

Bad Software: The Need For Investment in Mass-Market Software Quality

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The Basics: Quality-Related Costs

Prevention

- Cost of preventing software errors, documentation errors, and any other sources of customer dissatisfaction

Appraisal

- Costs of all types of inspection (testing).

Internal Failure

- Costs of coping with errors discovered during development.

External Failure

- Costs of coping with errors discovered, typically by your customers, after the product is released.

Total Cost of Quality = Prevention + Appraisal + Internal Failure + External Failure costs.

Categorizing Quality Costs

<i>Prevention</i>	<i>Appraisal</i>
<ul style="list-style-type: none"> • Staff training • Requirements analysis • Early prototyping • Fault-tolerant design • Defensive programming • Usability analysis • Clear specification • Accurate internal documentation • Pre-purchase evaluation of the reliability of development tools 	<ul style="list-style-type: none"> • Design review • Code inspection • Glass box testing • Black box testing • Training testers • Beta testing • Test automation • Usability testing • Pre-release out-of-box testing by customer service staff
<i>Internal Failure</i>	<i>External Failure</i>
<ul style="list-style-type: none"> • Bug fixes • Regression testing • Wasted in-house user time • Wasted tester time • Wasted writer time • Wasted marketer time • Wasted advertisements • Direct cost of late shipment • Opportunity cost of late shipment 	<ul style="list-style-type: none"> • Technical support calls • Answer books (for Support) • Investigating complaints • Refunds and recalls • Interim bug fix releases • Shipping updated product • Supporting multiple versions in the field • PR to soften bad reviews • Lost sales • Lost customer goodwill • Reseller discounts to keep them selling the product • Warranty, liability costs

Use Quality-Related Costs to Advocate Bug Fixes

Quality-related costs are borne throughout the company. To challenge a bad decision, find out who will lose money from it, and get them involved. For example, think about:

- Probable tech support cost. (*Tech Support*)
- Risk to the customer, the customer's data or equipment. (*Corporate Counsel.*)
- Problems that will be obvious to reviewers. (*Marketing Communications.*)
- Extent to which the defect detracts from the main use of the program. (*Marketing*)
- Incompatibility that will block OEM deals (bundled sales). (*Sales*)
- Incomprehensible feature. (*Documentation, Training*)

But what about the customer's costs? Quality / Cost analysis doesn't ask us to minimize them. Can we ignore them?

Uh-oh. If the customer's costs are big, this sounds like a good way to get sued.

Seller: external costs	Customer: failure costs
<i>These are the types of costs absorbed by the seller that releases a defective product.</i>	<i>These are the types of costs absorbed by the customer who buys a defective product.</i>
<ul style="list-style-type: none"> • Technical support calls • Preparing answer books • Investigating complaints • Refunds and recalls • Interim bug fix releases • Shipping updated product • Supporting multiple versions in the field • PR to soften harsh reviews • Lost sales • Lost customer goodwill • Reseller discounts to keep them selling the product • Warranty, liability costs • Gov't investigations 	<ul style="list-style-type: none"> • Wasted time • Lost data • Lost business • Embarrassment • Frustrated employees quit • Demos or presentations to potential customers fail because of the software • Failure during tasks that can only be done once • Cost of replacing product • Reconfiguring the system • Cost of recovery software • Cost of tech support • Injury / death

It's Too Easy to Forget the Customer's Costs in Quality / Cost Analysis

THE PINTO:

Benefits and Costs Relating to Fuel Leakage Associated with the Static Rollover Test Portion of FMVSS 208

Benefits -- Savings to Ford

180 burn deaths	\$200,000 each
180 serious burn injuries	\$67,000 each
2100 burned vehicles	\$700 each
<u>Total Benefit</u>	<u>\$49.5 million</u>

Costs of Fixing the Problem

11 million cars	\$11 each
1.5 million trucks	\$11 each
<u>Total Costs</u>	<u>\$137 million</u>

Quality-related litigation reflects the customer's intent to transfer its failure costs back to the company whose defective product caused them.

Irrational Myths About Customer Dissatisfaction

- Myth: no one uses documentation.
 - *Dataquest -- 85% of people in trouble solve their own problem*
 - *Kaner's data (financial application) -- 88% of callers said they checked the docs first and could identify the weakness in the doc that led them to give up and call for help.*
- Myth: investments in support don't improve sales.
 - *Jeff Tarter, SoftLetter, on MS's \$500 million investment in support: "Despite lots of wishful thinking to the contrary, spending money to upgrade a company's service reputation remains a lousy investment."*
- Myth: most calls for help reflect customer ignorance or customer fault.
 - *Kaner / Pels data (desktop publishing application): 50% of calls could have been prevented with cheap fixes.*

Recipe for Legal Trouble

1. Mis-set customer expectations
2. Add defects
3. When customers call for support:
 - (a) waste the customer's time
 - (b) lie
 - (c) blame it on the customer
 - (d) don't solve the problem
 - (e) be rude to the customer

Likely results?

- (a) Loss of customer loyalty
- (b) Lawsuits

Bad Software: Mis-set Customer Expectations

The Canadian government (Industry Canada, Competition Bureau) recently completed a study of the claims made on the packaging of consumer software. Here is the bottom line:

“Over 2000 claims were evaluated during this survey. Overall, some 163 or 8.1% of all claims evaluated were potentially false or misleading. While this may appear to be a small percentage based on the number of claims evaluated, these incorrect claims represent 65% of all the software titles tested.”

For detail, <http://strategis.ic.gc.ca/FBP> and search for “software”.

50% of software publishers don't give their manuals to the test group for testing. (Savings: about 15 minutes labor per page.) (Risk: In most states, the manual creates express warranties. The product must conform to all of the manual's “statements of fact”. The manual provides evidence of breach of contract.)

Bad Software: Mis-set Expectations

Albert Stark lays out problems that *software support staff* encounter when *they* try to buy and install problem management systems. Support staff provide an interesting example, because they're usually pretty talented at making things work.

Stark points out that:

- “The system will not do everything promised.”
- “System functionality is typically overstated.”
- “You’ll need to purchase additional modules to get the functionality you need.”
- “Features you need are scheduled for a future release.”
- “The out-of-box reality is less than expected.”
- “You’ll need to purchase additional hardware.”
- “The software will be more complex than it appeared during the sales cycle.”
- “System customization will not go smoothly” even though “Vendors can make customization look easy.”

In a parallel session at the same conference, the speaker asked publishers’ technical support staff how many of them would trade in their problem management system if they could. Over half the attendees raised their hands.

Bad Software: Defects

- *In software, we routinely ship products with many known defects.*
- Complete testing is impossible. *No one ships bug-free software.* The most responsible publishers pick the bugs they ship more carefully and deal with complaining customers more responsibly.
- Immense pressure to ship products quickly: The 4th competitor to market probably gets less than a 3% share.
- High cost of entry for new publishers' products. Over-investment in reliability or too-high a risk of liability will kill startups.
- Watts Humphrey and colleagues report products with nearly zero coding errors discovered in the field. The state of the art is advancing.

Bad Software: Pressure on Support

- Increasingly complex hardware/software configurations drive up support calls and costs.
- Skyrocketing support costs: staff ratios rose from 1:12 to 1:7
- In 1996, 200 million calls to tech support.
- Software customers spent over 3 billion minutes on hold. These are longer complaint hold times than other industries. This is tip of the iceberg because most American customers don't complain.
- For more data, (from Prognostics, SSPA, Softbank, etc.), see *Bad Software* (my book) or <http://www.badsoftware.com/stats.htm>

Bad Software: Genuinely Bad Support

Companies routinely deny their defects during calls for support (even known defects):

- we've never heard of that
- it must be your video card
- it must be you
- it's a feature

Doing research for Bad Software, David Pels and I dug up bug reports on BugNet and then called publishers to complain about those bugs. We always got denials. After getting past those, we still often heard these other excuses.

Bad Software: Bad Support

- Software companies have started charging for support. \$3 per minute or \$35-95 per call (or incident) are common. Some companies charge even in the event of known bugs. Quality / cost pressures from support cost go away.
- Computer-related complaints made Better Business Bureau's top 10 for 1995, even higher than used car dealers. We did worse in 1996.
- Customer satisfaction with software technical support has declined for ten straight years. Prognostics Corp. claims the trend has leveled off. Softbank still cites a decline.
- Cross-industry study of call hold times: Complaining software customers left on hold for longer than any other industry studied, even longer than airlines and government offices.

Bad Software: Bad Support

- Along with long hold times, it can take longer to actually connect with someone who can answer your question. According to SSPA, the average time to get a response from a capable technician is 30 minutes for PC/Shrink-Wrap products.
- At peak times, 85% of calls into tech support get busy signals.
- 58% of support staff get less than 1 week of training before independently handling phone calls.
- Complaints involving software / hardware from more than one vendor take 3 to 18 times as long to resolve.
- Business' cost of ownership of a PC is often estimated at \$8000 to \$11,000 per year.

The Law Today: Uniform Commercial Code

- Uniform Commercial Code (UCC) is the law in 50 states.
- Article 2 governs contracts for sale of goods in USA in 49 states.
 - Sale of packaged software is a sale of goods.
 - Sale of custom software is a sale of services, not directly covered by the UCC.
- UCC is supplemented by laws governing fraud, deceptive trade practices, unfair competition, public safety, and consumer protection.

The Law Today: Copyright Act

- Copyright Act is federal law. Supercedes state laws that try to govern copying and distribution of original works.
- Copyright Act provides a balance of rights to creators / publishers and buyers.
 - First sale doctrine
 - Buyer of a copy may lend, resell, destroy, or mark up her copy. The seller's rights to that particular copy are exhausted when the sale takes place.
 - Fair use rights: limited copying allowed for
 - reviews, parody
 - classroom use
 - reverse engineering

Shrink-Wrapped Licenses Misrepresent Customer Rights

- Post-sale warranty disclaimers are invalid.
 - *Warranty of merchantability has been hard to disclaim since the days of snake oil.*
- Post-sale limitations on remedies are suspect. Several states reject them.
- Restrictions on use in the mass market (no reverse engineering, can't write negative magazine reviews) are invalid under Fair Use doctrine.
- Restrictions on transfer (can't lend or give away) are invalid under First Sale doctrine.
 - *This is an old conversation. Shepardize *Bobbs-Merrill Co. v. Straus* 210 U.S. 339 (1908), which settled the existence of the First Sale doctrine. Read the literature review and discussion of *Motion Picture Patents Co. v. Universal Film Manufacturing Co.* 243 U.S. 502 (1917), which established the doctrine of exhaustion. Note the cases in which the Court rejected the idea that a notice affixed to the machine could create a restrictive license. Rejected form (license) for substance (sale).*

Shrink-Wrapped Licenses Misrepresent Customer Rights

Transfer (continued):

Ray Nimmer, the Article 2B Reporter, has repeatedly argued that nonexclusive licensees have no right to transfer their licenses. But:

Ownership of a copy should be determined based on the actual character, rather than the label, of the transaction by which the user obtained possession. Merely labeling a transaction as a lease or license does not control. If a transaction involves a single payment giving the buyer an unlimited period in which it has a right to possession, the transaction is a sale. In this situation, the buyer owns the copy regardless of the label the parties use for the contract. Course of dealing and trade usage may be relevant, since they establish the expectations and intent of the parties. The pertinent issue is whether, as in a lease, the user may be required to return the copy to the vendor after the expiration of a particular period. If not, the transaction conveyed not only possession, but also transferred ownership of the copy.

Ray Nimmer, *The Law Of Computer Technology* § 1.18[1] P. 1-103 (1992). Under the Copyright Act, the owner of a copy has every right to transfer the copy without the permission of the original seller.

UCC Article 2B: Background

- UCC is maintained and updated by the National Conference of Commissioners on Uniform State Laws (NCCUSL) a legal drafting organization funded by the 50 US states that writes all “Uniform” laws.
- NCCUSL has about a 50% success rate in passage of bills introduced into state legislatures. (If the same bill is introduced into 50 legislatures, on average, 25 would pass it.)
- The UCC is co-maintained by the American Law Institute, another non-profit body of senior lawyers.
- UCC and ALI appoint a joint Drafting Committee to prepare recommended revisions.

UCC Article 2B: Background

- Will govern all contracts for the development, sale, licensing, maintenance and support of software and almost all contracts involving “digital” information (will gradually encompass most books, movies, etc.).
- Current draft is over 200 pages (“official” formatting runs well over 250 pages)
- 12 years in the works so far.
- Current draft significantly criticized at ALI, which passed motions calling for fundamental revision. ALI will not approve 2B in 1999.
- Despite ALI objections so far, good chance that legislators will receive a bill with only cosmetic changes and a fair chance that it will hit in 1999.

UCC Article 2B: Proposed Legislation

Copyright Overview:

- It used to be hard to copyright (or patent) software and so software developers and publishers relied on licensing law to protect their intellectual property rights. License allows you to transfer less than you transfer under a sale of a copy.
- Today, though, the Copyright Act has been extensively revised to protect publishers from piracy.
- 2B endorses the concept of the anonymous license, which enables mass-market restrictions that defeat the copyright balance.
 - No fair use rights unless publisher grants them
 - No first sale rights unless publisher grants them

UCC Article 2B: Proposed Legislation

Contract Overview

- Software publishers and large consultants are almost as close to immune from lawsuits that arise from defective software as can be achieved in a contract statute.
- Independent developers have significant (I think, elevated) risk of lawsuits for bugs in their software.
- Freelance writers' contracts can be more easily cancelled (finished pieces not be paid for) and their work can be more easily republished without their permission.

Effects of 2B: Categories of External Failure Costs

- Customer Support Costs
- Lost Sales (esp. lost to competitors)
- Legal Costs

Effects of 2B: Customer Support Costs Under 2B

- Charge customers for support, even for known bugs.
- Easy to set up a waiver of liability--include it in the click-wrap with bug fixes.
- Seller can require precision and completeness in customer's bug reporting.
- Vendor's support contract will not require it to fix all defects.
- In a contract dispute, vendor can sometimes use "self-help" to shut down the operation of the program.
- Vendor will have the same or (probably) greater power to restrict your right to maintain its software or hire 3rd party support.

Effects of 2B: Lost Sales, Competitive Effects

Enforces hidden terms (no competition on these terms).

- At its Annual Meeting, in May, 1998, the American Law Institute passed the following resolution (available at www.ali.org):
 - "The current draft of proposed UCC Article 2B has not reached an acceptable balance in its provisions concerning assent to standard form records and should be returned to the Drafting Committee for fundamental revision of the several related sections governing assent."
- The authors of the ALI resolution (Braucher and Linzer) wrote in their supporting memo:
 - "The Draft reflects a persistent bias in favor of those who draft standard forms, most commonly licensors. It would validate practices that involve post-purchase presentation of terms in both business and consumer transactions (using "shrink-wrap" and "clickwrap"), undermining the development of competition in contingent terms, such as warranties and remedies. It would also allow imposition of terms outside the range of reasonable expectations and permit routine contractual restrictions on uses of information traditionally protected by federal intellectual property law. A fundamental change of approach is needed."

Effects of 2B: Lost Sales, Competitive Effects

Lets companies prohibit publication of criticisms.

- "The customer shall not disclose the results of any benchmark test to any third party without McAfee's prior written approval."
- "The customer will not publish reviews of the product without prior consent from McAfee." -- These are examples of contractual use restrictions (nondisclosure).

Makes possible a ban on reverse engineering

- "A common criticism of software publishers is that their EULAs prohibit reverse engineering, decompilation, and disassembly of their software. Software publishers typically restrict these activities because they risk exposing, and hence losing, to the public domain, the publisher's crown jewel-the secrets contained in the software's source code. Most purchasers of off-the-shelf software, however, care little, if at all, about the right to reverse engineer, and they certainly are not interested in paying more money to acquire this right. The entities that are most interested in acquiring this right are competitors of the software developer. A competitor should not be permitted to acquire the right to examine a company's trade secrets for the low price that the typical end user pays for the software." (CK -- Footnotes omitted. Also, a EULA is an end user license agreement, typically typically shrink-wrapped and presented to the customer after the sale.)
- --- Robert W. Gomulkiewicz (a senior corporate attorney at Microsoft) and Mary L. Williamson

(1996)

Effects of 2B: Lost Sales, Competitive Effects

Makes possible a ban on reverse engineering

- What's the problem? Well, here's why my colleagues and I have reverse engineered.
 - Personal education.
 - Understand and work around (or fix) limitations and defects in tools that I was using..
 - Understand and work around (or fix) defects in third-party products.
 - Make my product compatible with (able to work with) another product.
 - Make my product compatible with (able to share data with) another product.
 - To learn the principles that guided a competitor's design.
 - Determine whether another company had stolen and reused some of my company's source code.
 - Determine whether a product is capable of living up to its advertised claims.

Effects of 2B: Lost Sales, Competitive Effects

Perlman amendment (passed by NCCUSL)

- “If a court as a matter of law finds the contract or any term of the contract to have been unconscionable or contrary to public policies relating to innovation, competition, and free expression at the time it was made, the court may refuse to enforce the contract or it may enforce the remainder of the contract without the impermissible term as to avoid any unconscionable or otherwise impermissible result.”
- (Corresponding 2B change “If a contract term violates a fundamental public policy, the court may refuse to enforce . . . to the extent that the interest in enforcement is clearly outweighed by a public policy against enforcement of that term.”)

We’re neutral--We won’t stop you from going to federal court to try to re-establish your rights. Whatever you get, you can keep.

- “There have been no cases in which [Copyright Act] Section 301 preemption was used successfully to challenge and invalidate a term of a contract that was enforceable as a matter of general state contract law.”
 - (I’m not sure that this is an accurate summary of the law, but it comes from no less an authority than the Article 2B Reporter, Ray Nimmer. *Breaking Barriers: The Relation Between Contract And Intellectual Property Law Conference on the Impact of Article 2B*, Berkeley, April 23-25, 1998. www.SoftwareIndustry.org/issues/guide/docs/rncontract-new.html. -- So how can we call 2B neutral on the fair use and first sale issues?)

Effects of 2B: Legal Costs and Article 2B

- No implied warranty (in practice).
- Magnuson-Moss and state consumer protection statutes based on goods go away, again reducing customers' warranty rights.
- Creates exceptions to the express warranty created by demonstration.
- Reduces right to a refund (limits the perfect tender rule).
- Provides that a contract can be non-cancelable in the event of breach.
- Virtually no remedies
 - Post-sale remedy limitations are fully enforceable.
 - No refund for incidental expenses, such as charges for telephone support
 - No reimbursement for damage by known bugs
 - Eliminates principle of minimum adequate remedy

Effects of 2B: Legal Costs and Article 2B

Nearly impossible to sue

- Choice of law
- Choice of forum
 - *Get a copy of the plaintiff's cert. Petition in Gateway 2000 v. Hill. The facts are a lot less defense-friendly than the 7th Circuit opinion might lead you to believe. Without implying for a moment that Gateway 2000 intended fraud, you should recognize this as a case that lays out a how-to guide for the mass market defrauder.*

Summary of Objections to 2B: Mass-Market

- No accountability for known defects.
- Makes warranty disclaimers too easy
- Eliminates applicability of key consumer protection laws
- Limits express warranties
- Limits your uses of the software
- Limits transfer (such as resale or gift of used software)
- Lets the publisher choose state/country's law and forum
- No duty to protect your privacy
- Unreasonable electronic commerce rules
 - handling of message “receipt”, online fraud, and online error
- No pre-sale or time-of-sale disclosure of the contract terms

Summary of Objections to 2B: Larger Business

- Eliminates the perfect tender rule (cancellation for obvious defects that are found right away)
- Makes it harder to cancel a contract for “material breach”
- Lets publisher say you can never cancel the contract
- Transfer rules inflate costs of mergers and acquisitions
- Makes it risky to try an evaluation copy (publisher immunized from liability for defects that you could have found during evaluation)
- Allows self-help (shutdown of your software without a court order)

Objections to 2B: Independent Developers / Authors

- Lets publishers ban reverse engineering
- Gives big customers stricter warranties from small vendors
- Subjects consultants to mixed or uncertain law
- Reduces publishers' duty to actively market a work
- Makes it easier to refuse payment for competently written, contracted-for articles
- Makes it easier to refuse payment for ideas submitted under contract
- Lets publishers breach their writers' transfer restrictions

Growing Opposition to Article 2B

Here are some of the organizations that have recently asked that 2B be tabled or cancelled or that have raised fundamental criticisms of Article 2B:

© Fairness and Justice for Low Income Workers (www.2BGuide.com/docs/

© Magazine Publishers of America (www.2BGuide.com/docs/v9-98.1

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Web Sites

Article 2B

- www.law.upenn.edu/bll/ulc/ulc.htm

Kaner:

- www.badsoftware.com

Kunze:

- www.2bguide.com

NCCUSL

- www.nccusl.org

What Can You Do?

- Boston ASQ could write a letter to NCCUSL / ALI asking for termination of 2B. These letters from the industry are impressive.
- Attend NCCUSL meeting in late July, in Denver. Details, see www.nccusl.org.
- Write your state's NCCUSL members (e-mail me for addresses. kaner@kaner.com)
- Write your local legislators and protest 2B
- Write the head of ALI
- Write op-eds, or get press involved.
- Help me plan for an opposition campaign. I need advice, help.