

A condensed version of this article appears as H.J. Onsrud, "Liability in the Use of GIS and Geographical Datasets" in: P. Longley, M. Goodchild, D. Maguire, and D. Rhind (eds.), *Geographical Information Systems: Vol.2 Management Issues and Applications*, John Wiley and Sons, Inc., 1999, pp. 643-652.

Liability in the use of geographic information systems and geographic datasets

by Harlan J. Onsrud, Department of Spatial Information Science and Engineering, University of Maine, Orono, Maine, 04469-5711, United States

(Research interests: legal, policy and institutional issues surrounding geographic information. Telephone 207-581-2175; fax 207-581-2206, email onsrud@spatial.maine.edu)

1 Introduction¹

Liability is a subject of great interest and concern in the geographic information system (GIS) community. Use of GIS data and software inevitably results in some action or decision. If errors or shortcomings have resulted in inappropriate actions or decisions and parties are harmed, the specter of liability arises for dataset and software producers as well as for all other parties involved in handling geographic information.

As a general proposition, legal liability for damages is a harm-based concept. For instance, those who have been specifically hired to provide data for a database or those who are offering data for sale to others are responsible for some level of competence in the performance of the service or for some level of fitness in the product offered. If others are damaged by mistakes that a producer should not have made or by inadequacies that should not have been allowed, the courts have reasoned that producers should bear some responsibility for the damages. But for their mistake or defective product, the damages would not have occurred. In commercial settings, liability exposure often may be reduced through appropriate communications, contracts, and business practices. However, liability exposure may never be eliminated completely. Nor as a society would we want it to be. Modern societies generally support the proposition that individuals and businesses should take responsibility for their actions if those actions have unjustifiably caused harm to others.

However, the law does not require perfection. The law exists and responds to a realistic world. No general purpose dataset will ever be complete for all potential purposes that users might desire. Nor will the accuracy of data ever meet the needs of all conceivable uses. It is also inevitable that errors and blunders will be contained in any practical database. Thus, the law holds that those in the information chain should be liable only for those damages they had a duty to prevent. Establishing the nature and extent of rightful duties has traditionally been accomplished under theories of tort or contract law. Legislation may impose additional or alternative liability burdens. Legislation affecting liability for spatial datasets and software typically might be found in statutes addressing such issues as intellectual property rights, privacy rights, anti-trust issues, and access rights.

The liability in data, products, and services related to computerized geographic information systems is complicated by legal theory uncertainties surrounding liability for maps. This is

¹ This article provides information of a general nature only. It is not intended to provide legal advice and statements in it should not be acted upon without consultation with appropriate legal counsel. This work is based upon work partially supported by the National Center for Geographic Information and Analysis (NCGIA) under NSF grant No. SBR 88-10917. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

compounded by the complexities and uncertainties in liability for information system products and services generally. Liability in GIS is further confused by the wide array of current and potential applications of geographic information technologies. Each application requires integration of information specific to the application and often will involve different attributes, analytical methods, spatial features, and accuracy requirements. The specific software and end users will also vary depending on the application to which the technology is being applied. Thus, the complexity of the legal questions surrounding geographic information system liability combined with the diversity of problems to which geographic information technologies are being applied has tended to create diffuse, changing, and often undefined liability concerns for all parties involved in geographic information production and use.²

People purchasing GIS software, datasets, products, and services are often disappointed in their expectations. Representations that software will accomplish certain tasks or that a dataset is complete or sufficient to accomplish specified tasks may be false or misleading. Datasets may contain errors and software may achieve inconsistent or wrong results. In these instances the disappointed purchaser or user usually has a contract relation with the technology product or service provider upon which to assert their claim. Thus, any discussion of liability with regard to GIS should probably begin with consideration of liability in the context of contract and licensing arrangements. Whether GIS products or services are custom-developed or software and datasets are sold prepackaged for the general consumer market, the relationships between the producer and purchaser or user will probably be affected foremost by contract law principles.

In disputes based on contract principles, the issue of warranty, either express or implied, will typically be raised as a basis of claim. In addition to warranty claims, the disappointed party may attempt to pursue a parallel tort claim, such as negligence, in order to expand the types and extent of damages that might be covered or to raise a broader range of duties on the part of the technology product producer. Also, statutes of limitations may vary.

Tort theories come to the forefront when the goal of the law is to prevent harms to the public generally. Thus, tort concepts such as negligence and strict liability may often be invoked by third party users outside of and independent of contractual considerations. Certain geographic information technologies and products if found defective may be held by public policy to be unreasonably harmful to persons or property if offered on the market to the public. In these instances, the tort theory of strict liability will be important.

In some instances, an issue may be an attempt by a dominant party to restrict the entrepreneurial activities of those entering into a contract with it. In such instances, antitrust (or noncompetition principles in a European context) may be relevant. Infringement of rights to intellectual property, personal privacy, and access to government information may also give rise to responsibility for damages.

Specific laws in regard to liability are dependent upon the specific laws of individual nations. This chapter uses as its foundation primarily U.S. legal principles. However, in an attempt to remain more general, the chapter focuses on "fundamental" legal principles and policies that remain germane regardless of the national jurisdiction. In a U.S. context, many of these fundamental principles are best illustrated through reference to the various Restatement of Law documents and the Uniform Commercial Code.³

² Johnson, Jeff P. and H. Bishop Dansby, "Liability in Private Sector GIS" in Proceedings of the Conference on Law and Information Policy for Spatial Databases: Tempe, AZ (NCGIA, University of Maine, Orono, 1995) pp. 285-292, 285

³ The American Law Institute issues "Restatements of the Law" that are the work of highly competent group scholarship. The American Law Institute was established in 1923 "to promote the clarification and simplification of the law and its better adaptation to social need, to secure the better administration of justice, and to encourage and

2 Contract liability concepts

A contract may generally be defined as a mutual assent between competent parties, usually manifested by an offer and acceptance, upon a legal consideration to do or to abstain from doing some act. The mutual assent may be express or implied and the legal consideration is often cash in a GIS context.⁴ Once a contract exists, a party to the contract may recover for breach of contract by showing the other party failed to perform as promised. It is not necessary to prove fault on the part of the breaching party. It is necessary only to show that the terms of the contract were not met. As a general proposition in regard to damages, parties are entitled to the benefit of their bargain and thus damages are calculated by determining the amount that would place the damaged party in the position that party would have been in had the contract been fully performed.⁵

In the United States, contracts for the sale of goods are subject to Article 2 of the Uniform Commercial Code (UCC) which generally applies to all goods offered for sale in interstate commerce and has been adopted in entirety or large part by most states. If no explicit contract exists between a supplier of goods and a consumer, the law applies the provisions of Article 2 to the sales relationship. If an explicit contract for the sale of goods exists but is quiet in respect to certain items that were not addressed by the contract but that are now in dispute, the UCC fills in the gap to clarify the relationship between the parties. GIS software, hardware, and datasets typically qualify as "goods" and thus their sale often would be subject to UCC provisions.⁶ Of course, the parties to a contract have leeway to develop and agree to alternative provisions to those contained in the UCC. Contracts for the performance of services are not covered by the Uniform Commercial Code. Other nations often have similar default statutory provisions that apply when a sale is not governed by explicit contract language.

2.1 Warranties

Warranties are often the issue in dispute in cases involving computer product contracts. The most basic warranty provided by a seller of goods is that the "(a) the title conveyed shall be

carry on scholarly and scientific legal work." By restating the law through the efforts of leading legal scholars, the Institute attempts to address such problems as "lack of agreement among members of the profession on the fundamental principles of the common law," "lack of precision in the use of legal terms," "conflicting and badly drawn statutory provisions," "the lack of systematic development of the law," "the great volume of recorded decisions," and the "numerous variations (of the law) within the different jurisdictions of the United States." <http://www.ali.org/>

Similarly, the Uniform Commercial Code (UCC) has been used as the primary basis for achieving uniformity in commercial transaction law throughout American jurisdictions. General Comment, U.C.C. From a practical perspective, the UCC in the U.S. is similar in concept, although narrower in the subject matter it covers, to the generally applicable contract law provisions found in the Codes of civil law countries. For a review of the major differences between civil and common law jurisdictions in Europe relative to the enforcement of contracts, see Chance, Clifford, ed., *European Computer Law: An Introductory Guide* (The Computer Law Association: Current Issues Publication Series, 1996) Chapter 2.

For contract liability in an international trade context it may be important to consider the provisions of the "United Nations Convention on Contracts for the International Sale of Goods" and, within the European Union, the "Council Directive on Unfair Terms in Consumer Contracts." Chance, Chapter 2.

⁴ "The obligation of the seller is to transfer and deliver and that of the buyer is to accept and pay in accordance with the contract." §2-301 UCC

⁵ "The remedies provided by this Act shall be liberally administered to the end that the aggrieved party may be put in as good a position as if the other party had fully performed but neither consequential or special nor penal damages may be had except as specifically provided in this Act or by other rule of law." §1-106 UCC

⁶ State laws typically make leasing of goods subject to Article 2 as well or apply Article 2A which specifically addresses leasing of goods and is very similar to Article 2.

good, and its transfer rightful; and (b) the goods shall be delivered free from any security interest or other lien or encumbrance of which the buyer at the time of contracting has no knowledge."⁷ Such a warranty may of course be negated by specific language that the person selling does not claim title to the product or modified to claim only partial title in the product being sold.⁸ Because geographic data sets may sometimes be acquired through a string of successive sources that may each alter the data set, a seller's ability to sell or license full interests in a geographic dataset may be an issue in some cases. Additional warranties may be express or implied.

Express warranties by the seller are created by the following:⁹

- (a) Any affirmation of fact or promise made by the seller to the buyer which relates to the goods and becomes part of the basis of the bargain creates an express warranty that the goods shall conform to the affirmation or promise.
- (b) Any description of the goods which is made part of the basis of the bargain creates an express warranty that the goods shall conform to the description.
- (c) Any sample or model which is made part of the basis of the bargain creates an express warranty that the whole of the goods shall conform to the sample or model.

"It is not necessary to the creation of an express warranty that the seller use formal words such as "warrant" or "guarantee" or that he have a specific intention to make a warranty, ..."¹⁰

Implied warranties are of two fundamental types, implied warranties of merchantability and implied warranties of fitness for a particular purpose. Under §2-314 UCC, a warranty that goods are merchantable "is implied in a contract for their sale if the seller is a merchant with respect to goods of that kind."¹¹

- (2) Goods to be merchantable must be at least such as
 - (a) pass without objection in the trade under the contract description; and
 - (c) are fit for the ordinary purposes for which such goods are used; and
 - (d) run, within the variations permitted by the agreement, of even kind, quality and quantity within each unit and among all units involved; and
 - (e) are adequately contained, packaged, and labeled as the agreement may require; and
 - (f) conform to the promise or affirmations of fact made on the container or label if any.
- (3) ... other implied warranties may arise from course of dealing or usage of trade.¹²

Implied warranties of fitness for a particular purpose are established under the language of §2-315 UCC. "Where the seller at the time of contracting has reason to know any particular purpose for which the goods are required and that the buyer is relying on the seller's skill or judgment to select or furnish suitable goods, there is unless excluded or modified under the next section an implied warranty that the goods shall be fit for such purpose."¹³

Language in the contract tending to negate or limit an express warranty is construed whenever reasonable as consistent with the express warranty but where consistent construction is unreasonable the negation or limitation is inoperative.¹⁴ Implied warranties of merchantability and implied warranties of fitness may be waived in the contract.¹⁵ Warranties "whether express or implied shall be construed as consistent with each other and as cumulative ..."¹⁶

⁷ §2-312(1) UCC

⁸ §2-312(2) UCC

⁹ §2-313(1) UCC

¹⁰ §2-313(2) UCC

¹¹ §2-314(1) UCC

¹² §2-314(2&3) UCC

¹³ §2-315 UCC

¹⁴ §2-316(1) UCC

¹⁵ §2-316(2&3) UCC

¹⁶ §2-317 UCC

2.2 Warranties in GIS Cases

2.2.1 Scenario 1 - Let us assume that an individual has purchased off-the-shelf GIS software from a merchant. The purchaser leaves the store, tries the software, and is disappointed in her expectations of the capabilities of the software. The product carries with it an implied warranty of merchantability as well as potential express warranties that might be included, for instance, on the packaging. Whether the purchaser may receive return of her purchase price will depend on whether these warranties have been breached. Software, system and data sellers typically are able to avoid damages for breaching implied warranties of merchantability by meeting the requirements of §2-314(2) of the UCC listed above and are able to avoid damages for breaching express warranties by not blatantly overstating or misrepresenting the capabilities of their products. Thus, in the typical business-like sale of prepackaged software or data it is unlikely that these warranties have been breached. Of course, further consumer laws in some jurisdictions or custom in the trade may allow return of undamaged products within specified time periods with no need for explanation. There is also considerable case law authority supporting the invalidity of "shrink-wrap license" provisions under U.S. law¹⁷ and therefore a waiver of merchantability contained in a license inside of a software or dataset package probably would be unenforceable against a consumer.

2.2.2 Scenario 2 - In another instance, let us assume that an individual is engaged in the business of selling health care products by mail. She reads sales literature about a GIS database and software system that will allow her to better profile her potential customers and their physical relationships to a wide range of environmental hazards. Updates of information on the purchasing patterns of households and environmental hazard ratings are provided on a regular bi-weekly basis under the terms of her license with the system supplier. Her signed standard-form license supplied by the system supplier states that "the software system and data are supplied AS IS without warranties of any kind, either expressed, implied, or statutory, including but not limited to warranties of merchantability and fitness for a particular purpose." After suffering greatly decreased sales through her latest mailing efforts, as evidenced by her worst sales in ten years, she discovers that a recently introduced non-intentional defect in the latest version of the GIS software has resulted in her mailings going to the least likely purchasers of her health care products rather than the most likely purchasers. From her perspective, the software did not do what the sales literature promised and resulted in very substantial losses to her business.

Unless she lives in a jurisdiction that bans the exclusion of implied warranties, she may have little chance of prevailing on a contract claim since all warranties were explicitly waived in the contract. She might argue that the contract as a whole was so one-sided at the time it was made that it was unconscionable under the circumstances.¹⁸ However, let us assume for the sake of argument that the court finds otherwise, perhaps because the contract was among reasonably sophisticated business parties of relatively equal bargaining power and the parties freely negotiated the terms of the contract or had a reasonable opportunity to do so. This raises the question of whether a tort action based on negligence, misrepresentation, fraud, or strict liability might be brought in lieu of or in parallel with the contract claim.

¹⁷ Vault Corp. v. Quaid Software Ltd., 775 F.2d 638 (5th Cir. 1988), Step-Saver Data Systems, Inc. v. Wyse Technology, 939 F.2d 91 (3rd Cir. 1991), Arizona Retail v. TSL (D. Ariz. 1993). But see ProCD v. Zeidenberg (7th Cir. 1996)

¹⁸ "If the court as a matter of law finds the contract or any clause of the contract to have been unconscionable at the time it was made the court may refuse to enforce the contract, or it may enforce the remainder of the contract without the unconscionable clause, or it may so limit the application of any unconscionable clause as to avoid any unconscionable result." §2-302(1) UCC

3 Tort liability concepts

A tort is a private or civil wrong or injury to a person or property, which does not arise as the result of a breach of contract. There are no fixed and rigid classifications for torts. Two major policies supported by tort law are punishing wrongdoers for their conduct and compensating injured parties.¹⁹ If both policies can be supported by transferring money from the wrongdoer to pay for the damages of the party harmed, the rationale is strong for granting tort relief. Although there are no rigid classifications for judge-made tort law, there are some traditionally recognized or classic tort situations. Three traditional classes of tort liability have been for intentional harms, negligence, and strict liability. Additional classes of claims that may be relevant to disputes involving GIS products and services include products liability, defamation, wrongful invasion of the right of privacy, and misrepresentation. The primarily judge-made law of torts has been summarized in the U.S. in Restatement of the Law (Second) Torts. Legislation relative to tort law in individual states has often mirrored the provisions of this document.

3.1 Negligence

Negligence is conduct that breaches a duty of care for the protection of others against unreasonable risk of harm.²⁰ Each person owes a duty to act as a reasonable person would under the same or similar circumstances.²¹ Thus, negligence does not involve intent to cause harm but only failure to meet a sufficient degree of care. The greater the risk of harm involved, the greater the care that a reasonable person can be expected to take. Under negligence, the duty to act reasonably to avoid foreseeable risks of physical injury extends to any person. If this duty is breached, a plaintiff can recover for personal injury or property damage caused by a product. However, purely economic loss is not typically recoverable in a negligence action. The duty to avoid foreseeable risks of solely economic injury runs only to those with whom the product producer has a special relationship.²²

In some situations the defendant is able to present a defense that the plaintiff's own actions failed to provide sufficient self-protection. In such cases, a combination of the plaintiff's and defendant's actions may have caused the injury and, if so, liability for damages is distributed among the parties using the doctrine of comparative negligence or the older doctrine of contributory negligence.

In most instances, those whose cause of action against a GIS product or service provider is based solely on economic damages will have a contractual relationship with that provider. For instance, even under principles that support extension of contract warranties to other reasonably foreseeable users of the product, those parties without a contractual relationship would typically be excluded from claiming for economic loss unless they were also injured in person.²³ Since negligence claimants seeking only economic damages would in most cases also have a contract with the GIS product provider, this raises the issue of whether they might bring a parallel action in negligence or bring such an action in lieu of a contract claim. Remember that plaintiffs often desire to pursue tort claims such as negligence because of the possibility for expanded damages and a broader range of duties imposed on the defendant.

¹⁹ Restatement (Second) of Torts § 901 (1964)

²⁰ Id., § 282

²¹ Id., § 283

²² Perritt, Henry H. Jr., *Law and the Information Superhighway* (John Wiley and Sons, 1996) p. 172, making reference to cases discussed in Ora Fred Harris and Alphonse M. Squillante, *Warranty Law in Tort and Contract Actions* §3.10 (John Wiley & Sons, Inc., 1989) and to *Purely Economic Loss: A Standard for Recovery*, 73 Iowa L. Rev. 1181 (1988).

²³ §2-318 UCC

The traditional test in allowing a negligence action in parallel with the contract action for breach of a duty established by the contract was whether there was misfeasance (improper performance) as opposed to nonfeasance (failure to perform.)²⁴ In nonfeasance or nonperformance, one may only resort to contract damages.

Another possibility for maintaining a parallel negligence action would be through a claim of "professional malpractice." Malpractice occurs when an individual does not perform to the expected standards of one's profession. Professional standards of care are higher than those imposed on the average citizen. Under this approach the plaintiff would argue that a duty independent of the contractual duty arose in the specific instance. The plaintiff would argue that a "special relationship" existed between the parties. Proving such a relationship would involve showing that the plaintiff was relatively unsophisticated, the plaintiff needed to depend on the defendant's expertise, the plaintiff did depend on that expertise, and the defendant held itself out as having the required special expertise. If shown, the plaintiff could maintain both breach of contract and negligence claims.²⁵

3.2 Negligent and Fraudulent Misrepresentation

Liability for negligent misrepresentation is established by Restatement (Second) of Torts § 552 as follows:

One who in the course of his business, profession or employment, or in any other transaction in which he has a pecuniary interest, supplies false information for the guidance of others in their business transactions, is subject to liability for pecuniary loss caused to them by their justifiable reliance upon the information, if he fails to exercise reasonable care or competence in obtaining or communicating the information.²⁶

Liability for fraudulent misrepresentation is established by Restatement (Second) of Torts § 525 as follows:

One who fraudulently makes a misrepresentation of fact, opinion, intention or law for the purpose of inducing another to act or to refrain from action in reliance upon it, is subject to liability to the other in deceit for pecuniary loss caused to him by his justifiable reliance upon the misrepresentation.²⁷

Perritt argues that in a contract setting establishing the duty in a misrepresentation case above and beyond what the contract requires of the parties is often very difficult. He additionally argues that "the modern law of fraudulent misrepresentation is only subtlety different from the modern law of breach of contract."²⁸ He makes this argument both in regard to damages recoverable and in establishing the elements of the case. As such, when a contractual relationship exists there would appear to be only infrequent situations where it would be beneficial to pursue a misrepresentation claim over a contract claim. One instance might be where the time to bring a cause of action has passed the statute of limitations for bringing tort claims but not a longer statute of limitations for contract claims.²⁹

3.3 Fraud in the Inducement

The complexities and confusion caused by bringing a tort action within a contract setting and the

²⁴ Perritt, p. 227, making reference to *Valhal Corp. v. Sullivan Assocs., Inc.*, 44 F. 3d 195, 228 (3d Cir. 1995) and *Janicek v. Kikk, Inc.*, 853 S.W.2d 780, 781 (Tex. CT. App. 1993).

²⁵ *Id.*, p. 227

²⁶ Restatement of the Law (Second) Torts § 552 (1964)

²⁷ *Id.*, § 525

²⁸ Perritt, p. 239

²⁹ *Id.* at 243 referencing 604 F. 2d 737 (2d Cir. 1979).

tendency of courts to defer to the written contract as the final agreement between the parties sometimes may be overcome by claiming "fraud in the inducement" of the contract.³⁰ The objective of the plaintiff in such an action is to focus the courts attention solely on the events that occurred prior to and separate from the contract. Alleged fraud, such as evidenced by fabricated testimonials or test results, that occurred before consideration of a contract could justifiably be considered as tortious conduct separate from the contract. The wrongful conduct led the party into a contract which directly resulted in damages. Fraud in the inducement may be pursued independent of contract claims. Thus, by this approach the plaintiff advocates disposition of the dispute by establishing duties and breach of duty standards through tort concepts and ignoring the contract language, except perhaps in evidencing the amounts and kinds of damages suffered.

3.4 Strict Products Liability

For public policy reasons, suppliers of defective products are often held strictly liable to consumers and other product users for injuries caused by defective products. The primary objective of strict products liability theory is to provide an incentive to manufacturers to keep unsafe defective products off the market. The incentive is provided by reducing the burden of proof on harmed parties and making the manufacturer and others in the supply chain responsible for damages caused by unsafe defective products. If only negligence theory applied, suppliers could often escape liability for defective unsafe products by showing that industry-wide standards for design and manufacture were reasonably met. A product might be unsafe, yet still meet usual industry standards for quality control and design.

Restatement of the Law (Second) Torts §402A states that:

- (1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if
 - (a) the seller is engaged in the business of selling such a product, and
 - (b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold.
- (2) The rule stated in Subsection (1) applies although
 - (a) the seller has exercised all possible care in the preparation and sale of his product, and
 - (b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.

Under a strict products liability approach there is no need for the harmed party to show that those with a financial interest in placing the product on the market were negligent in the design or manufacture of the product. Showing the defective condition, that it was unreasonably dangerous, and that it caused the physical harm suffered is sufficient. The duty of a product provider in such an instance is to any reasonably foreseeable member of the public that might be harmed by the good. Fault is not a required element of the cause of action under strict liability and therefore waivers and disclaimers of fault that might be contained in a contract between the supplier and the consumer are ineffective because they are irrelevant to the cause of action. Other courts have held such disclaimers not to be irrelevant but to be invalid in consumer transactions as against public policy.

Although liability is strict in such instances, it is not absolute. There is no award of damages for purely economic injuries. There must be physical injury and the plaintiff must prove that a defect attributable to the defendant caused the injury. Defects may be due to manufacture or design. A manufacturing defect results when the finished product is not in the condition the manufacturer intended it to be when it left its control. A design defect is one that causes the

³⁰ Id., p. 243

product to carry an inherent risk of harm in its normal use.³¹

If a physical injury occurs only to property, the question often arises whether the physical injury is of such a nature that the claim warrants inclusion under strict products liability theory. The clearest cases appear to be those in which property damage involved a safety hazard that could readily have caused personal physical injury to a consumer or other user even though in the case at issue it caused only physical injury to property.³² That is, the nature of the defect and the type of risk involved in causing the physical injury to property are so closely associated with potential physical injury to persons that the underlying goal of preventing such hazards would be frustrated if the physical injury to property is not included within the ambit of strict liability.³³

Other courts determine whether physical injury to property without physical injury to persons falls within the ambit of tort law primarily by looking at the relationship among the parties. A "garden variety" consumer has very little bargaining power and therefore some courts, on public policy grounds, allow consumers to sue in tort rather than restrict them to breach of warranty actions. Thus a consumer with little bargaining power that has suffered physical harm from a defective product should be able to pursue a strict liability cause of action in these jurisdictions. This may be true even for a commercial consumer assuming the commercial consumer has little expertise in the product and the product was offered "as is" with little or no bargaining involved. If a party has little bargaining power, sound public policy also indicates that the consumer also has no power to disclaim their right to seek redress under strict liability principles.³⁴

Several court cases in the U.S. have indicated that the imposition of strict liability should be allowed in electronic maps and charts.³⁵ The language of these cases justifies including electronic charts and maps while excluding how-to-do books from the realm of strict liability by distinguishing charts and maps as technical tools whereas how-to-do books are more in the tradition and nature of providing ideas and expressions. At least one commentator suggests that this distinction is not very useful. He suggests that distinguishing practical works that lead people to depend on a work product for taking direct physical action is a more reasonable way to determine which products should be considered within the ambit strict liability.³⁶ Whether treated as a technical tool or a practical work that leads people to take action, electronic charts and maps seem to be well within the bounds of the type of information product reasonably considered under strict liability principles.

Damages are recoverable for direct injuries such as medical expenses, lost wages, property damages, and pain and suffering. Losses which are solely economic without physical injury are generally not recoverable under strict liability.

3.5 Tort Liability in GIS Cases

3.5.1 Scenario 2 - In scenario 2 discussed previously, the only damages alleged by the health care products distributor are economic. In that case the clear showing of a defect in the software that resulted in the system malfunctioning rather than not working may be sufficient to meet the requirement of misfeasance. If so, this would allow the parallel action in negligence and raise

³¹ Id., p. 184

³² Id., p. 225 referencing *East River Steamship Corp. v. Transamerica Delaval, Inc.*, 476 U.S. 858 (1986) and *Seely v. White Motor Co.*, 63 Cal.2d 9, 403 P.2d 145, 45 Cal. Rptr. 17 (1965)

³³ *Pennsylvania Glass and Sand Corp. v. Caterpillar Tractor Co.*, 652 F.2d 1165 (3d Cir. 1981)

³⁴ Perritt, p. 226

³⁵ *Johnson and Dansby*, p. 287, making reference to *Brocklesby v. U.S. and Jeppesen & Co.*, 767 F.2d 1288 (1985) and *Aetna Casualty v. Jeppesen & Co.*, 642 F.2d 339 (1981) and comparing *Winter v. G.P. Putnum's Sons*, 938 F.2d 1033 (1991).

³⁶ Perritt, p. 183

the possibility of recovering damages beyond those allowed under contract liability principles. However, even if negligence is found in failing to meet the requisite duty, the fact remains that the waiver of express and implied warranties in that specific contract might still be upheld.

3.5.2 Scenario 3 - Let's assume that a small two person "timber finding" business reads about the possibilities of finding pockets of hardwoods through the use of GIS and image processing software in combination with satellite imagery. A large GIS consulting firm advises the timber finding business that they have already developed the system that the timber finding company needs, they have numerous clients using the system, and those clients have all increased their hardwood finds by at least 200% over conventional ground cruising methods. The timber finding business enters into a contract with the GIS consulting firm for delivery of a fully operational system including the imagery they need for the large land mass that they are interested in investigating. The signed contract between the parties states that "damages recoverable by the purchaser in the event of a breach of this contract by the seller are limited solely to return of the price of the contract." The GIS consulting firm fails to provide the system and in fact no system has ever been developed. The timber finding company relies on the consulting firm's promise to deliver the system on time and suffers substantial reliance damages due to timber finding contracts it was forced to breach because the new capabilities were not delivered as promised.

Discussion: In this case the claimed losses are solely economic. They are arguably the result of nonperformance as opposed to improper performance. Thus, the traditional test for allowing a negligence action in parallel with the contract action is not met. Yet, the plaintiff would still prefer suing in tort since tort actions may allow the possibility for a greater range of damage recoveries.

One approach that the timber finding company might take is to argue the malpractice claim that a duty independent of the contractual duty arose in this specific instance. In arguing the "special relationship" elements of such a case the timber finding company would argue that their company is relatively unsophisticated, they needed to depend on the expertise of the consulting company, did in fact do so, and the consulting company held itself out as having the required special expertise to implement the complex technological system for them. If the court rejects these arguments, defers to the contract as the final agreement between the parties, and holds that the contract is not unconscionable, the provision limiting the contract damages is likely to be upheld.³⁷

Negligent or fraudulent misrepresentation may also be potential causes of action in the case. If the plaintiff can prove through a preponderance of the evidence the misstatements of facts as alleged, they probably have a good case for fraudulent misrepresentation. For instance, evidence of fabricated written testimonials of the other purported clients of the GIS consulting firm would be solid evidence of fraudulent intent and misrepresentation of facts. If the only evidence of fraud is oral, the danger exists that oral statements prior to the contract will be treated as "puffery" on the part of the seller which any reasonable purchaser should have treated with caution and the court may lean toward the contract as evidencing the full and final agreement between the parties.

A claim for "fraud in the inducement" of the contract also offers possibilities for success by the plaintiff. Here the objective is to convince the court that the alleged fraud involved separate and distinct actions prior to and extraneous to the contract. If the court is convinced that the fraud

³⁷ §2-719(1)(a) UCC states that "the agreement may provide for remedies in addition to or in substitution of those provided in this Article and may limit or alter the measure of damages recoverable under this Article, as by limiting the buyer's remedies to return of the goods and repayment of the price or to repair and replacement of non-conforming goods or parts; ..."

was a sufficiently separate occurrence there is less likelihood of deferring to the contract language to resolve the matter. This would undoubtedly be to the plaintiff's benefit as it would avoid imposition of the contract language limiting damages.

3.5.3 Scenario 4 - Assume that a farmer buys a "precision farming" system consisting of software, computer hardware, and computerized variable rate farming equipment from a large equipment manufacturing company. The new computer controlled system tracks the location of farm machinery very precisely through the use of a global positioning system receiver mounted on the farm equipment and is able to apply fertilizers, pesticides, and herbicides at variable rates in order to match the needs of the soil and groundcover conditions as identified in a digital spatial dataset for the farmers fields. The system is also able to measure the productivity of each square meter of soil as crops are harvested. The farmer hires a local engineering consulting firm to accomplish soil tests in a dense grid over his fields and to insert this information along with other physical data specified by the manufacturer into the computerized system. The farmer implements precision farming of his fields. After one of the best growing seasons on record, the farmer experiences one of the worst crops he has ever had. Through an investigation the farmer discovers that chemical fertilizers, weed sprays, and insecticides were sprayed by the automated machinery in reverse locations to where they were needed due to a software error in the latest version of the software. The inappropriate spraying resulted in poisoning of the ground in some areas, killing off the crop in other areas, and allowing insect infestations in other areas. Evidence shows that the engineering firm made no errors in data collection and inserted the required information as directed by the manufacturer's instructions. The farmer's standard form contract supplied by the instrument manufacturer states that "the software system and data are supplied AS IS without warranties of any kind, either expressed, implied, or statutory, including but not limited to warranties of merchantability and fitness for a particular purpose." The software component of the system containing the defect was developed and distributed by a very large GIS software company with whom the farmer did not have a direct contract.

Discussion: Under contract principles, the farmer might pursue breach of implied warranties of fitness for use and merchantability as well as any express warranties that might have been made. However, to pursue these warranties the farmer would have to overcome the clause in the contract stating that the "software system and data are supplied AS IS without warranties of any kind ..." The farmer might argue that the contract clause on its face is unconscionable since application of the disclaimer clause would allow the system producer to provide useless and harmful systems to consumers without any responsibility for the harm caused by the systems nor any contract benefit for the consumer. If the court as a matter of law finds the clause to have been unconscionable at the time it was made, the court would probably limit the clause as to avoid any unconscionable result.³⁸ Resort to normal contract principles in determining damages would then seem appropriate. Deeming the entire contract unconscionable with resort in entirety to negligence principles for resolving the liability issues would appear to be inappropriate, except perhaps if the court found from the evidence an extreme disparity in bargaining power between the parties.

Because the dispute involves improper performance as opposed to nonfeasance, the possibility of pursuing a parallel negligence claim with the contract claim exists. Negligence in this case arguably involves both physical harm to property as well as economic damages. It appears reasonably foreseeable that a software error could cause physical damage to farmland and crops if the software was used in conjunction with computer controlled farm equipment as intended by the suppliers and as used under normal conditions as was done in this instance. Although pursuing a negligence claim in parallel with a contract claim is complex and gives rise to difficulties in meeting the conflicting underlying objectives of tort law versus contract law, protecting the public against the hazardous harms caused by this type of defect and the argument

³⁸ See note 17.

that suppliers are in a better position than users to insure against the losses caused by defective products may be reason enough to allow the parallel action.

It is also interesting to explore whether a strict products liability claim might be successful in the instant case. Although no person was physically injured by the defective product, the fact situation seems to meet the requirements of Restatement of Law (Second) Torts § 402A of being "unreasonably dangerous" to a user's property. The software defect is arguably more in the nature of a "manufacturing defect" than a "design defect" in that the defect was unintended and didn't meet the software developer's own standards. The cost and feasibility of testing the software to see if it worked properly and to correct it prior to its release to consumers seems very small compared to the risk of physical injury and the gravity of potential harms that might be caused by the malfunctioning of the system. The software developers and the machinery manufacturers were fully aware that their products would be used in the application of dangerous farm chemicals. Although the physical harm was to property only in this instance, the hazard and defect represent a significant safety hazard to humans as well. Because of the inherent safety hazards and because of failing to establish safety conditions designed to avoid unreasonable risks of harm, the type of physical damage involved seems to be of the type that should be allowed to be included within the ambit of strict liability.

Section(1)(b) of §402A additionally requires that the product "is expected to and does reach the user or consumer without substantial change in the condition in which it is sold." Although a complex combination of farm machinery, computers, software, and data contributed by various parties was required to make the system operational, the individual components were not altered by the user. The software containing the defect remained unaltered by the consumer. Thus, those in the chain of generating income from the sale of the precision farming system should not be able to escape their duty to provide a safe product by claiming that the system was changed when applied to a specific farm site. The system was implemented in conformance with the manufacturers instructions and the application of the system to a particular site did not involve substantially changing the condition in which it was sold to and received by the farmer.

3.5.4 Scenario 5 - Assume that a car manufacturer installs a vehicle routing system in its latest line of automobiles. Drivers are able to insert a CD containing detailed street, address, and business information for a community and are able to have the computerized system select a travel route for them based on selected criteria such as shortest time, shortest travel distance, or all streets of a certain type. The location of the vehicle is tracked as it travels primarily through use of a global positioning system receiver and the system uses oral voice commands to inform the driver when an exit is coming, features of interest along the route, turn right, turn left, etc. An engineering firm has collected street and business data for a local community, has placed it on a CD, and the CD is now being used by consumers in routing themselves through the metropolitan area. It appears that all data collected by the engineering firm is spatially accurate and all other information such as street names, street directions, names of businesses, locations of traffic lights and signs, and similar physical features was accurate when collected. The owners manual for the system indicates that the system is provided solely as an aid for determining routes and warns that drivers should rely primarily on their own observations to check the oral routing instructions against potentially conflicting traffic and street conditions. A similar abbreviated notice is provided on the dashboard.

A thirty year old male driver bought the CD at a local discount store and has been using it for several months to aid him in routing himself through the city to deliver flowers in his part-time job with a small florist. After typing in the addresses of his deliveries for the day, the system calculates a route. Half way through his deliveries the system gives him oral instructions to turn right at the next street. He turns right and drives down a major one-way street in the wrong direction. This results in a head-on collision with another vehicle and he receives major physical injuries. Upon investigation, it is determined that no data was entered into the system wrongly

nor was there a malfunction in the software. Rather, it is determined that the street recently was changed from a two-way street to a one-way street by the city.

Discussion: Under the facts, there is no manufacturing defect in the provided vehicle routing software nor in the separately purchased dataset. However, the injured party may argue that the system was defectively designed and poses too great a threat to physical injury from a safety hazard perspective as designed and implemented. Any reasonable system designer should have known that the directions of streets, locations and kinds of traffic controls, and similar physical features affecting safe routing decisions could be expected to change over time and the system and data providers should have provided a means to update the information when it changed. It may be argued that the system is so unreasonably dangerous with the current design defect that it should never have been placed on the market. Placing it on the market should have been delayed until such time as remote data upgrades to such systems could have been reasonably and responsibly provided or the CD should have been sold under a license agreement with data upgrades going to the address of the currently registered owner of the vehicle. The gravity and likelihood of harm due to the inability to provide reliable data upgrades far outweighs the social benefits of such systems.

Counter arguments are that the system is unavoidably unsafe in certain very limited situations but the overall social utility of vehicle routing systems is so great that they should not be kept off the market simply because the technology hasn't advanced to the point where the systems are able to be made fail-safe. Unavoidably unsafe products are not "defective" when the danger is reasonably apparent and the danger of full reliance on oral directions from a computerized system should have been obvious. Adequate warnings were provided. It was the plaintiff's unreasonable misuse of the product that caused the "defect" and therefore no defect exists and no cause of action exists without that unreasonable misuse.

In the U.S., courts typically would resort to one of three risk-utility analysis methods to determine whether the design should be deemed to be defective. Depending on the jurisdiction, plaintiffs and defendants would couch their arguments to address a pure negligence standard, a state-of-the-art analysis, or a consumer expectations test.³⁹ If the jury did find the system to be in a defective condition unreasonably dangerous to the user and found the defect to be the cause of the injury, those jurisdictions following comparative negligence approaches for determining the distribution of damages probably would reduce the award to the plaintiff by the plaintiff's proportionate share of responsibility in causing the injury as determined by the jury.

4 Summary

Liability is a creation of the law to support a range of important social goals such as avoidance of injurious behavior, encouraging the fulfillment of obligations established by contracts, and the distribution of losses to those responsible for them. If decisions are made based on geographic data or products produced by other than the user, there will always be liability exposure. Minimizing losses for users of geographic data products and reducing liability exposure for creators and distributors of such products is achieved primarily through performing competent work and keeping all parties informed of their obligations.

Liability in data, products and services related to geographic information systems is likely to be determined in most instances by resort to contract law and warranty issues. This is true whether geographic data products are custom developed for specific clients or mass produced for the general consumer market. Tort theories, such as negligence and strict liability, come to the forefront when preventing harms to the public generally arises as an issue.

³⁹ Perritt, p. 185.

In this chapter, fundamental contract and tort liability concepts were reviewed followed by illustrations of how liability issues might arise and be addressed in a range of GIS conflict scenarios. Liability burdens arising under legislation relating to specific substantive topics such as intellectual property rights, privacy rights, anti-trust laws, and open records laws were not addressed by the chapter. Assessing liability exposure arising under statutory law requires consideration of the specific language of the legislation in each nation or other jurisdiction. In addition, this chapter did not address the potential immunity of government agencies from liability for their geographic information products. Again, the availability of immunity for government agencies from damages varies among nations.⁴⁰ Finally, even though many geographic information products are being transferred across international boundaries and geographic data forms a significant component of the global information infrastructure, this chapter did not address the likely effects of international agreements on liability for injuries resulting within world trade contexts.⁴¹ All of these additional issues should be considered when relevant to geographic information supplier and consumer relationships.

⁴⁰ In the U.S. it is probably safe to conclude that government GIS offices assume at least some liability exposure in collecting and disseminating land-related data, whether or not they compete with the private sector in the sale of GIS data. See Dansby, H. Bishop, "Public Records and Governmental Liability," in *GIS Law*, Vol. 1, No. 2. (1992), p. 8-13 and Anderson, Jerome R. and Alan R. Stewart, "Local Government Liability for Erroneous Data: Law and Policy in a Changing Environment," in *Proceedings of the Conference on Law and Information Policy for Spatial Databases: Tempe, AZ (NCGIA, University of Maine, Orono, 1995)*, pp. 267-279. It is probably safe to conclude also that those GIS agencies or political subdivisions choosing to enter or compete with the commercial market in selling geographic information data, services or products incur greater liability exposure than those government jurisdictions that do not, regardless of the business practices and contract language used by the GIS agency to minimize exposure. See Anderson and Stewart, p. 277 and Perritt, Henry H., Jr., "Tort and Criminal Liability as a Function of the Right to Control Content" in *Proceedings of the Conference on Law and Information Policy for Spatial Databases: Tempe, AZ (NCGIA, University of Maine, Orono, 1995)*, pp. 313-315, 314.

⁴¹ International agreements having an effect on trade in geographic data and products might include the International Institute for the Unification of Private Law (UNIDROIT) Principles of International Commercial Contracts, the General Agreement on Tariffs and Trade (GATT 1994) creating the World Trade Organization (WTO) to deal with dispute resolution, the Trade Related International Property (TRIP) appendix to GATT, the various existing and proposed laws by the European Union (EU) affecting electronic databases, and the North American Free Trade Agreement (NAFTA). See Perritt, Chapter 14 generally.

A geographic information system (GIS) is a conceptualized framework that provides the ability to capture and analyze spatial and geographic data. GIS applications (or GIS apps) are computer-based tools that allow the user to create interactive queries (user-created searches), store and edit spatial and non-spatial data, analyze spatial information output, and visually share the results of these operations by presenting them as maps. The early origins of GIS (Geographical Information Systems) can be traced to the influx of micro-computers into North America in the early 1960s (Bernherdson, 1992). Early GIS such as CGIS (Canadian GIS) and McIDAS (the US equivalent). As GIS has developed, the definition of GIS as a spatial visualisation facility is too vague as any spatial display of information such as a simple weather chart or raster satellite image could be thought of as a GIS. Nevertheless, GIS has now evolved into a powerful management tool used for. Geographic Information Systems (GIS) is considered a smart technology which through property implementation can manage data more effectively, providing significantly more automation during updates, enabling more interaction between data providers and data users. These are the major conditions of smart technology (Esri White Paper 2009). GIS is the critical link for a connected campus where smart data awareness and implementation is achievable for planning, operations and assessment. information systems (GIS) witnessed the growth in popularity in the 1990s that computer-aided drafting and design (CADD) systems did in the 1980s. In the past, most businesses operated as hierarchically structured organizations where individual tasks were accomplished by dividing. 19.