

NEW THEORIES OF LIABILITY FOR DEFECTIVE SOFTWARE

by

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Introduction

During the latter half of the twentieth century, computers and computer software programs became ingrained within business and social life. The evolution of computers was augmented during the past few years by the commercialization of the Internet and the development of the World Wide Web. Today, more and more business is conducted by computer, via the Internet, through a Web browser.¹

Accompanying the proliferation of computers in almost every facet of life, however, is an underlying risk to financial and physical well-being resulting from programming defects.² Software errors have been directly linked to business disruptions, loss of services (such as metropolitan telephone services), plane crashes, and deaths.³ The world's reliance upon computers was particularly demonstrated in the later years of the twentieth century when it was discovered that many older, critical software programs could not properly calculate dates after January 1, 2000.⁴ The concern over the Millennium Bug led directly to the expenditure of billions of dollars to update computer software to eliminate this problem.⁵

Today, it is security vulnerabilities which are at the forefront of concerns. Quite literally there are almost daily warnings issued regarding "security holes" (vulnerabilities) which can allow unauthorized users access to computer systems or permit nefarious computer programs to damage data or disrupt computer operations.⁶ For example, a recent email virus reportedly infected more than 45 million computers worldwide, causing estimated damages in excess of \$2.5 billion.⁷ The virus exploited security vulnerabilities within Microsoft's Outlook (email) program.⁸

This paper addresses issues of liability related to defective software. Although most of the commentary and reported cases dealing with liability associated with defective software do not directly address security vulnerabilities, such vulnerabilities highlight a particular type of defect. For purposes of this paper, it is assumed that where a computer system cannot function, or where data is lost, due to program-related security vulnerabilities, that software is defective.⁹ Many different types of software, produced by a variety of software manufacturers,¹⁰ have security vulnerabilities, and computer security breaches can cost individual businesses millions of dollars per year.¹¹

Microsoft products, in particular, have received the most attention regarding security.¹² This is not to imply that only Microsoft products have security vulnerabilities. However, Microsoft is the most dominant software company in the world¹³ and its products are often the most susceptible to security breaches.¹⁴

It is certainly recognized that software is exceedingly complex and that every possible source of vulnerability cannot be anticipated.¹⁵ Further, a significant amount of responsibility lies with the software users and their computer systems managers. The problem is compounded, however, by "... the release-and-patch security cycle of modern software ..."¹⁶ in which "[s]oftware vendors frequently put out code that is at best insecure, and which exposes users to serious vulnerabilities."¹⁷ Microsoft is considered one of the most notorious "ship-and-fix" vendors within the computing industry, accused by many of adding new features at the expense of security and only fixing security problems as they become public.¹⁸ Indeed, a security flaw in Microsoft's newest operating system (Windows XP) resulted in an FBI warning to the public.¹⁹

This situation has become so severe that within the computing industry, commentators are suggesting that new forms of legal liability be created. For example, a recent report by the Computer Science and Telecommunications Board of the National Research Council has recommended that policy makers should consider "... steps that would increase the exposure of software and system vendors and system operators to liability for system breaches"²⁰ The conclusions of this report have gained the attention of Congress,²¹ as well as business commentators.²² The reason new forms of legal liability for software manufacturers must be created is that under current U.S. law, manufacturers of mass-produced, off-the-shelf software²³ (such as Microsoft) are generally not liable for damages suffered as a result of flaws in their software.

Software fits into many categories. It is intangible intellectual property embodied in a physical medium.²⁴ It is copyrightable²⁵ as well as patentable.²⁶ It can be created as part of a services contract, or mass-marketed as a "good" subject to the Uniform Commercial Code,²⁷ although it is rarely "sold." It is licensed to end users through a standardized form of contract with no bargaining and the user generally pays for the software before acquiring it.²⁸ And for purposes of tort law, it may not even be a "product."²⁹ It is this combination of factors that has resulted in the current situation in which software vendors have little to no liability for damages resulting from errors, defects, or deficiencies in their software.

This paper first addresses the current situation—that pre-packaged software is sold through adhesion contracts which exclude warranties and limit remedies. Possible relief for the software purchaser is then discussed relative to unconscionability and theories regarding failure of remedies. A review of pertinent sections of the proposed Uniform Computer Information Transactions Act is provided to analyze its possible impact on current software licensing practices.

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Possible tort-based remedies for defective software are then reviewed. This paper concludes with a finding that the rationale for severely limiting remedies in software licenses no longer exists and an approach is suggested to permit purchasers of mass-produced, off-the-shelf software the opportunity to be compensated for consequential damages arising from serious defects in software.

The Current Situation: Limited Warranties, Limited Remedies and Contracts of Adhesion

Today's mass-produced, off-the-shelf software transactions are governed by the Uniform Commercial Code (U.C.C.).³⁰ The fact that software is acquired through a license agreement does not, *ab initio*, negate the application of U.C.C. Article 2, which applies to contracts for the *sale* of goods.³¹ "[W]e treat ... [software] ... licenses as ordinary contracts accompanying the sale of products, and therefore as governed by the common law of contracts and the Uniform Commercial Code."³² Software manufacturers license, rather than sell software, which is copyrightable subject matter,³³ in order to avoid the first sale doctrine and maintain control over distribution. The first sale doctrine allows the owner of an authorized copy of a copyrighted work to sell that copy without the authority of the copyright holder.³⁴ By using a license, the licensee is not sold a copy of the software and therefore never becomes an owner of that copy; and therefore cannot re-sell the software except as authorized by the licensor. "Entering a license agreement is not a 'sale' for purposes of the first sale doctrine."³⁵

Express warranties are created by affirmations of fact or promises made by the "seller,"³⁶ as well as by product descriptions.³⁷ Included in each transaction, unless excluded or modified, is an implied warranty of merchantability, meaning that the goods will pass without objection in the trade under the contract description and are fit for the ordinary purposes for which such goods are used.³⁸ The U.C.C. also provides that express and implied warranties may be excluded or modified, and that the seller may limit remedies in the event of breach.³⁹ It has become standard practice for software vendors to provide very limited express warranties, disclaim all other warranties, and severely limit remedies in the event of a breach.⁴⁰ These disclaimers and limitations of remedy are generally enforced by the courts.⁴¹

The initial premise under which disclaimers and limitations are allowed is that the parties negotiate the terms of the underlying agreement. Indeed, the Supreme Court has assumed a buyer will trade the risks associated with limited warranties for a (presumably bargained-for) lower price.⁴² The rationale for permitting warranty disclaimers and limited remedies is to lower the cost of the product—that it would be prohibitively expensive for the manufacturer to insure against every disappointed buyer. And the courts do not necessarily require equal bargaining power in order for warranties to provide these lower prices:

The law of warranty is not limited to parties in a somewhat equal bargaining position. Such a limitation is not supported by the language and history of the sales act and is unworkable. Moreover, it finds no support in ... the analysis of the financial strength or bargaining power of the parties to the particular action. It rests, rather, on the proposition that [t]he cost of an injury and the loss of time or health may be an overwhelming misfortune to the person injured, and a needless one, for the risk of injury can be insured by the manufacturer and distributed among the public as a cost of doing business. ... That rationale in no way justifies requiring the consuming public to pay more for their products so that a manufacturer can insure against the possibility that some of his products will not meet the business needs of some of his customers. ...⁴³

In today's software transaction, "bargaining," at least on the part of the buyer, often consists of clicking on an "I Agree" button during software installation. Modern software is acquired through a variety of "wrap"-type agreements. A "shrinkwrap" agreement derives its name from software contained in a box wrapped in plastic (shrinkwrapped). The agreement pertaining to the software is either printed on the box and readable through the plastic, or there is a notice that the agreement is contained within the box. In either event, opening the box and installing the enclosed software is considered acceptance of the terms of the agreement.⁴⁴ The shrinkwrap agreement has evolved into the "clickwrap" agreement. Software is often acquired without any packaging (*e.g.*, when it is copied to a computer ("downloaded") from a Web site or is pre-loaded on a computer). When the buyer installs the software a dialog box is displayed containing the license agreement. The user is instructed to select a button (*e.g.*, by using the mouse pointer to "click" on the button displayed on the computer screen) to accept the terms of the license agreement and complete the installation.⁴⁵ The latest incarnation of the "wrap"-type agreement is the "browsewrap" agreement, which generally pertains to accessing information on a Web page. A notice is placed on the Web site informing the user that continued use of (browsing) the Web site constitutes acceptance of a license agreement (the terms of which are usually made available by the user selecting a link on the Web site).⁴⁶

Under shrinkwrap agreements,⁴⁷ the buyer has the choice of either agreeing or not agreeing—the only way the buyer has the ability to use the software is to accept the former choice, with no opportunity to negotiate. As a result, most software⁴⁸ is acquired through an "adhesion" contract:

"Adhesion contract" is a handy shorthand descriptive of standard form printed contracts prepared by one party and submitted to the other on a "take it or leave it" basis. The law has recognized there is often no true equality of bargaining power in such contracts and has accommodated that reality in construing them.⁴⁹

Despite the lack of bargaining power on the part of the purchasers, shrinkwrap agreements have generally been held enforceable,⁵⁰ and, in the sense they are a form of standardized contract, are considered vital to the efficiencies of modern commerce. “Standardization of agreements serves many of the same functions as standardization of goods and services; both are essential to a system of mass production and distribution. Scarce and costly time and skill can be devoted to a class of transactions rather than the details of individual transactions.”⁵¹ If clickwrap agreements were not enforceable, “... these unboxed sales ... [would be] unfettered by terms—so the seller has made a broad warranty and must pay consequential damages for any shortfalls in performance, two ‘promises’ that if taken seriously would drive prices through the ceiling or return transactions to the horse-and-buggy age.”⁵²

The fact that a contract is presented on a “take it or leave it” basis does not automatically invalidate the contract.⁵³ The courts presume buyers have alternatives.⁵⁴ As explained by the Missouri court of appeals in *Estrin Constr. Co. v. Aetna Cas. & Sur. Co.*,⁵⁵ adhesion contracts are generally enforced on the basis of commercial expediency:

...The contract where the parties choose all the terms of agreement ... is no longer typical. The proliferation of business transactions from the mass production and distribution of goods made too costly—and otherwise impossible—a separate contract distinctive for each separate transaction, and made inevitable a form contract for a typical transaction. Once formulated by the business enterprise, the form is used in every bargain involved with that product or service. ... These terms are not the result of formal assent but are imposed. The other party does not agree to the transaction, but only adheres from want of genuine choice.

The legitimacy of an adhesion contract derives, not from the social value of a transaction freely negotiated, but from the social value of goods produced more abundantly and cheaper from the reduced cost of legal and other distribution services.⁵⁶

As further explained by the *Estrin* court, adhesion contracts have their own particular foundation for enforceability:

... The usefulness of contract as a business form, particularly in mass transactions, depends upon a predictable adherence. That becomes possible only because the reasonable expectations of promises receive the protection of the law. ... In the case where the contract results from free negotiations between persons brought together by market conditions, the reasonable expectations of agreement are shown by the words. In such a case, the court simply enforces the words of contract. In the case of a contract devised by the enterpriser for the mass market, and not for any particular person, the terms are predetermined and imposed. The validity of the transaction rests not on individual assent, but on mass consensus. The reasonable expectations of an adherent, therefore, do not derive from the words of the form alone, but from the words to the extent they reflect the typical transaction.⁵⁷

The result is that a vast amount of economic activity is dependent upon software that is acquired through a form contract with no opportunity to bargain for warranties or remedies. A few contract theories exist which may allow a software purchaser to avoid the warranty disclaimers or limitations of remedies, but, as discussed below, they are not always readily available.

An Unlikely Source of Relief: Unconscionability of a Limitation of Remedies in Shrinkwrap Agreements

A limitation of remedies, such as a prohibition against an award of consequential damages, is generally valid under the U.C.C., unless it is unconscionable.⁵⁸ Two types of unconscionability are generally recognized: substantive and procedural.⁵⁹ Substantive unconscionability examines the terms of the contract to determine whether any are unduly harsh or one-sided.⁶⁰ Establishing that a clause limiting consequential damages resulting from defective software is substantively unconscionable may be a nearly impossible task. For example, this issue was directly addressed by the supreme court of Washington,⁶¹ which first explained that the exclusion of consequential damages under the U.C.C. is merely an “allocation of unknown or undeterminable risks.”⁶² “In a purely commercial transaction, *especially involving an innovative product such as software*, the fact an unfortunate result occurs after the contracting process does not render an otherwise standard limitation of remedies clause substantively unconscionable.”⁶³

Procedural unconscionability concerns the manner in which the contract is entered into, particularly to determine whether there was a lack of meaningful choice on the part of one of the parties.⁶⁴ Courts consider “...such factors as the setting of the transaction, the experience and education of the party claiming unconscionability, whether the contract contained ‘fine print,’ whether the seller used ‘high-pressured tactics’ and any disparity in the parties’ bargaining power.”⁶⁵ Despite the fact that most software transactions arise through a shrinkwrap agreement, courts which have addressed this specific issue have ruled that procedural unconscionability has not been an obstacle to enforcement.⁶⁶

A Possible Source of Relief: Failure of the Essential Purpose of a Remedy

Under contract law, if software purchasers wish to recoup any amount of losses (beyond, perhaps, the initial cost of the software), they will have to demonstrate that the remedy contained within the contract failed of its essential purpose.

Most software license agreements limit the purchaser's remedies to "repair or replace" in the event the software fails to conform to its express warranties.⁶⁷

A finding that the essential purpose of a remedy was not satisfied typically arises "when the exclusive remedy involves replacement or repair of defective parts, and the seller because of his negligence in repair or because the goods are beyond repair, is unable to put the goods in warranted condition."⁶⁸

U.C.C. § 2-719(2) provides that "[w]here circumstances cause an exclusive or limited remedy to fail in its essential purpose, remedy may be had as provided in ..." the U.C.C.⁶⁹ The first step is to determine whether a remedy has indeed failed of its essential purpose:

There are at least two ways of determining whether a particular set of facts deems a restricted contractual remedy to fail of its essential purpose. The first is to assess the potential breaches envisioned by the parties when they agreed to limit their remedies and then to compare the actual breach to the parties' initial expectations. If the expectations and reality are materially the same, the remedial limitation should be enforced. ... The second, more common approach is to evaluate the compliance of the party in breach with its limited remedial responsibilities. If the party violating the agreement fails to compensate the innocent party in the limited manner provided for by the contract, the remedy has failed of its essential purpose.⁷⁰

First, the seller must be afforded a reasonable opportunity to repair or replace the defective product. It is only if the seller is unwilling or unable to repair or replace that the remedy fails.⁷¹ There is, however, a split of authorities as to exactly what to do in this event. One line of cases holds that where an exclusive remedy fails of its essential purpose, the buyer can proceed to any remedy available under the U.C.C., including consequential damages, even if excluded in the contract.⁷² Another line of cases, however, holds that a limited remedy of repair and a consequential damages exclusion are independent and that failure of the former does not automatically invalidate the latter.⁷³ At present, then, if a software license's exclusive remedy fails of its essential purpose, whether the purchaser may be able to recover consequential damages depends on the jurisdiction of the matter.

The Uniform Computer Information Transactions Act: A Bad Situation Becomes Worse

The issue of failed remedies and consequential damages exclusions is specifically addressed in the Uniform Computer Information Transactions Act ("UCITA"), a draft uniform law intended to update the U.C.C. with a new Article 2B.⁷⁴ UCITA applies to computer information transactions.⁷⁵ A "computer information transaction" is defined as "... a license or other contract whose subject matter is (i) the creation or development of, including the transformation of information into, computer information or (ii) to provide access to, acquire, transfer, use, license, modify, or distribute computer information."⁷⁶ "Computer information" means "... electronic information, including software, that is in a form directly capable of being processed or used by, or obtained from or through, a computer"⁷⁷

UCITA attempts to resolve the issue of whether a failed remedy negates a consequential damages exclusion (supposedly) in favor of licensees (software purchasers). UCITA § 2B-703, Contractual Modification of Remedies, provides, in part:

(b) ... If performance of an exclusive remedy by the party in breach causes the remedy to fail of its essential purpose, the exclusive remedy fails. If the exclusive remedy fails, subject to subsection (c), the aggrieved party is entitled to other remedies under this article [which can include incidental and consequential damages (*e.g.*, under § 2B-709(a)(2))].

(c) Failure or unconscionability of an agreed remedy does not affect the enforceability of terms disclaiming or limiting consequential or incidental damages if the agreement expressly makes those terms independent of the agreed remedy.

This approach is explained in the Reporter's Notes:

Limited Remedy Related to Consequential Damage Limits. Article 2B assumes that the consequential damages limitation covers all aspects of the obligations and remedies under that agreement. Some commentators characterize the obligation to replace or repair in a limited remedy as a promise and a separate contractual obligation, breach of which creates a damages claim. Whether that is correct or whether the remedy clauses are better treated as an overall transaction, is not clear since it should depend on the actual expectations of the parties. Article 2B treats such remedy clauses as part of an overall transaction and sets out a presumption that a consequential damages limitation to apply to all consequential loss. A failure of the remedy results in failure of that limitation unless the agreement expressly provides that the consequential damages limitation is independent of the remedy limitation. In that case, the consequential damage limit continues to apply to any and all consequential damages incurred in the overall transaction.

Subsection (c) resolves a frequently litigated issue under [U.C.C.] Article 2. It deals with the effect of failure of a limited remedy on a contract limitation or exclusion of consequential

damages. This is a contract interpretation issue that asks whether one term (exclusion of consequential damages) is dependent on, or independent of, the other (limited remedy).

The interpretation question concerns whether failure (or breach) of the one (the limited remedy) affects the other (consequential damage limitation). Cases under [U.C.C.] Article 2 split, but most hold that in commercial contracts, failure of one remedy does not exclude enforceability of the other. Article 2B rejects this, enacting the assumption more favorable to licensees that a consequential damage limit fails if the limited remedy fails, unless the contract makes the consequential damages limit clearly independent of the limited remedy. This favors the party against whom the limitation of damages applies, treating the two terms as a package unless the agreement indicates otherwise. If the agreement expressly states that the two are independent, both parties are bound by the agreement.⁷⁸

UCITA is not, however, a panacea for victims of defective software. As long as the software vendor expressly makes consequential damages exclusions separate from other remedies, those exclusions remain enforceable according to UCITA § 2B-703(c). This is in direct contrast to the line of cases which do hold that consequential damages can be available when a remedy fails of its essential purpose.⁷⁹

Based on the decisions which treat limitation of remedy and consequential damages exclusion clauses as independent, the only way to currently invalidate a consequential damages exclusion clause in a majority of courts is through a showing of fraud, bad faith or total breach, or unconscionability. As discussed above, courts rarely find unconscionability in a commercial transaction.⁸⁰ Courts are more likely to invalidate a consequential damages exclusion upon a finding of fraud, bad faith, or total breach.⁸¹ However, since fraud, bad faith, and total breach go to the manner in which the remedy failed (*e.g.*, the magnitude or nature of the breach), it can be argued that these elements would no longer be available to invalidate a consequential damages exclusion under UCITA because UCITA allows the consequential damages exclusion to be independent of the limited remedies clause. In other words, under UCITA, a software vendor can potentially exclude consequential damages regardless of the manner or magnitude of breach.⁸²

UCITA is not without its critics.⁸³ As one commentator has stated, “UCITA changes the economics of defective software in ways that will encourage software publishers and large custom software development firms to deliver shoddier products faster.”⁸⁴ Indeed, UCITA considers defective software to still be merchantable:

In 1998, a popular operating system program for small computers used by both consumers and commercial licensees contained over ten million lines of code or instructions. In the computer these instructions interact with each other and with code and operations of other programs. This contrasts with a commercial jet airliner popular in that year that contained approximately six million parts, many of which involved no interactive function. A typical consumer goods product contains fewer than one hundred parts. A typical book has fewer than one hundred fifty thousand words. In the software environment, it is virtually impossible to produce software of complexity that contains no errors in instructions that intermittently cause the program to malfunction, so-called “bugs.” The presence of errors in general commercial products is fully within common commercial expectation. Indeed, in programs of complexity, the absence of errors would be unexpected. In this commercial environment, the contract law issue is whether the level of error exceeds the bounds of ordinary merchantability. This occurs only if the significance of the errors or their number lies outside ordinary commercial expectations for the particular type of program.⁸⁵

It may be impossible to eliminate all bugs from software, but that does not mean that known bugs are eliminated from software prior to distribution (or even corrected afterwards).⁸⁶ Further, the complexity of software does not prevent software errors from being discovered prior to their actually causing disruption, damage or breaches in security. Many software security vulnerabilities are discovered and made public by groups and individuals not associated with the manufacturer.⁸⁷ Indeed, so many security vulnerabilities have been independently discovered and publicly disclosed that a controversy has arisen as to whether it is prudent to publicly disclose these vulnerabilities.⁸⁸ Complexity is no excuse when independent computer programmers can so quickly and easily discover multiple programming errors or oversights. It is difficult to fathom that a software program is merchantable when it is riddled with blatant security vulnerabilities. Currently, though, merchantability is not necessarily a factor since UCITA and U.C.C. Article 2 permit software vendors to disclaim the implied warranty of merchantability, as well as all other warranties.⁸⁹

In effect, the law of contracts, particularly the U.C.C., provides no protection against the substantial losses businesses may encounter, and have encountered, when they cannot operate their business because data is lost or the computer system cannot operate due to software defects. If contract law cannot provide relief, it is logical to consider whether tort law can.

Torts and Software: Oil and Water

Most tort theories do not apply to mass-produced, off-the-shelf software transactions. Some commentators have argued that if a seller makes an inaccurate representation during sales-contract negotiations, that representation may later

support a tort-based misrepresentation action by the buyer.⁹⁰ Software that is created or customized for the specific needs of an individual user generally involves a negotiated contract. As noted previously, however, there is no negotiation surrounding the licensing of pre-packaged software,⁹¹ which accounts for the majority of software sales volume.⁹²

As a general rule, negligence theories do not apply to commercial transactions:

... [W]hen the tort involves actions arising from a contractual relationship, the plaintiff is limited to an action under the contract. ... This doctrine's rationale is that tort law is not intended to compensate parties for losses suffered as a result of a breach of duties assumed only by agreement. ... A party cannot recover in negligence for failed commercial expectations that can be recovered in a contract action. ... Furthermore, tort law is intended to compensate individuals where the harm goes beyond failed expectations into personal and other property injury. ... In order to recover in negligence, there must be a showing of harm above and beyond disappointed expectations evolving solely from a prior agreement.⁹³

And courts are already wary of a contract claim couched as a tort claim. For example, in *Caudill Seed v. Prophet 21, Inc.*,⁹⁴ the plaintiff brought an action for breach of contract and fraud based upon the failure of software to perform as promised. The federal district court applied the "gist of the action" test:

When a plaintiff alleges that the defendant committed a tort in the course of carrying out a contractual agreement, Pennsylvania courts examine the claim and determine whether the "gist" or gravamen of it sounds in contract or tort; a tort claim is maintainable only if the contract is "collateral" to conduct that is primarily tortious.

... Looking, then, to the fraud claim in the amended complaint here, it is clear that it is essentially a restatement of the breach of contract claim. The bottom line in this case is that [the plaintiff] ... signed an agreement with [the defendant] ... to buy software that worked, and the software (allegedly) did not work. The duties that plaintiff alleges defendant breached were created by and grounded in the licensing agreement. ... The agreement is far from collateral to the fraud claim; rather, ... the agreement is at the heart of plaintiff's ongoing fraud claim, and therefore the gist of the plaintiff's fraud claim is unmistakably contractual, not tortious. ...

[P]laintiff's fraud claim merely duplicates its breach of contract claim and must be dismissed.⁹⁵

Likewise, negligence theories, relative to a business transaction, generally apply to services and, as discussed previously, licenses for pre-packaged software are transactions in goods.⁹⁶ But where services accompany the sale of software, that does not necessarily open the door for a negligence claim. For example, in *Gus' Catering, Inc. v. Menusoft Systems*,⁹⁷ the plaintiff brought suit on theories of breach of warranties and negligence after an automated restaurant management system (a "digital dining system") failed to properly operate, the negligence theory being based on negligent installation and support of the system by the defendant's authorized distributor. The Vermont supreme court ruled that the plaintiff's negligence claim could not proceed for the same reason most tort-based claims fail regarding breach of a commercial transaction:

... Plaintiff argues on appeal that economic losses are recoverable on negligence here because defendant caused physical damage to the computer system by improperly installing the program and causing it to malfunction, analogous to dropping the computer to the floor and rendering it inoperable. Plaintiff additionally argues that defendant failed to perform to the level of care expected of a competent computer service provider and therefore breached the duty of care required of one engaged in a profession or trade.

... [N]egligence law does not generally recognize a duty to exercise reasonable care to avoid intangible economic loss to another unless one's conduct has inflicted some accompanying physical harm, which does not include economic loss. ... The harms plaintiff alleged in its amended complaint were damages by virtue of loss of business profits and loss of customers, as well as loss of time in trying to correct the myriad of difficulties caused by the improper installation of the digital dining system.

In its amended complaint, plaintiff sought damages for not having received the benefit of the bargain to which it believed it was entitled, and such a loss of its disappointed commercial expectations is not recoverable under our negligence law. ... Defendant had no duty to avoid the intangible economic losses plaintiff alleged here. Absent a duty of care, an action for negligence fails.⁹⁸

The "economic loss rule" is a clear barrier to defective software tort claims. For example, in *Hou-Tex, Inc. v. Landmark Graphics*,⁹⁹ Hou-Tex, an oil and gas company, drilled a dry hole after its geological contractor chose an incorrect drilling site using Landmark's software (SeisVision). Landmark had learned of the defect which caused the inaccurate results prior to Hou-Tex's use of the software, but had failed to notify Hou-Tex (as well as other users) of the defect. Hou-Tex based its negligence claims on the theories that Landmark owed it a duty (1) to inform its geological contractor about the bug in SeisVision and (2) to ensure that SeisVision worked correctly.¹⁰⁰ The Texas court of appeals held, however, that "[i]n this

case, the fact of most import is that Hou-Tex suffered only economic damages for its costs of drilling a dry well. Given this fact, we hold that the economic loss rule precludes any duty in tort by Landmark to Hou-Tex.”¹⁰¹

The Final Barrier: Products Liability Does Not Apply to Defective Software

Products liability law protects those who suffer damages as a result of a defective product.¹⁰² To date, however, there has been no reported successful products liability lawsuit regarding defective software.¹⁰³ All courts which have directly addressed the issue of whether products liability applies to defective software have ruled against application on the basis that the damages sustained can be categorized as economic loss – a remedy not available under products liability theory.¹⁰⁴

Economic losses are the damages sustained by a party when they fail to receive the benefit of their bargain. “The term ‘economic loss’ developed as a label for the remedy in contract for damages under warranty for a defective product.”¹⁰⁵ The economic loss rule was first enunciated in *Seely v. White Motor Co.*,¹⁰⁶ in which the California supreme court held that economic loss caused by qualitative defects cannot be recovered in tort:

The distinction that the law has drawn between tort recovery for physical injuries and warranty recovery for economic loss is not arbitrary and does not rest on the “luck” of one plaintiff in having an accident causing physical injury. The distinction rests, rather, on an understanding of the nature of the responsibility a manufacturer must undertake in distributing his products. He can appropriately be held liable for physical injuries caused by defects by requiring his goods to match a standard of safety defined in terms of conditions that create unreasonable risks of harm. He cannot be held for the level of performance of his products in the consumer's business unless he agrees that the product was designed to meet the consumer's demands. A consumer should not be charged at the will of the manufacturer with bearing the risk of physical injury when he buys a product on the market. He can, however, be fairly charged with the risk that the product will not match his economic expectations unless the manufacturer agrees that it will. Even in actions for negligence, a manufacturer's liability is limited to damages for physical injuries and there is no recovery for economic loss alone.¹⁰⁷

The *Seely* court specifically rejected the holding in *Santor v. A & M. Karagheusian, Inc.*,¹⁰⁸

... [A]lthough the doctrine [of strict liability] has been applied principally in connection with personal injuries sustained by expected users from products which are dangerous when defective, ... the responsibility of the maker should be no different where damage to the article sold or to other property of the consumer is involved.¹⁰⁹

The majority of courts, however, have followed *Seely* rather than *Santor*.¹¹⁰

The economic loss rule was clarified by the Supreme Court in *East River S. S. Corp. v. Transamerica Delaval*,¹¹¹ in which the Court held that where no person or other property (other than the product itself) is damaged, the resulting loss is purely economic.¹¹² “... [T]he resulting loss due to repair costs, decreased value, and lost profits is essentially the failure of the purchaser to receive the benefit of its bargain—traditionally the core concern of contract law.”¹¹³ *Fishbein v. Corel Corp.*¹¹⁴ provides an example of how courts are interpreting *East River*:

“[In *East River*], the Supreme Court expressed its concern for maintaining the separate spheres of the law of contract and tort. It emphasized that where an allegedly defective product causes damage only to itself, and other consequential damages resulting from the loss of the use of the product, the law of contract is the proper arena for redressing the harm because in such a case, the damages alleged relate specifically to product quality and value as to which the parties have had the opportunity to negotiate and contract in advance. . . . When the product fails to conform and only economic losses result, the parties’ recovery one against the other for economic losses should be limited to an action on that contract and no additional recovery in negligence or strict liability is permitted.”¹¹⁵

Fishbein also exemplifies how the economic loss rule is being used specifically to deny products liability claims for defective software:

The various “damages” allegations set forth throughout the amended complaint constitute variations on the same theme: that plaintiff and the members of the class have been or may be caused to expend substantial sums of money in an effort to correct the problems caused by the software and to make the software usable. ... Plaintiff has not alleged any personal injury or damage to other property. Allegations of computers “crashing” or “locking up” do not plead physical damage to the computers themselves. Thus, defendant's assertion of the economic loss rule is appropriate, thereby limiting plaintiff's recovery to breach of warranty and/or breach of contract claims.¹¹⁶

The economic loss rule has been softened to some extent, particularly relating to damage to “other property.” In *Saratoga Fishing Co. v. J. M. Martinac & Co.*,¹¹⁷ the Supreme Court ruled that equipment added to a fishing boat after its initial sale constituted “other property” for purposes of products liability:

The particular question before us requires us to interpret the Court's decision in *East River*: does the term "other property," as used in that case, include the equipment added by the Initial User before he sold the ship to the Subsequent User? We conclude that it does: When a Manufacturer places an item in the stream of commerce by selling it to an Initial User, that item is the "product itself" under *East River*. Items added to the product by the Initial User are therefore "other property," and the Initial User's sale of the product to a Subsequent User does not change these characterizations.¹¹⁸

The Court further noted that:

State law often distinguishes between items added to or used in conjunction with a defective item purchased from a Manufacturer (or its distributors) and (following *East River*) permits recovery for the former when physically harmed by a dangerously defective product. Thus the owner of a chicken farm, for example, recovered for chickens killed when the chicken house ventilation system failed, suffocating the 140,000 chickens inside, ... [and] ... [a] warehouse owner recovered for damage to a building caused by a defective roof.¹¹⁹

In a case following *Saratoga* and similar in facts to one of the cases noted by the *Saratoga* Court, the Third Circuit Court of Appeals, in *2-J Corp. v. Tice*,¹²⁰ ruled that a plaintiff could recover for inventory destroyed when a warehouse collapsed.¹²¹ In reversing the district court's dismissal of the plaintiff's products liability claim, the court of appeals specifically rejected the lower court's determination that "...property that foreseeably may be injured if the defective product fails ... [is property that] ... is effectively 'integrated' with the defective product, so that damage to that property is tantamount to damage to the product itself."¹²² The court of appeals held that "...it necessarily follows that the inventory foreseeably stored by the initial user in the warehouse here did not become a part of the warehouse itself."¹²³

It is therefore theoretically possible, at least initially, to argue that data lost, damaged or destroyed as a direct result of a software defect could be considered "other property" foreseeably injured when the defective product fails. Unfortunately, however, computer data is considered intangible property, and the type of property contemplated in *Saratoga* and *2-J* is tangible.¹²⁴

In *Transport Corp. of America v. IBM*,¹²⁵ the Eighth Circuit Court of Appeals dealt directly with the issue of whether losses related to computer data and downtime constitute an "other property" exception to the economic loss rule.¹²⁶ The court specifically held that the lost data and loss of income were not "other property" within the exception to the economic loss rule because "... the electronic data stored on the disk drive was integrated into the computer system."¹²⁷ The court also noted that the plaintiff (TCA) was aware of the risk of computer system failure and possible loss of data (because it made daily backups of its data). The court concluded, "[b]ecause failure of the disk drive was contemplated by the parties and the damage was limited in scope to the computer system (into which the disk drive and its data were integrated), TCA must look exclusively to the U.C.C. for its remedy."¹²⁸

Similarly, in *Rockport Pharmacy, Inc. v. Digital Simplistics, Inc.*,¹²⁹ the plaintiff (Rockport) sought damages under a negligence theory that it sustained a loss of data installed on a computer system and therefore suffered damage to "other property" not subject to the economic loss rule.¹³⁰ The court rejected Rockport's contention, holding that "... such losses represent nothing more than 'commercial loss for inadequate value and consequent loss of profits.'"¹³¹

Regardless of the economic loss rule, the plaintiff must also establish that the product is defective. The Restatement (Second) of Torts 402A (1965) does not define "defect," merely providing liability against one who sells a product "in a defective condition unreasonably dangerous to the user or consumer." However, there are three types of "defects" recognized: manufacturing defects, warning defects, and design defects.¹³² The issue with software would not be that a particular copy was defectively manufactured,¹³³ nor that some form of "security warning" would necessarily defeat any potential liability.¹³⁴ The Restatement (Third) of Torts: Products Liability §2(b) (April 1, 1997) provides that a product ...is defective in design when the foreseeable risks of harm posed by the product could have been reduced or avoided by the adoption of a reasonable alternative design by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the alternative design renders the product not reasonably safe.¹³⁵

The fact that vendors publish a number of software patches to eliminate errors,¹³⁶ coupled with the contention that vendors emphasize features over reliability,¹³⁷ supports the notion that software vendors could adopt reasonable alternative designs that render the software less defective.

A products liability plaintiff would also have to establish causation (that the defect proximately caused the claimed damages) and would be subject to defenses, particularly that one's own internal configurations did not contribute to the defect.¹³⁸

An Additional Hurdle: Is Software Even a Product?

Even if the economic loss barrier could be overcome, there would still be the issue of whether computer software is a "product" for products liability purposes. While computer software can be considered a good for commercial transaction purposes (subject to U.C.C. Article 2),¹³⁹ that does not necessarily mean that it is a "product" for products liability purposes.

Software is copyrightable intellectual property.¹⁴⁰ Intellectual property is generally not considered a “product” under products liability law. For example, two recent cases have dealt directly with whether video games and motion pictures can be considered products under products liability law. In *Wilson v. Midway Games, Inc.*,¹⁴¹ the mother of 13-year-old boy who was stabbed by his friend sued the defendant on the basis that the boy’s friend had become addicted to a video game manufactured by the defendant, alleging, in part, products liability based on the design and marketing of the video game. When dealing with products incorporating ideas or expression, the *Wilson* court divided the analysis into two distinct classes. The first class deals with cases involving “... harm resulting from reliance on instruction manuals, cookbooks, navigational charts and similar materials.”¹⁴² The *Wilson* court noted that “[t]hese ‘commercial intellect’ cases are about misinformation, and ‘most courts, expressing concern that imposing strict liability for the dissemination of false and defective information would significantly impinge on free speech have, appropriately, refused to impose strict products liability in these cases.’”¹⁴³

The second class of cases involves “... harm allegedly resulting from the intellectual aspects of magazine articles, games, motion pictures and internet web sites, that harm is a result of alleged exhortation, inspiration or “brainwashing” rather than the result of simply following the instructions”¹⁴⁴ The *Wilson* court rejected, in line with a number of cited cases, the proposition that “inciting” media speech (such as magazine articles, games, motion pictures and internet web sites) is a “product” for the purposes of strict products liability.¹⁴⁵ In finding that the video game is not subject to products liability, the *Wilson* court concluded, “[t]he line drawn in these cases is whether the properties of the item that the plaintiff claimed to have caused the harm was ‘tangible’ or ‘intangible.’ This line is reflected in the Restatement, which defines a product as ‘tangible personal property distributed commercially for use or consumption.’”¹⁴⁶

In *Sanders v. Acclaim Entm’t*,¹⁴⁷ Inc., the district court dealt with a case of first impression for Colorado law of whether thoughts, images, ideas, and messages contained in movies and video games constitute “products” for purposes of strict products liability.¹⁴⁸ The court held that while “... computer source codes and programs may be construed as ‘tangible property’ for tax purposes and as ‘goods’ for commercial purposes, these classifications do not establish that intangible thoughts, ideas, and messages contained in computer video games or movies should be treated as products for purposes of strict liability.”¹⁴⁹ The *Sanders* court further noted that “... the commentary for § 19(a) of the Restatement (Third) of Torts notes that courts ‘have, appropriately refused to impose strict product liability’ in cases where the plaintiff’s grievances were ‘with the information, not with the tangible medium.’”¹⁵⁰

Barriers to establishing software as a product for products liability purposes may be overcome by focusing on the functional aspect of software versus the expression of ideas. However, the economic loss rule appears, at least at present, to be an insurmountable obstacle to a recovery of damages for defective software under any tort theory, including products liability. Economic losses are the purview of contracts, particularly in the form of warranties.

The Result: The Rationale for a Lack of Remedies No Longer Exists

The economic loss rule enunciated in *East River*¹⁵¹ has been wholeheartedly embraced by the lower courts. As explained by the Third Circuit Court of Appeals:

As we read *East River*, it is the character of the plaintiff’s loss that determines the nature of the available remedies. When loss of the benefit of a bargain is the plaintiff’s sole loss, the judgment of the Supreme Court was that the undesirable consequences of affording a tort remedy in addition to a contract-based recovery were sufficient to outweigh the limited interest of the plaintiff in having relief beyond that provided by warranty claims. The relevant bargain in this context is that struck by the plaintiff. It is that bargain that determines his or her economic loss and whether he or she has been injured beyond that loss.¹⁵²

The rationale for the economic loss rule was explained by the Supreme Court in *Saratoga*:¹⁵³

The commercial buyer and commercial seller can negotiate a contract—a warranty—that will set the terms of compensation for product failure. If the buyer obtains a warranty, he will receive compensation for the product’s loss, whether the product explodes or just refuses to start. If the buyer does not obtain a warranty, he will likely receive a lower price in return. Given the availability of warranties, the courts should not ask tort law to perform a job that contract law might perform better.¹⁵⁴

It is safe to assume that if software manufacturers were faced with the possibility of increased liability for defective software (*e.g.*, through the loss of, or additional limitations on, the disclaimer of warranties or limitation of remedies), they would have an incentive to improve the quality of their software (*e.g.*, by reducing defects).¹⁵⁵ Therefore, it is questionable as to whether limitations of warranties and remedies actually lower the cost of software. According to one estimate, faulty software cost U.S. businesses \$100 billion in 2001.¹⁵⁶ That compares roughly with the total amount spent on software, custom and pre-packaged.¹⁵⁷ Therefore, for roughly every dollar spent on software, an additional dollar was spent due to defects.¹⁵⁸ If every \$1 increase in the price of software resulting from a loss of warranty protection or from the loss of limitation of remedies resulted in quality-related savings of any amount over \$1, software purchasers would benefit.

Contract law, particularly through U.C.C. warranties, generally preempts tort law with respect to defective software. As discussed previously, however, the U.C.C. (and soon, perhaps, UCITA) fails to adequately provide the fundamental

safeguards that are the basis of warranty law.¹⁵⁹ Ironically, "... warranties originated in the law to safeguard the buyer and not to limit the liability of the seller or manufacturer."¹⁶⁰ "...[L]imitations of warranty were an important factor in the development of the strict products liability law."¹⁶¹

The current lack of meaningful remedies in software licenses is already prompting an outcry for new theories of liability for defective software.¹⁶² Further, the current quality of mass-produced, off-the-shelf software negates one of the principal foundations for permitting disclaimers of warranties and limitations of remedies in shrinkwrap agreements. The enforceability of an adhesion contract is based upon the reasonable expectations of the parties, particularly the purchaser:

The principle of reasonable expectations as it applies to an adherent of a form contract, therefore, has validity because it removes the fiction of a negotiated assent and places the adherent in the typical life situation to determine the purpose of the contract. ... It takes into account that one of the purposes of standardization is to eliminate bargaining over details of individual transactions so that the adherent merely assents to a few terms, typically inserted in blanks on the printed form, and gives blanket assent to the type of transaction embodied in the standard form. ... Thus, in construction of a standard form contract, a court will allow evidence of the total transaction to give effect to the generally prevailing meaning of the language. ... In this process of construction of a standard contract, courts seek to effectuate the reasonable expectations of the average member of the public who accepts it. And although customers typically adhere to standardized agreements and are bound by them without even appearing to know the standard terms in detail, they are not bound to unknown terms which are beyond the range of reasonable expectation.¹⁶³

It is logical to assume that the "reasonable expectation" of the software purchaser is that the software will function as intended — that it will not repeatedly cause a computer to crash,¹⁶⁴ nor damage data simply from activating an included feature,¹⁶⁵ nor perform basic miscalculations.¹⁶⁶ A reasonable expectation of the purchaser is that it will not suffer losses as a result of fundamental defects in the software.

Likewise, the economic realities of the software industry defeat another basic premise underlying shrinkwrap agreements. Courts do not consider shrinkwrap agreements as truly "take it or leave it" contracts because purchasers can always choose another vendor.¹⁶⁷ While an individual or business may have a few vendors from which to select for the purchase of a computer (e.g., Dell, Gateway, or Hewlett Packard/Compaq), there is effectively only one vendor for the operating system of that computer.¹⁶⁸ Also, since disclaimers of warranties and limitations of remedies are standard provisions in shrinkwrap agreements, purchasers are effectively unable to find an alternative vendor that doesn't include those provisions.

A Modest Proposal: New Theories of Liability for Defective Software

While there are certainly strong arguments to open products liability laws to defective software,¹⁶⁹ the economic loss doctrine is currently an insurmountable obstacle.¹⁷⁰ Since courts insist in maintaining the distinction between tort and contract law, the most logical approach to incorporating liability for defective software is in contract law. Just as the U.C.C. and UCITA prohibit a limitation of consequential damages for injury to the person in the case of consumer goods,¹⁷¹ so a similar approach can apply to severely defective software:

Where mass-produced, off-the-shelf software distributed through a shrinkwrap agreement contains a severe defect that renders the software unmerchantable, any limitation or exclusion of consequential damages provision contained within the agreement should be invalidated.

This approach is limited to shrinkwrap agreements to protect the terms in non-standardized contracts, which may include a limitation of consequential damages, which are truly bargained for between parties. Preserving the use of shrinkwrap agreements also continues the economic efficiencies provided by standardized contracts.¹⁷² This approach also allows courts to turn to U.C.C. § 2-314, which defines merchantability, and existing case law interpreting § 2-314 to make a determination of merchantability.

Interestingly, UCITA's § 2B-403, which defines merchantability,¹⁷³ recognizes the reality that defects exist in software.¹⁷⁴ To some extent, it accepts defective software as part of the definition of merchantability.¹⁷⁵ The approach proposed in this paper acknowledges that it is essentially impossible to produce defect-free software. But there is a difference between minor defects which may cause some annoyance and interference with the operation of a program, but still leave the software functional (or at least fit for the ordinary purpose for which it is used), versus serious errors which substantially impair the functionality of the software. Hence the focus on a severe defect which renders the software unmerchantable (i.e., not fit for the ordinary purpose for which it is used).

Of course, a "severe" defect must be defined. Some guidance is provided by UCITA. Although it does not define defect it recognizes that a software program is not merchantable "... if the significance of the errors or their number lies outside the ordinary commercial expectations for the particular type of program."¹⁷⁶ The "significance" of the errors should be such that the purchaser is deprived of a significant benefit of the product.¹⁷⁷

To protect the software vendor from truly unforeseeable software bugs, the definition of "severe" defect should also incorporate the basic definition of defective design under products liability law. This takes into consideration whether the

manufacturer could have adopted a reasonable alternative design to eliminate any foreseeable damages.¹⁷⁸ Therefore, errors which easily could have been detected and corrected, or which were ignored, and which substantially interfere with the functionality of the software would be considered “severe.” Under this approach, companies which suffer millions of dollars of damages as a result of a reasonably foreseeable fundamental defect in software have an opportunity to be compensated—contrary to current law.

Conclusion

The approach for liability for defective software suggested in this paper shifts the risks for severe software defects onto the vendors, who are the ones who should bear them—after all, they are the ones in control of the quality of the software. If, as it is argued, that the lack of liability provides little incentive for software vendors to minimize defects in software,¹⁷⁹ is the converse true? Under the threat of potential liability, will software vendors produce higher-quality software? We may already be seeing concrete actions taken as a result of recent calls for changes in the law regarding liability for defective software. In early 2002, Microsoft Chairman Bill Gates published a company-wide memo outlining a strategic direction for Microsoft to produce software that is available, reliable, and secure.¹⁸⁰ In the memo, Bill Gates is quoted as saying, “We must lead the industry to a whole new level of Trustworthiness in computing.”¹⁸¹ Importantly, Bill Gates is also quoted in the memo as saying, “So now, when we face a choice between adding features and resolving security issues, we need to choose security.”¹⁸² Of course, this does not mean that the issue of liability for defective software is moot. Indeed, some commentators are taking a “wait and see” attitude towards whether Microsoft truly alters its “features-over-reliability” approach.¹⁸³ It can certainly be inferred, however, that the world’s largest software company has changed its corporate strategy in response to calls for increased liabilities. This can certainly be seen as a step in the right direction for reliable computing.

Footnotes

¹ Computer programs (“software”) provide the instructions followed by computers in their operations. This paper includes discussion of four types of software: (1) operating systems (“An ‘operating system’ is a software program that controls the allocation and use of computer resources (such as central processing unit time, main memory space, disk space, and input/output channels). The operating system also supports the functions of software programs, called [(2)] ‘applications,’ that perform specific user-oriented tasks.” See U.S. v. Microsoft Corp., 84 F.Supp.2d 9, 1999 U.S. Dist. LEXIS 21782, *6 (D. D.C. 1999) (Findings of Fact).); (3) Web browsers (“A ‘Web browser’ is a type of Web client that enables a user to select, retrieve, and perceive resources on the Web.” See *id.*, 1999 U.S. Dist. LEXIS at *11.); and (4) Internet and Web application servers (A “... Web application server is the traffic cop for the Internet, creating and posting Web pages on the fly and handling transactions for the busiest Web sites and run-the-business applications.” See Jim Kerstetter, *A David Surrounded by Goliaths*, BUSINESSWEEK, May 27, 2002, at 88.). For a general description of the Internet, the World Wide Web, and Web browsers, see U.S. v. Microsoft Corp., *supra*, 1999 U.S. Dist. LEXIS at *9-11. Although Internet-based transactions (“e-commerce”) account for less than 2% of all trade, they are continuing to grow. See Robert D. Hof and Steve Hamm, *How E-Biz Rose, Fell, and Will Rise Anew*, BUSINESSWEEK, May 13, 2002, at 64. There are more than 500 million Internet users worldwide; Internet trade between businesses was just under \$500 billion in 2001; and online (*i.e.*, Internet-based) retail spending reached \$112 billion in 2001. *Id.*

² There is no precise definition of a software defect. The Institute of Electrical and Electronic Engineers (IEEE) defines a defect as a product anomaly, and defines an anomaly as “[a]ny condition that deviates from expectations based on requirements specifications, design documents, user documents, standards, etc. ...” See Cem Kaner, *What is a Serious Bug? Defining a “Material Breach” of a Software License Agreement*, 1996 (available at www.badssoftware.com/uccdfect.htm), referencing ANSI/IEEE Standard 982.1-1988, IEEE STANDARD DICTIONARY OF MEASURES TO PRODUCE RELIABLE SOFTWARE 13 (IEEE 1989) and IEEE Standard 1044-1993, IEEE STANDARD CLASSIFICATION FOR SOFTWARE ANOMALIES 3 (IEEE 1984). A software defect has also been defined as “... any flaw in the specification, design, or implementation of a product ...” Kaner, *supra*, quoting ROBERT B. GRADY AND DEBORAH L. CASWELL, SOFTWARE METRICS: ESTABLISHING A COMPANY-WIDE PROGRAM 78 (PTR Prentice-Hall 1987). An error or defect in computer software is generally referred to as a “bug.” Legend has it that the first reported computer bug was a moth trapped between two electrical relays in an early (1945) computer, causing the whole machine to shut down. See <http://www.webopedia.com/TERM/B/bug.html>. Within this paper, software defects may also be generally referred to as “errors,” “flaws,” and “bugs,” and software containing defects (or bugs) will also be generally referred to as “defective software.”

³ For lists of “famous” software bugs, see <http://www.zenger.informatik.tu-muenchen.de/persons/huckle/bugse.html>, <http://www.cs.tau.ac.il/~nachumd/verify/horror.html>, and <http://infotech.fanshawec.on.ca/gasantor/Computing/FamousBugs.htm>. See also Philip Elmer-DeWitt, *Ghost in the Machine*, TIME, January 29, 1990, at 58.

⁴ The “Millennium Bug” (*aka* Y2K bug) spawned a number of predictions of economic and social upheavals. For a summary of various predictions, *see* Declan McCullagh, *What They Said with Dread*, WIRED.COM, January 4, 2000 (available at <http://www.wired.com/news/politics/0,1283,33419,00.html>). *See also* Frank Hayes, *A Global Y2K Recession?*, COMPUTERWORLD, August 27, 1999 (available at <http://www.cnn.com/TECH/computing/9908/27/411.y2k.idg/>), discussing economist Dr. Edward Yardeni’s predictions regarding possible worldwide recessions and depressions resulting from the Y2K bug.

⁵ Pre-2000 estimates of the cost to fix the Millennium Bug, in the U.S. alone, ranged from \$50 billion to hundreds of billions of dollars (*see, e.g., Experts Debate Y2K Cost*, COMPUTERWORLD, June 8, 1999 (available at <http://www.strassmann.com/pubs/cw/y2kdebate/>)), to over \$1 trillion worldwide (*see, e.g., Marcia Stepanek, Y2K Is Worse Than Anyone Thought*, BUSINESSWEEK, December 14, 1998 (available at <http://www.businessweek.com/1998/50/b3608068.htm>)). Post-2000 estimates are approximately \$500 billion for businesses worldwide. *See* Des Dearlove, *The Heavy Price of Fear and Hype*, THE TIMES (LONDON), January 18, 2001 (available at LEXIS/NEXIS). Note that this figure happens to be equal to the total value of business-to-business Internet trade in 2001. *See* Hof & Hamm, *supra* note 1.

⁶ For a description of various types of malevolent software and Internet-related vulnerabilities, *see* Robin A. Brooks, *Detering the Spread of Viruses Online: Can Tort Law Tighten the “Net”?*, 17 REV. LITIG. 343, 347-351 (1998). The author personally witnessed a situation where outsiders (“hackers”) gained unauthorized access to a Web server over a holiday weekend. By the time the intrusion was detected, the hackers had taken complete control of the server, denying access to all authorized users and system administrators. The services on the Web server had to be completely re-installed and re-configured, resulting in the system being unavailable to users for at least one week and the loss of some critical data.

⁷ Paul Festa and Joe Wilcox, *Experts Estimate Damages in the Billions for Bug*, CNET NEWS.COM, May 5, 2000 (available at <http://news.com.com/2100-1001-240112.html>). Or was it \$15 billion in damages? *See* Sarah Faulkner, *Invasion of the Information Snatchers: Creating Liability for Corporations with Vulnerable Computer Networks*, 18 J. MARSHALL J. COMPUTER & INFO. L. 1019, 1021-22 (2000).

⁸ Many viruses accompany email messages and, when activated, automatically send themselves to others in email messages using the victim’s address book (which is a part of the Outlook email program). *See, e.g., Festa & Wilcox, supra* note 7. When companies provide a company-wide (global) list of email addresses in Outlook for each user, the virus sends itself to every address in the list, replicating itself over and over again as the virus reaches each user. A company’s email system is quickly engulfed in these messages. The system must be shut down while the system operators remove all copies of the infected messages, as well as await a “patch” (*see infra* note 16) which will prevent a recurrence of the virus. Based on the author’s personal experience, this “clean up” process can leave the company without an email system for days.

⁹ It is this author’s contention that security breaches which render computer systems inoperable or unavailable to authorized users and/or cause loss of data, and which could have been prevented by different or additional programming by the software manufacturer, reflect a error in programming no different from one that, without a security breach, would cause a computer to “crash,” or result in inaccurate calculations or loss of data. *See e.g., A Lemon Law for Software?*, THE ECONOMIST, March 14, 2002 (available at http://www.economist.com/science/tq/displaystory.cfm?Story_ID=1020715), noting that software “... defects invariably provide security holes for malicious hackers to exploit.”

¹⁰ The term “manufacturer” in this paper refers to the business entity that actually produces and distributes the software. In this paper, the term “vendor” is used interchangeably with manufacturer.

¹¹ A recent survey conducted by the Computer Security Institute and the San Francisco Federal Bureau of Investigation discovered the following trends (based on 503 responses from businesses): Ninety percent of respondents detected computer security breaches within the past 12 months; eighty percent of respondents acknowledged financial losses due to computer breaches; forty-four percent of respondents were willing and/or able to quantify losses from computer breaches, totaling just under \$500 million, for an average of just over \$2 million per respondent; seventy-four percent of the respondents reported their Internet connection as a frequent point of attack; and eighty-five percent reported detecting computer viruses. Computer Security Institute, *2002 CSI/FBI Computer Crime and Security Survey*, COMPUTER SECURITY ISSUES & TRENDS, Vol. VIII, No. 1 (2002) (available at <http://www.gocsi.com>). It has also been estimated that “faulty” software cost U.S. businesses \$100 billion in 2001. *See A Lemon Law for Software?*, *supra* note 9.

¹² *See, e.g., Joseph Menn, Security Flaws May Be Pitfall for Microsoft*, LOS ANGELES TIMES, January 14, 2002 (available at <https://www.latimes.com/business/la-000003463jan14.story?coll=la-headlines-business-manual>).

¹³ Microsoft reported over \$13 billion in cash from operations for the fiscal year ending June 30, 2001 (compared to just over \$10 billion for the fiscal year ending January 31, 2002 for Wal-Mart Stores, Inc., the world’s largest retailer in terms of sales revenue, and compared to just over \$14 billion in cash from operations for the fiscal year ending December 31, 2001 for IBM, which also receives significant revenues from computer hardware sales and consulting services). Microsoft already has a monopoly on the operating system software that controls personal computers. *See* U.S. v. Microsoft Corp., 253 F.3d 34, 46 (D.C. Cir. 2001) (“... Microsoft violated § 2 of the Sherman Act by employing anticompetitive means to maintain a monopoly in the operating system market ...”). Microsoft’s email software has just recently become the leading corporate email software in the world. *See* Rebecca Buckman and William M. Bulkeley, *IBM, Microsoft Battle Again, This Time Over*

“*Web Services*,” THE WALL STREET JOURNAL, May 10, 2002, at B1. Likewise, Microsoft has begun an intensive marketing campaign to dominate the Web services market, providing the underlying software to support Web-based computer applications. *Id.* Microsoft includes its Web application server software free in its Windows server operating system. See Kerstetter, *supra* note 1.

¹⁴ The reasons Microsoft products are particularly susceptible include: (1) lack of separation of data and computer code (in other words, Microsoft products, such as Outlook and Internet Explorer, allow instructions to be imbedded within the contents of email messages (Outlook) and Web pages (Internet Explorer)); (2) default settings which install more features than users need or want, often increasing vulnerability (for example, a recent security flaw in Windows XP was found in a new Plug-and-Play feature that is automatically activated but for which there are no devices currently on the market that can use the new feature); (3) intermingling a variety of services so that if a user wants one service, she must install a number of unwanted services; (4) producing “brittle” software (*i.e.*, due to programming flaws the software can easily break down and expose critical elements to outside attack); and (5) lack of auditability (*i.e.*, much of the Microsoft operating system operates invisibly, without the user’s knowledge, and often without an audit trail to record events, resulting in users having difficulty controlling their own system or knowing what the system is doing). See Bruce Schneier and Adam Shostack, *Results, Not Resolutions: A Guide to Judging Microsoft’s Security Progress*, SECURITYFOCUS ONLINE, January 24, 2002 (available at <http://online.securityfocus.com/news/315>). Recently a Gartner, Inc. analyst “... recommended that IT shops using Microsoft’s Internet Information Server (IIS) should ‘immediately investigate alternatives to IIS’ because of security problems ...” See Frank Hayes, *Time to Retool IIS*, COMPUTERWORLD, October 1, 2001, at 62 and Jaikumar Vijayan, *IIS Is As Secure as Other Web Servers, Claims Microsoft*, COMPUTERWORLD, October 1, 2001, at 10. Microsoft has argued “... that there are so many Windows-specific viruses, worms and Trojan horses not because Windows is so insecure, but because Windows has the largest market share.” See Nicholas Petreley, *The Cost of Free IIS*, COMPUTERWORLD, October 22, 2001, at 49. However:

According to the Netcraft Web survey (www.netcraft.co.uk/survey), Apache [a different Internet server software] runs about 60% of Internet Web sites. About 28% are running a flavor [*i.e.*, version] of Microsoft IIS, which includes every Joe Blow with a cable modem running Windows 9x and the Microsoft Personal Web server. So, if the problem is market share and not bad software, then why over a five-day period did my Web servers log 35,000 Nimda and Code Red probes [*i.e.*, attempts by virus programs to penetrate the Web site] that exploit IIS-specific weaknesses, but not a single probe related to Apache?

Id.

¹⁵ It is estimated there are approximately 55 million lines of code comprising Windows 2000, the precursor to Microsoft’s latest version of Windows, Windows XP. See, e.g., <http://www.biznix.org/whylinux/windows/win2000.html>. “In the software environment, it is virtually impossible to produce software of complexity that contains no errors in instructions that intermittently cause the program to malfunction, so-called ‘bugs.’” Uniform Computer Information Transactions Act (“UCITA”), § 2B-403, Reporter’s Notes, ¶ 2.a. See *infra* note 85 and accompanying text. See *infra* notes 74-76 and accompanying text for a general discussion of UCITA.

¹⁶ Mark Rasch, “*Responsible Disclosure*” Draft Could Have Legal Muscle, SECURITYFOCUS ONLINE, March 11, 2002 (available at <http://online.securityfocus.com/columnists/66>). A “patch” is additional software released by the vendor to correct a specific error or deficiency in previously released software.

¹⁷ *Id.*

¹⁸ See Menn, *supra* note 12.

¹⁹ *Id.* See also Carol Siliwa, *Security Challenges Take Toll: Windows XP Still Under Scrutiny*, COMPUTERWORLD, January 7, 2002, at 1.

²⁰ Computer Science and Telecommunications Board, *Cybersecurity Today and Tomorrow: Pay Now or Pay Later*, National Academy Press, Washington, D.C., 2002, at 17 (available at <http://books.nap.edu/html/cybersecurity/>).

²¹ See, e.g., Menn, *supra* note 12, quoting Rep. Rick Boucher (D-Va.), “The producers of software should be responsible for any flaws that the software contains....”

²² See, e.g., Ira Sager and Jay Greene, *The Best Way to Make Software Secure: Liability*, BUSINESSWEEK, March 18, 2002, at 61, in which the authors argue that Microsoft and other off-the-shelf software makers have little incentive to make their software more secure because they are not subject to products liability laws. See also *A Lemon Law for Software?*, *supra* note 9.

²³ The term “mass-produced, off-the-shelf” is used to differentiate popular software programs, identical copies of which are used by millions of people worldwide, from customized software which is designed for the particular needs of an individual or business. Users of mass-produced, off-the-shelf software each receive an identical copy which can only be customized or configured through options and features provided in the original software package. This type of software may also be generally referred to in this paper as “pre-packaged.” Pre-packaged software is certainly not limited to consumer transactions. Many of the basic software programs used by businesses (such as workstation operating systems, network operating systems, word processing and spreadsheet applications, email, and Web server software) are pre-packaged.

²⁴ See generally Peter A. Alces, *W(h)ither Warranty: The B(l)oom of Products Liability Theory in Cases of Deficient Software Design*, 87 CALIF. L. REV. 269, 294 (1999).

²⁵ See 17 U.S.C. §§ 101-801.

²⁶ See Arti Rai, *Re-Engineering Patent Law: The Challenge of New Technologies: Part II: Judicial Issues: Addressing the Patent Gold Rush: The Role of Deference to PTO Patent Denials*, 2 WASH. U. J.L. & POL'Y 199 (2000), and Soma, et al., *Software Patents: A U.S. and E.U. Comparison*, 8 U. BALT. INTELL. PROP. J. 1 (Fall, 1999/Summer, 2000).

²⁷ See, e.g., *Advent Systems Ltd. v. Unisys Corp.*, 925 F.2d 670, 675-76 (3d Cir. 1991). See generally, Robert A. Holmes, *Application of Article Two of the Uniform Commercial Code to Computer System Acquisition*, 9 RUTGERS COMPUTER & TECH. L. J. 1 (1982); Bonna Lynn Horowitz, *Computer Software as a Good Under the Uniform Commercial Code: Taking a Byte Out of the Intangibility Myth*, 65 B.U. L. REV. 129 (1985); David A. Owen, *The Application of Article 2 of the Uniform Commercial Code to Computer Contracts*, 14 N. KY. L. REV. 277 (1987); Andrew Rodau, *Computer Software: Does Article 2 of the Uniform Commercial Code Apply?*, 35 EMORY L. J. 853 (1986); and Andrew Rodau, *Computer Software Contracts: A Review of the Caselaw*, 21 AKRON L. REV. 45 (1987).

²⁸ See *infra* notes 44-50 and accompanying text.

²⁹ See *infra* notes 139-150 and accompanying text.

³⁰ See *supra* note 27.

³¹ U.C.C. § 2-106(1) (emphasis added).

³² *ProCD, Inc. v. Zeidenberg*, 86 F.3d 1447, 1450 (7th Cir. 1996).

³³ See *supra* note 25.

³⁴ 17 U.S.C. § 109(a).

³⁵ *Microsoft Corp. v. Harmony Computers & Electronics, Inc.* 846 F.Supp. 208, 213 (E.D. N.Y. 1994), *citing* *ISC-Bunker Ramo Corp. v. Altech, Inc.*, 765 F. Supp. 1310, 1331 (N.D. Ill. 1990).

³⁶ Since the U.C.C. applies to the sale of goods, the provider of the goods is generally referred to as the “seller.” For software licenses, the software manufacturer would actually be the “licensor,” but in discussions of the application of the U.C.C. the licensor, for convenience, may also be referred to as a “seller” in this paper. Likewise, the party acquiring the software under a license agreement would be the “licensee,” but in discussions of the application of the U.C.C. the licensee, for convenience, may also be referred to in this paper as the “buyer” or “purchaser.”

³⁷ U.C.C. §§ 2-313(1)(a) & (b).

³⁸ U.C.C. §§ 2-314(1) & (2)(a) & (c).

³⁹ U.C.C. § 2-316 (Exclusion and Modification of Warranties), and U.C.C. §2-719 (Contractual Modification or Limitation of Remedy).

⁴⁰ See, e.g., *Hou-Tex, Inc. v. Landmark Graphics*, 26 S.W.3d 103 (Tex. App. 2000), in which the software manufacturer, Landmark, provided the following warranty disclaimer:

5. Disclaimer of Warranty: It is your responsibility to choose, maintain, and match the hardware and software components of your computer. Thus [Landmark] does not guarantee uninterrupted service, and this software is licensed on an "AS IS" basis.

THE SOFTWARE IS PROVIDED AS IS, AND [LANDMARK] DISCLAIMS ANY AND ALL REPRESENTATIONS OR WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, WITH RESPECT TO IT, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Id. at 110.

Below are the limited warranties, disclaimer of other warranties, and limitation of remedies provided in the Microsoft End-User License Agreement which accompanies Microsoft's Windows XP operating system:

LIMITED WARRANTY. Manufacturer warrants that (a) the SOFTWARE will perform substantially in accordance with the accompanying written materials for a period of ninety (90) days from the date of receipt, and (b) any Microsoft hardware accompanying the SOFTWARE will be free from defects in materials and workmanship under normal use and service for a period of one (1) year from the date of receipt. Any implied warranties on the SOFTWARE and Microsoft hardware are limited to ninety (90) days and one (1) year, respectively. Some states/jurisdictions do not allow limitations on duration of an implied warranty, so the above limitation may not apply to you.

CUSTOMER REMEDIES. Manufacturer's and its suppliers' entire liability and your exclusive remedy shall be, at Manufacturer's option, either (a) return of the price paid, or (b) repair or replacement of the SOFTWARE or hardware that does not meet this Limited Warranty and which is returned to Manufacturer with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE or hardware has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE or hardware will be warranted for the remainder of the original warranty period or thirty (30) days, whichever is longer.

NO OTHER WARRANTIES. To the maximum extent permitted by applicable law, Manufacturer and its suppliers disclaim all other warranties, either express or implied, including, but not limited to implied warranties of merchantability and fitness for a particular purpose, with regard to the SOFTWARE, the accompanying written materials, and any accompanying hardware. This limited warranty gives you specific legal rights. You may have others which vary from state/jurisdiction to state/jurisdiction.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES. To the maximum extent permitted by applicable law, in no event shall Manufacturer or its suppliers be liable for any damages whatsoever (including without limitation, special, incidental, consequential, or indirect damages for personal injury, loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use this product, even if Manufacturer has been advised of the possibility of such damages. In any case, Manufacturer's and its suppliers' entire liability under any provision of this agreement shall be limited to the amount actually paid by you for the SOFTWARE and/or Microsoft hardware. Because some states/jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

⁴¹ “The UCC ‘allows manufacturers to restrict their liability by the exclusion or modification of both implied and express warranties.’” *Hou-Tex*, *supra* note 40 at 110, quoting *Nobility Homes of Texas, Inc. v. Shivers*, 557 S.W.2d 77, 82 (Tex. 1977). “Just as commercial parties may agree to waive warranties, they may legally contract to limit recoverable damages, provided the agreement clearly reflects the parties' intention to do so.” *Traina v. NationsBank of Texas, N.A.*, 00-1160 SECTION: “R”(5), 2001 U.S. Dist. LEXIS 14612, *12 (E.D. La. September 7, 2001).

⁴² *Saratoga Fishing Co. v. J. M. Martinac & Co.*, 520 U.S. 875, 880 (1997). “Basically, warranties fix risk.” Alces, *supra* note 24 at 277. Professor Alces points out that when U.C.C. Article 2 was drafted:

...The sales law at the time applied contract principles to recurring transactions among relatively sophisticated transactors. From the drafting perspective, Article 2 was bilateral legislation, in that it did not favor one party's interest over the other. Large institutional sellers such as the Ford Motor Company or Sears were as often buyers as they were sellers, and these large institutional interests would not have been served by legislation that favored either buyers or sellers as a class. The drafters, therefore, had a real interest in enacting legislation that would provide certain, predictable results, rather than legislation that would accommodate one business interest at the expense of another.

Id. at 291 (footnotes omitted).

⁴³ *Seely v. White Motor Co.*, 403 P.2d 145, 151 (1965) (citation omitted).

⁴⁴ *See generally ProCD*, *supra* note 32 at 1449.

⁴⁵ *See generally* *Specht v. Netscape Communications Corp.*, 150 F. Supp.2d 585, 593-94 (S.D. N.Y. 2001).

⁴⁶ *See generally id.* at 594, and *Pollstar v. Gigmania Ltd.*, 170 F.Supp.2d 974, 981 (E.D. Ca. 2000).

⁴⁷ Except where a specific type of agreement is being discussed, shrinkwrap, clickwrap, and browsewrap agreements will generally be referred to hereinafter as “shrinkwrap” agreements.

⁴⁸ The 1997 U.S. Census (the latest date for which comprehensive data is available) reflects nearly \$61.7 billion in annual receipts for “software publishers” (SIC code 7372, tracking pre-packaged software, including operating systems, applications, utilities, and games) (available at <http://www.census.gov/epcd/ec97sic/E97SUSI.HTM>). This compares with \$38.3 billion in annual receipts for custom software (SIC code 7371). *Id.*

⁴⁹ *Standard Oil Co. of Cal. v. Perkins*, 347 F.2d 379, 383 n.5 (9th Cir. 1965).

⁵⁰ *See, e.g., ProCD*, *supra* note 32. *Cf. Hill v. Gateway 2000, Inc.*, 105 F.3d 1147 (7th Cir.), *cert. denied*, 522 U.S. 808, 118 S.Ct. 47, 139 L.Ed.2d 569 (1998) (enforcing “accept or return in 30 days” provision in agreement accompanying computer purchased via telephone), and *Mortenson v. Timberline Software*, 998 P.2d 305, 313 (Wa. 2000) (terms in shrinkwrap license agreement become part of agreement through “layered contracts”). *See also* James C. Hoyer, *Click—Do We Have a Deal?*, 6 SUFFOLK J. TRIAL & APP. ADV. 163, 165 (2001), noting that most courts have enforced shrinkwrap agreements. *But see* *Vault v. Quaid Software, Ltd.*, 847 F.2d 225, 268-69 (5th Cir. 1988) (shrinkwrap agreement in compliance with Louisiana Software License Enforcement Act, La.Rev.Stat. Ann. § 51:1961 *et seq.*, unenforceable due to preemption by U.S. Copyright Act, 17 U.S.C. § 101 *et seq.*) and *Brower v. Gateway 2000, Inc.*, 676 N.Y.S.2d 569 (1988) (refusing to enforce an arbitration clause in a shrinkwrap agreement as substantively unenforceable). Although Hoyer asserts that “... current caselaw has not firmly established whether clickwrap agreements are enforceable ...”, Hoyer, *supra* at 165, all reported decisions to date which have addressed the issue of whether a clickwrap- or browsewrap-type agreement is enforceable have, at a minimum, not declared such an agreement as unenforceable or invalid. *See Pollstar*, *supra* note 46 at 982 (declining to “... declare the invalidity and unenforceability ...” of a browsewrap agreement in considering the defendant's motion to dismiss); *Caspi v. The Microsoft Network, L.L.C.*, 732 A.2d 528 (N.J. Sup. 1999), *cert. denied*, 743 A.2d 851 (N.J. 1999) (enforcing the forum selection clause contained in a clickwrap-type subscriber membership registration process); and *Hotmail Corp. v. Van Money Pie, Inc.*,

C98-20064 JW, C-98 JW PVT ENE, 1998 U.S. Dist. LEXIS 10729, 47 U.S.P.Q.2d (BNA) 1020 (N.D. Ca. 1998) (granting preliminary injunction where defendants sent email in violation of “Terms of Service” agreement entered through a clickwrap-type registration process).

⁵¹ *ProCD*, *supra* note 32 at 1451, *quoting* Restatement (2d) of Contracts § 211 comment a (1981).

⁵² *Id.* at 1452.

⁵³ *See, e.g., Brower*, *supra* note 50. “Although the parties clearly do not possess equal bargaining power, this factor alone does not invalidate the contract as one of adhesion.” *Id.* at 572.

⁵⁴ “...[W]ith the ability to make the purchase elsewhere and the express option to return the goods, the consumer is not in a ‘take it or leave it’ position at all; if any term of the agreement is unacceptable to the consumer, he or she can easily buy a competitor's product instead” *Id.* *See generally, ProCD supra* note 32 at 1453.

⁵⁵ 612 S.W.2d 413 (Mo. App. 1981).

⁵⁶ *Id.* at 422-23 (citations and footnote omitted).

⁵⁷ *Id.* at 423 (citations omitted).

⁵⁸ “Consequential damages may be limited or excluded unless the limitation or exclusion is unconscionable. Limitation of consequential damages for injury to the person in the case of consumer goods is prima facie unconscionable, but limitation of damages where the loss is commercial is not.” U.C.C. § 2-719(3). *See also Mortenson*, *supra* note 50 at 314.

⁵⁹ *See generally, id.* *See also, Brower*, *supra* note 50 at 573.

⁶⁰ *See supra* note 59.

⁶¹ *Mortenson*, *supra* note 50.

⁶² *Id.* at 315, *quoting* Comment 3 to U.C.C. § 2-719.

⁶³ *Id.* (emphasis added). The *Mortenson* court distinguished its focus on the type of clause which generally cannot be substantively unconscionable to the mandatory arbitration clause found to be substantively unconscionable in a shrinkwrap agreement in *Brower*, *supra* note 50—a clause limiting damages due to defects in the product which was the subject of the contract vs. a clause requiring mandatory arbitration with a French arbitration company requiring an advance fee of \$4,000. *Mortenson*, *supra* note 50 at 315. The former involved allocation of risk; the latter did not.

⁶⁴ *Id.* *See also, Brower*, *supra* note 50 at 573.

⁶⁵ *Brower*, *supra* note 50 at 573.

⁶⁶ *See, e.g., id.* *See also Mortenson*, *supra* note 50 at 315. An adhesion contract is not, *per se*, unconscionable. The contract must still be examined for unfairness. *See* Batya Goodman, *Honey, I Shrink-Wrapped the Consumer: The Shrink-Wrap Agreement As an Adhesion Contract*, 21 CARDOZO L. REV. 319, 327 (1999), *citing* Guthman v. La Vida Llana, 709 P.2d 675 (N.M. 1985).

⁶⁷ *See, e.g., Caudill Seed v. Prophet 21, Inc.*, 123 F.Supp.2d 826 (E.D. Pa. 2000), which involved the following provisions in the defendant’s license agreement:

LIMITATION OF LIABILITY. In no event shall Prophet 21 be liable for any direct, indirect, consequential or resulting damages or injury due to failure of, or otherwise arising out of the Software, or for any lost profits, time, business, records, or other monetary damages, nor for any claim or demand against Licensee by any other person. Licensee shall indemnify and hold Prophet 21 harmless against any claim asserted against Prophet 21 as a result of, or arising out of Licensee's use of the Software. LICENSEE'S SOLE AND EXCLUSIVE REMEDY FOR ANY FAILURE OF THE SOFTWARE SHALL BE THE WARRANTIES CONTAINED HEREIN AND THESE ARE IN LIEU OF ANY AND ALL OTHER WARRANTIES. THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE EXCEPT AS HEREIN EXPRESSLY PROVIDED. UNDER NO CIRCUMSTANCES WILL PROPHET 21'S LIABILITY EXCEED THE COST OF THE SOFTWARE SET FORTH ON THE SCHEDULE.

...

WARRANTY SOFTWARE. Prophet warrants that (i) it has the right to license the Software to Licensee; (ii) the Software shall operate in conformity with the then current Documentation; (iii) if the licensed Software fails to function in accordance with this Documentation, Prophet 21 will, for a period of one (1) year from the date of shipment, without charge to Licensee, make all corrections required to make the Software operate. The Licensee is responsible for sending evidence of the nonconformity to Prophet 21. Prophet 21 will respond by finding the cause of the nonconformity and correcting the same. Licensee is responsible for installing any such Software correction. Prophet 21 does not warrant that the Software will meet all of Licensee's requirements nor that the use of the Software will be uninterrupted or error free. Warranty of the Software is separate from maintenance and support of the Software. Refer to Paragraph 7 for Software maintenance and service offerings.

Id. at 828.

⁶⁸ *Id.* at 829, *citing* New York State Elec. & Gas Corp. v. Westinghouse Elec. Corp., 387 Pa. Super. 537, 557, 564 A.2d 919 (1989), *quoting* WHITE, J.J. & SUMMERS R.S., UNIFORM COMMERCIAL CODE 469 (2d ed. 1980).

⁶⁹ As explained in Comment 1 to § 2-719, "... under [§ 2-719] subsection (2), where an apparently fair and reasonable clause because of circumstances fails in its purpose or operates to deprive either party of the substantial value of the bargain, it must give way to the general remedy provisions of this Article."

⁷⁰ Dowty Communications v. Novatel Computer Sys. Corp., 817 F. Supp. 581, 585-86 (D. Md. 1992) (citation omitted), *aff'd. sub nom.* Cray Communications v. Novatel Computer Sys., 33 F.3d 390 (4th Cir. 1994), *cert. denied*, 513 U.S. 1191, 115 S.Ct. 1254, 131 L.Ed.2d 135 (1995).

⁷¹ *See generally id.* at 587.

⁷² *See, e.g., Caudill, supra* note 67 at 832. *See also* Ragen Corp. v. Kearney & Trecker Corp., 912 F.2d 619, 625 (3d Cir. 1990). For a discussion of the analysis underlying the various court decisions that negate a consequential damages exclusion upon a finding of a failure of the essential purpose of a remedy, *see* Douglas E. Phillips, *Consequential Damages Exclusions Under UCITA*, 19 J. MARSHALL J. COMPUTER & INFO. L. 295, 301-02 (2001) (referring to UCITA § 2B-703 under an earlier numbering scheme as § 2B-803).

⁷³ *See, e.g., Chatlos Sys., Inc. v. National Cash Register Corp.*, 635 F.2d 1081, 1086 (3d Cir. 1980). *See also Dowty, supra* note 70. The *Dowty* court determined that the remedy did not fail of its essential purpose because the buyer failed to present evidence that the seller was unwilling or unable to repair or replace the allegedly defective products. *Id.* at 588. However, the court stated that if the remedy had failed of its essential purpose, it would still uphold the consequential damages exclusion in the contract. *Id.* at 588-89. For a discussion of the analysis underlying the various court decisions that generally uphold a consequential damages exclusion even upon a finding of a failure of the essential purpose of a remedy, *see* Phillips, *supra* note 72 at 306-08. Phillips also discusses a "mixed" approach taken by some courts, which generally enforce the consequential damages exclusion but on a case-by-case basis. *Id.* at 302-306.

⁷⁴ The final draft of UCITA was adopted by the National Conference of Commissioners on Uniform State Laws in July, 1999. *See* Thomas J. Murphy, *It's Just Another Little Bit of History Repeating: UCITA in the Evolving Age of Information*, 30 GOLDEN GATE U.L. REV. 559, 559 (2000). Nineteen amendments, however, were recommended in December, 2001 (Report of UCITA Standby Committee, December 17, 2001, available at <http://www.nccusl.org/nccusl/UCITA-2001-comm-fin.htm>). At least two states have enacted UCITA and UCITA bills have been introduced in at least six states. *See* Phillips, *supra* note 72 at 296. All references to UCITA in this paper are to the final (July, 1999) draft.

⁷⁵ UCITA § 2B-103(a).

⁷⁶ UCITA § 2B-102(b). A computer information transaction "... does not include a contract to distribute or create for purposes of distribution, information in print form." *Id.* UCITA Article 2B

... focuses on transactions involving creation or distribution of computer software, multimedia or interactive products, computer data, Internet, and online distribution of information. This leaves unaffected the many transactions in the core businesses of other information industries (e.g., print, motion picture, broadcast, sound recordings) whose business practices in their core businesses differ from those of the computer software, online, and data industries. This article does not apply to print books, newspapers, or magazines. ...

UCITA § 2B-103, Reporter's Notes, ¶ 2.

⁷⁷ UCITA § 2B-102(a)(8).

⁷⁸ UCITA § 2B-703, Reporter's Notes, ¶ 5.

⁷⁹ *See* note 72, *supra*. UCITA provides an additional twist to the failure of remedy issue. According to the Reporter's Notes, if the remedy requires or permits a refund, the remedy does not fail even if the software vendor cannot provide a functioning product. UCITA § 2B-703, Reporter's Notes ¶ 4. "This article does not give a court the right to invalidate a remedy limitation because it believes that the limitation does not afford a 'minimum adequate remedy' for the aggrieved party." *Id.* This is in direct contrast to the approach taken by at least one court. In *Cooley v. Big Horn Harvestore Systems, Inc.*, 813 P.2d 736 (Colo. 1991), the defendant had sold equipment with a warranty that provided an exclusive remedy of repair, replace or credit. Despite the availability of the credit remedy, the *Cooley* court found that the remedy had failed of its essential purpose because "[t]he Cooleys' purchase had value only to the extent the ... system functioned." *Id.* at 745. It appears therefore, that under UCITA, if a software vendor offers a refund (or credit) as part of the available remedy, the remedy can never fail of its essential purpose (as long, of course, as the vendor is willing to provide the refund or credit).

⁸⁰ *See Dowty, supra* note 70 at 589. *See also* Colonial Life Ins. Co. v. Elec. Data Sys. Corp., 817 F. Supp. 235, 241-42 (D. N.H. 1993).

⁸¹ "Therefore, it follows that the contractual limitation of liability is not enforceable under New Hampshire law if plaintiff's claim of fraud, bad faith and/or 'total and fundamental' breach is proven at trial." *Colonial Life Ins., supra* note 80 at 242-43. *See also Dowty, supra* note 70 at 589-91; PK's Landing v. New England Tel., 519 A.2d 285, 287 (1986) ("wanton and willful conduct intended to harm is not subject to the limitation of liability."); RRX Industries, Inc. v. Lab-Con, Inc, 772 F.2d 543 (9th Cir. 1985) (damage limitation ignored where breach "total and fundamental"); and Long Island Lighting Co. v.

Transamerica Delaval, Inc., 646 F.Supp. 1442 (S.D. N.Y. 1986) (damage limitation invalid when defendant acts fraudulently or in bad faith).

⁸² See Phillips, *supra* note 72 at 311-12.

⁸³ See, e.g., Cem Kaner, *Uniform Computer Information Transaction Act: Software Engineering and UCITA*, 18 J. MARSHALL J. COMPUTER & INFO. L. 435, 436-44 (1999), detailing the broad variety of opposition to UCITA. See generally *id.* for a detailed discussion of the shortcomings of UCITA.

⁸⁴ *Id.* at 444.

⁸⁵ UCITA § 2B-403, Reporter's Notes, ¶ 2.a. As the Director of the Software Engineering Institute stated in a letter to the drafters of UCITA:

The Article 2B draft assumes that software products are inherently defective and that the current quality practices in the industry will not improve. The history in other fields demonstrates that as a technology matures, the marketplace becomes more sensitive to quality issues. In fact, software quality is a growing concern to the user community, and software quality is an active current area of study. ... We feel that ... [Article 2B] ... would inhibit natural market forces, damage users, and ultimately limit the health and growth of this industry.

Kaner, *supra* note 83 at 456.

⁸⁶ Kaner, *supra* note 83 at 454. "... [A] large proportion of defects (often the vast majority of them) that reach customers are discovered and intentionally left unfixed by the publisher before the product is released." *Id.* See also, *Hou-Tex*, *supra* note 40 at 106, in which corrections to a defect in a software program had not been sent to all users.

⁸⁷ See, e.g., <http://jscript.dk/unpatched/> which lists, as of May 21, 2002, fourteen "vulnerabilities" in Microsoft's Internet Explorer Web browser software which have not yet been "patched" (corrected) by Microsoft.

⁸⁸ See, e.g., Jaikumar Vijayan, *Microsoft: Loose Lips Give Hackers Tips*, COMPUTERWORLD, October 22, 2001, at 6, reporting that Microsoft had "... urged the security community to exercise better judgment about publicizing software vulnerabilities ..."

⁸⁹ UCITA § 2B-406 and U.C.C. §2-316.

⁹⁰ See, e.g., Alces, *supra* note 24 at 281.

⁹¹ See *supra* notes 44-46 and 50 and accompanying text.

⁹² See *supra* note 48.

⁹³ *Montgomery County v. Microvote Corp.*, No. 97-6331, 2000 U.S. Dist. LEXIS 983, *9-10 (E.D. Pa. February 3, 2000) (citations omitted).

⁹⁴ See *supra* note 67.

⁹⁵ *Id.* at 833-34 (citations and footnotes omitted).

⁹⁶ See *supra* note 27.

⁹⁷ 762 A.2d 804 (Vt. 2000).

⁹⁸ *Id.* at 807-08 (citations omitted).

⁹⁹ See *supra* note 40.

¹⁰⁰ *Id.* at 106.

¹⁰¹ *Id.* at 107.

¹⁰² The plaintiff must show (1) a strict duty owed by the defendant, (2) breach of that duty, (3) causation, and (4) damages resulting therefrom. Restatement (Second) of Torts 402A (1965). See also Daniel T. Perlman, *Who Pays the Price of Computer Software Failure?*, 24 RUTGERS COMPUTER & TECH. L. J. 383, 396 (1998).

¹⁰³ See, e.g., *Hou-Tex*, *supra* note 40 (products liability claim for defective software dismissed); *Fishbein v. Corel Corp.*, 29 Pa. D. & C.4th 289 (1996) (products liability claim dismissed in class action complaint alleging that graphic design computer software designed and released by defendant was defective); *AT&T Corp. v. Medical Review of North Carolina, Inc.*, 876 F.Supp. 91 (E.D. N.Car. 1995) (North Carolina products liability law does not apply to case involving allegedly defective voice mail system); *Columbus McKinnon Corp., v. China Semiconductor Co., Ltd.*, 867 F.Supp. 1173 (W.D. N.Y. 1994) (products liability claim for defective semiconductor hardware and software components denied); *Affiliates for Evaluation v. Viasyn Corp.*, 500 So.2d 688 (Fla. App. 1987) (products liability claim denied where computer system experienced various mechanical breakdowns); *Antel Oldsmobile-Cadillac, Inc. v. Sirius Leasing Co.*, 475 N.Y.S.2d 944 (1984) (strict products liability claim not applicable where computer broke down resulting in loss of data); and *Jaskey Finance and Leasing v. Display Data Corp.*, 564 F.Supp. 160 (E.D. Penn. 1983) (products liability claim denied where plaintiffs alleged computer equipment and programs were negligently designed because they were insufficient to perform their contemplated tasks).

The closest any court has come to implying that products liability may be applicable to defective software is dictum contained in *Winter v. G.P. Putnam's Sons*, 938 F.2d 1033 (9th Cir. 1991). In *Winter*, the plaintiffs sued the publisher of the book *The Encyclopedia of Mushrooms* after the plaintiffs became extremely ill after picking and eating mushrooms based on instructions in the book. The Plaintiffs asserted that *The Encyclopedia of Mushrooms* should be analogized to aeronautical charts since several jurisdictions have held that charts which graphically depict geographic features or instrument approach

information for airplanes are "products" for the purpose of products liability law. *Id.* at 1035. The court was not persuaded by the plaintiffs' argument, noting:

Aeronautical charts are highly technical tools. They are graphic depictions of technical, mechanical data. The best analogy to an aeronautical chart is a compass. Both may be used to guide an individual who is engaged in an activity requiring certain knowledge of natural features. *Computer software that fails to yield the result for which it was designed may be another.* In contrast, *The Encyclopedia of Mushrooms* is like a book on how to use a compass or an aeronautical chart. The chart itself is like a physical "product" while the "How to Use" book is pure thought and expression.

Id. at 1036 (emphasis added).

¹⁰⁴ See e.g., *Hou-Tex*, *supra* note 40 at 107 (According to the court, the plaintiff suffered only economic damages. "Under the economic loss rule, economic damages are not recoverable [under strict products liability] unless they are accompanied by actual physical harm to persons or their property."); and *Fishbein*, *supra* note 103 (plaintiff's action in strict products liability for defective software is barred by the economic loss rule).

¹⁰⁵ *Sharon Steel Corp. v. Lakeshore, Inc.*, 753 F.2d 851, 854 (10th Cir. 1985).

¹⁰⁶ See *supra* note 43.

¹⁰⁷ *Id.* at 151 (citations omitted).

¹⁰⁸ 207 A.2d 305 (1965).

¹⁰⁹ *Id.* at 312.

¹¹⁰ See, e.g., *Daitom, Inc. v. Pennwalt Corp.*, 741 F.2d 1569, 1583 (10th Cir. 1984).

¹¹¹ 476 U.S. 858 (1986). Although *East River* is an admiralty case, the Court used "land-based" products liability, negligence, and contract theories in its analysis. *Id.* at 865.

¹¹² *Id.* at 870.

¹¹³ *Id.*

¹¹⁴ See *supra* note 103.

¹¹⁵ *Id.* at 295-96, quoting *New York State Electric and Gas Corp. v. Westinghouse Electric*, 564 A.2d 919, 925-26 (1989).

¹¹⁶ *Fishbein*, *supra* note 103 at 297 (footnote omitted).

¹¹⁷ See *supra* note 42. *Saratoga*, like *East River*, *supra* note 111, is a maritime case, but the Court noted that its context is purely commercial. *Saratoga*, *supra* note 42 at 878.

¹¹⁸ *Id.* at 878-79. It should be noted, however, that part of the Court's rationale for its decision was based on the fact that "...it is likely more difficult for a consumer—a commercial user and reseller—to offer an appropriate warranty on the used product he sells akin to a manufacturer's (or distributor's) warranty of the initial product." *Id.* at 882.

¹¹⁹ *Id.* at 880-81 (citations omitted).

¹²⁰ 126 F.3d 539 (1997) (applying Pennsylvania law).

¹²¹ The warehouse collapsed after the warranty for the building had expired and the plaintiff brought a products liability suit seeking damages for the loss of inventory stored in the warehouse at the time of the collapse.

¹²² *Id.* at 542.

¹²³ *Id.* at 544.

¹²⁴ See, e.g., Herbert Bernstein, *Civil Liability for Pure Economic Loss Under American Tort Law*, 46 AM. J. COMP. L. 111, 111-12 (1998), discussing the possible tort liability for consequential damages arising from personal injury and damage to *tangible* property.

¹²⁵ 30 F.3d 953 (8th Cir. 1994) (applying Minnesota law).

¹²⁶ The plaintiff had purchased an IBM computer system through a third party reseller for approximately \$500,000. One year later, a disk drive malfunctioned, causing the system to lose some data and be inoperable for nearly 36 hours. The plaintiff claimed over \$470,000 in damages as a result, 99% of which it attributed to loss of income.

¹²⁷ *Id.* at 957.

¹²⁸ *Id.* at 958.

¹²⁹ 53 F.3d 195 (8th Cir. 1995) (applying Missouri law).

¹³⁰ *Id.* at 198.

¹³¹ *Id.*, quoting *R.W. Murray Co. v. Shatterproof Glass Corp.*, 697 F.2d 818, 829 n.11 (8th Cir. 1983). Rockport also argued that the "computer crash" it suffered was a calamitous event, attempting to fall within the rule allowing for recovery in the event of a "violent occurrence." The court specifically rejected this argument as well, holding that a "[c]omputer crash" is a commonly used descriptive term for computer malfunction. It should not given the literal interpretation sought by Rockport here to do service beyond its ordinary meaning." *Rockport*, *supra* note 129 at 199 n.2.

¹³² See James A. Henderson, Jr. and Aaron D. Twerski, *Achieving Consensus on Defective Product Design*, 83 CORNELL L. REV. 867, 869 (1998).

¹³³ See generally *id.* at 869, n.6.

¹³⁴ See generally *id.* at 869-870, n.7.

¹³⁵ See *id.* at 919-20, concluding that §2(b) of the Restatement (Third) of Torts: Products Liability reflects the consensus view regarding design defects.

¹³⁶ See, e.g., *supra* notes 16 and 17 and accompanying text.

¹³⁷ See, e.g., *supra* notes 18 and 19 and accompanying text.

¹³⁸ For a general discussion of these issues, see Brooks, *supra* note 6, at 376-81.

¹³⁹ See *supra* note 27.

¹⁴⁰ See *supra* notes 24 and 25 and accompanying text.

¹⁴¹ No. 3:00cv2247 (JBA), 2002 U.S. Dist. LEXIS 6070 (D. Conn. March 27, 2002).

¹⁴² *Id.* at *12.

¹⁴³ *Id.*, quoting Restatement (Third) Torts: Products Liability § 19 cmt. d (1998). The *Wilson* court did note there are, however, exceptions, citing *Saloomey v. Jeppesen & Co.*, 707 F.2d 671 (2d Cir. 1983) (navigational chart used by pilots is a product for § 402A purposes). *Wilson*, *supra* note 141 at *12.

¹⁴⁴ *Id.* at *13.

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*, quoting Restatement (Third) Torts: Products Liability § 19 (1998). *Wilson* had argued that the interactive nature of the video game rendered through advanced technology had added “something more” that eliminates the distinction between the physical “container” of the ideas and the ideas themselves. The *Wilson* court rejected this argument, claiming that the technological “something more” in video games is no different from the technological “... developments at the turn of the twentieth century that ushered in the motion picture” *Id.*

¹⁴⁷ 188 F.Supp.2d 1264 (D. Colo. 2002).

¹⁴⁸ The *Sanders* case arose in the aftermath of the Columbine High School shooting in which it was alleged that the two killers were influenced by movies and video games. *Id.* at 1276-77.

¹⁴⁹ *Id.* at 1278.

¹⁵⁰ *Id.* at 1279.

¹⁵¹ *Supra* note 111.

¹⁵² *King v. Hilton-Davis*, 855 F.2d 1047, 1051 (3d Cir. 1988).

¹⁵³ See *supra* note 42.

¹⁵⁴ *Id.* at 880.

¹⁵⁵ See *infra* notes 179-181 and accompanying text.

¹⁵⁶ See *A Lemon Law for Software?*, *supra* note 11.

¹⁵⁷ See *supra* note 48.

¹⁵⁸ Of course, the amount spent on software in 2001 should be higher than the amounts reflected in the 1997 U.S. Census (see *supra* note 48), but these figures do not distinguish between business and consumer purchases, and the defect-related cost estimates (see *supra* note 156) relate only to businesses. Therefore, for the sake of argument, they will be considered roughly equal.

¹⁵⁹ Cf. *Alces*, *supra* note 24 at 284.

¹⁶⁰ *Henningsen v. Bloomfield Motors*, 161 A.2d 69, 85 (N.J. 1960).

¹⁶¹ *Alces*, *supra* note 24 at 288.

¹⁶² See *supra* notes 20-22 and accompanying text. See also *Alces*, *supra* note 24 at 299, arguing that “... where warranty fails, frustrated transactors and courts may resort to strict liability theories that heretofore have been unnecessary”

¹⁶³ *Estrin*, *supra* note 55 at 423.

¹⁶⁴ See, e.g., *Fishbein*, *supra* note 103.

¹⁶⁵ See, e.g., *Microsoft Corp. v. Manning*, 914 S.W.2d 602 (Tex. Ap. 1995), one of three class action lawsuits brought against Microsoft alleging that a programming defect in disk compression software included with MS-DOS 6.0 caused loss of data. The other two cases were *Stuessy v. Microsoft Corp.*, No. 9308-4784 (Court of Common Pleas of Philadelphia County), filed in September 1993, and *Davis v. Microsoft Corp.*, No. 963597 (Superior Court for the County of San Francisco), filed in September 1994. *Microsoft Corp. v. Manning*, 914 S.W.2d at 606. The *Manning* case was subsequently dismissed as moot on the plaintiff’s motion. See *Walt Borges, High Courts; Class Decertified, Much-Watched Microsoft Slips Off Docket*, TEXAS LAWYER, October 2, 1996, at 2 (available at LEXIS/NEXIS). There is no reported information regarding the two other cases.

¹⁶⁶ See, e.g., *Hou-Tex*, *supra* note 40.

¹⁶⁷ See *supra* note 54 and accompanying text.

¹⁶⁸ See generally note 13 and accompanying text.

¹⁶⁹ See, e.g., *Alces*, *supra* note 24.

¹⁷⁰ See *supra* notes 103 and 104 and accompanying text.

¹⁷¹ U.C.C. § 2-719(3) and UCITA § 2B-703(d).

¹⁷² See *supra* note 51 and accompanying text.

¹⁷³ (a) Unless the warranty is disclaimed or modified, a merchant licensor of a computer program warrants:

(1) to the end user that the computer program is reasonably fit for the ordinary purpose for which it is distributed;
... and
(3) that the program conforms to the promises or affirmations of fact made on the container or label, if any.

UCITA § 2B-403.

¹⁷⁴ See *supra* note 85 and accompanying text.

¹⁷⁵ *Id.*

¹⁷⁶ UCITA § 2B-403, Reporter's Notes, ¶ 2.a.

¹⁷⁷ See, Kaner, *What is a Serious Bug?*, *supra* note 2.

¹⁷⁸ See *generally supra* note 135.

¹⁷⁹ See, e.g., *supra* note 85, and Sager & Greene, *supra* note 22.

¹⁸⁰ See Schneier & Shostack, *supra* note 14.

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ See, e.g., *id.*