A billion eyes in Rome"



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.”

פנימי



Bogazici university, turkey

Quality Measure

$$\text{per } f_{TX} = \frac{1}{n} \sum_{i=1}^n g s_i - g c_i$$

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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