Leeches to Lidocaine

Bringing Empiricism to Software

*Slides: **goo.gl/TX3vQc***
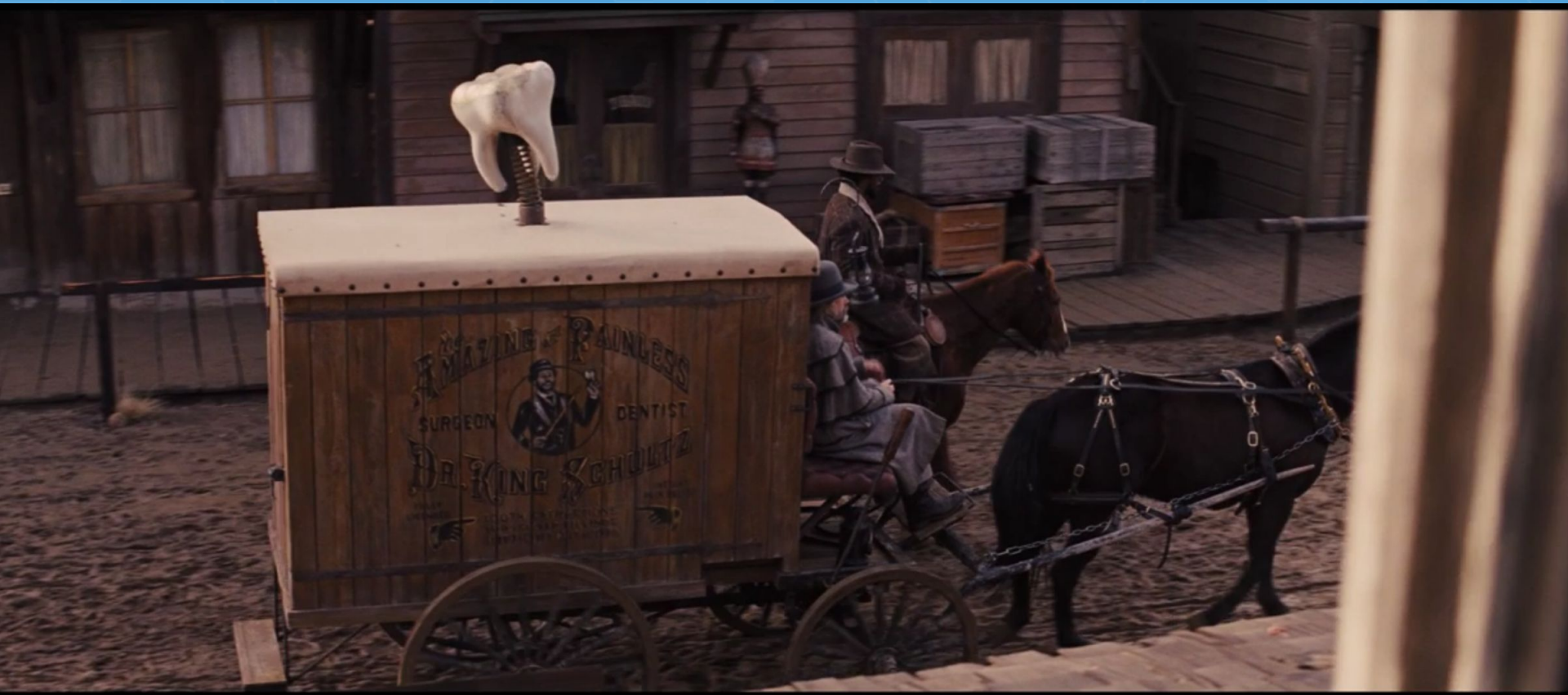
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empirical software engineering

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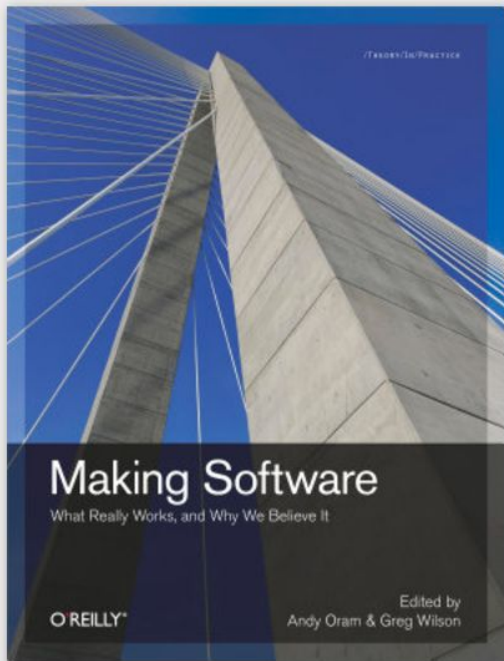
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Empirical Software Engineering - incl. option to publish open access
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Making Software: What Really Works, and Why We Believe It

Andy Oram   **Greg Wilson**   October 14, 2010   ★★⯪☆☆ 2 👤

"O'Reilly Media, Inc."

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The 10x programmer, **no wait** 68x

Conway's Law

Is code influenced by team structure?

Conway's Law

It's true.

Any organization that designs a system will produce a design whose structure is a copy of the organization's communication structure.

Conway's Corollary

Can we exploit it? **Yes**.

A software system whose structure closely matches its organization's communication structure works "better" than a subsystem whose structure differs from its organization's communication structure.

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Is OSS different?

Nope.

Conway's Corollary suggests that **new** OSS contributors can benefit by suggesting they join SIGs and etc, that align with their first contributions.

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Software is made of people?!

Does Pair Programming work?

Pairing seems better when . . .

The problem is complex.

Errors are costly.

Knowledge transfer lowers your bus-factor.

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Unexpected findings while Pairing

Better when different personalities pair. Wha?

Pairing reduces interruption. Really? Yup.

It's only effective if practiced (need 12 hrs to learn)

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Costs of Pairing

Some devs (about 5%) will never pair well.

Teams work faster and at higher quality, but since it's 2x coders, it costs about 15% more dev-hours.

Ideal session is 1.5 to 4 hours. Longer or shorter gets poor results.

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Measuring Code?

When I was a little kid my mother told me not to stare into the sun.
So once when I was six, I did.

McCabe's Cyclomatic Complexity

Like a pachinko machine for code.

Drop an input in, determine all of the possible routes it can travel.

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McCabe's Cyclomatic Complexity

Upside? Great indicator.

Downside? Complex to measure.

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Halstead's Software Science Metrics

Count the number of operators and operands. Distinctness counts, as **a+b+c** is simpler than **a+b*c** because it relies on a single operator (+), rather than two(+, *).

Feed into formulas like "length" and "volume".

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Halstead's Software Science Metrics

Upside? Maps intuitively to complexity.

Downside? There are simpler measures that accomplish the same thing.

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Simpler Measures

Source Lines of Code + # of Funcs

Table 8-2. *Correlation coefficients among all the metrics*

	SLOC	LOC	NFUNC	MCYCLO	ACYCLO	HLENG	HVOLU	HLEVE	HMD
SLOC	1.00	**0.97**	0.68	**0.77**	0.63	**0.97**	**0.97**	0.88	**0.96**
LOC		1.00	0.67	**0.75**	0.60	**0.94**	**0.94**	0.84	**0.92**
NFUNC			1.00	0.63	0.32	0.64	0.63	0.67	0.66
MCYCLO				1.00	0.91	0.76	0.75	0.82	0.80
ACYCLO					1.00	0.63	0.62	0.72	0.68
HLENG						1.00	0.99	0.90	0.99
HVOLU							1.00	0.90	0.98
HLEVE								1.00	0.96
HMD									1.00

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Table 8-2. Correlation coefficients among all the metrics

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ACYCLO					1.00	0.63	0.62	0.72	0.68
HLENG						1.00	0.99	0.90	0.99
HVOLU							1.00	0.90	0.98
HLEVE								1.00	0.96
HMD									1.00

Healthy Skepticism

Study was done on C-files. May not hold for other languages.

Measures of code complexity fail to be predictive with smaller code samples (eg < 100 SLoC).
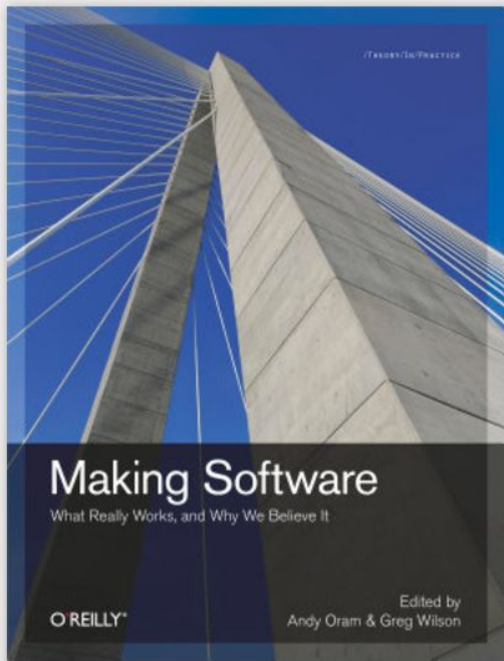
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Other Resources

Empirical Software Engineering Journal

ESEM Conference

PromiseData.org Conference

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Cool, so just science more?

Jared Spool
@jmspool

Following

Anyone else notice these weird things started happening right after they fired up that Large Hadron Collider?

10:09 AM - 20 Jan 2017

Shall I refuse my dinner because I do not fully understand the process of digestion?

- Oliver Heaviside

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In the first place, you won't succeed, and even if you do, no one will believe you.

- Max Planck
Writing to Einstein about the Theory of General Relativity

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The great obstacle to discovering the shape of the earth, the continents, and the oceans was not ignorance, but the illusion of knowledge.

- Daniel J. Boorstin

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