

How Sustainability Informs Software Procurement and Management

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Economic Paradise

Exponential gains in price/performance

- Moore's Law: 2x every 18-24 months
- Disk Law: 2x every 12 months
- Fiber Law: 2x every 9 months
- Sustained over decades

The Only Sustainable Edge, by John Hagel III and
John Seely Brown

Economic Paradise Lost

[However], there [has been] no Moore's law for software. While computing power falls rapidly in price, **software** that can make use of that computing power **becomes more complicated**, sometimes **more expensive** and **less reliable**, and almost always **more difficult to configure and maintain**. Yet it is software that constitutes the fundamental rules for information processing, and thus for an information economy and an information society.

— United Nations Conference on Trade and Development

(UNCTAD), 2003, p.95

Definition of Insanity

Doing the same thing over and over again
and expecting different results

— Albert Einstein

IT: Insanity x 10^{12}

- Global ICT Spending tops \$3.4T USD
 - 18% of applications abandoned before production
 - 55% are “challenged” (late, deficient, broken)
 - Assume 80% salvage, 20% loss
 - Total annual waste = 29% (no change since 1994)
- We're wasting > \$1T USD per year on Bad SW!

Bad Software is Not New

- Fred Brooks and *The Mythical Man Month*
- *Breaking Windows* by David Bank
- *Software That Lasts 200 Years* by Dan Bricklin
(why prop. software makes this impossible)
- Do we continue to repeat our mistakes because we are insane, or thinking like sheep?

Omnivore's Dilemma

Michael Pollan's remix of Wendell Berry

- Industrial agriculture: 12x more “efficient”
 - Destroys 40 years of topsoil every year
 - Fish kill zones larger than some US states
 - Rampant obesity and health-related problems
- Sustainable agriculture: 6x more efficient
 - Adds one year of topsoil every year
 - Plants and animals naturally healthy w/o pesticides, antibiotics, hormones, or chemical fertilizers
 - *Everything I Want To Do Is Illegal*, Joel Salatin

What's Wrong with Industrial?

- “Adding more people to a late project only makes it later” — Fred Brooks
- Coverity reports 20-30 defects per 1000 SLOC
- No measurable improvement in 5 years
- No structural improvement in 50 years

Conclusion: It's insane

Worst Industrial Model Problem

- Costs are externalized
 - Money *you waste* is reported as *profits* by others

What's Great about Sustainable?

- Gen X ensures Gen X+7 has it better
 - 7 generations of Moore's Law is only 14 years
 - 7 generations of Fiber Law is only 5 years
- Should make better choices if we have to live with seven-generation consequences!

Best News About Sustainable Model

“The animals do most of the work”

— Joel Salatin

How Green is the OSS Valley?

Coverity scans demonstrate *Kaizen*:

- 2004: 5.76M SLOC, 985 defects, $\rho = 0.17$
- 2005: 6.03M SLOC, 1,008 defects, $\rho = 0.16$
- 2006: 32 projects, PHP worst in LAMP stack with $\rho = 0.474$

Sustainable Software is...

When the byproduct of every action in the system enriches the whole by its process of existence

“It's a developer scratching an itch.”

—Eric Raymond, *The Cathedral and the Bazaar*

Moore's Law for Software

- DHS Sponsored Coverity's 2008 SCAN project
 - 250 top OSS projects
 - 55 MLOC
 - 16% reduction in static defects (over 8,500 total)
 - (Coverity itself improved false positive rate by 14%)
 - Overall $\rho < 1.0$
 - PHP one of 11 projects to achieve “perfect score” (meaning $\rho = 0.0$)
- OSS now 1B SLOC, doubling every 12.5 months
- Avg. prop. software made *zero* measurable gains

New Business Model

- Software bits are free to read, modify, share
- Value in services, support, subscriptions
- User-driven innovation encouraged
 - Be the change you want to see!
- No exclusionary licenses
- No “Software as a Service”
 - That's a “cargo cult” construct

An Agriculture of Technology

The whole point of integrated circuits is to absorb the functions of what previously were discrete electronic components, to incorporate them in a single new chip, and then to ***give them back for free***, or at least for a lot less money than what they cost as individual parts. Thus, semiconductor technology eats everything, and people who oppose it get trampled.

— Andy Grove

The Success of Open Source

The conventional notion of property is, of course, the right to exclude you from using something that belongs to me. Property in open source is configured fundamentally around the right to distribute, not the right to exclude.

— Steven Weber

End of Insanity

- Freedom of choice means you don't have to do the same thing over and over
- Start with objective quality in the first place; don't settle for an average that wastes \$1T/year
- Improve quality constantly and forever
- Invest in education and self-improvement
- Make transformation *everybody's* job

No Exit?

- The most important procurement decision is this: when the time comes, what's your exit strategy?
 - In a sustainable system, death is part of life
 - Topsoil is the key to fertility
- Software that costs nothing to acquire costs nothing to *retire*
 - Freedom to *Move On!*

Technology Ponzi Schemes

- Ponzi schemes offer no good exit strategies
 - Holds no actual asset value
 - Dependent on ever-increasing inflows of cash
- How many software vendors sell licenses that
 - Have no resale value?
 - Demand ever-increasing amounts of new money to cover old promises never kept?
- Exit costs should be accounted for in the procurement costs!

Open Source for America

- Commercial open source is mission ready
 - More than 20% market share by CPU deployments
 - Less than 2% revenue share by dollar cost
 - This 10:1 price efficiency is not appreciated by some market participants
- Rights and freedoms of open source users and developers must be protected
- Open source is truly for everyone!