

# FINALLY ADDING METHOD TO MADNESS:<sup>1</sup> APPLYING PRINCIPLES OF OBJECT-ORIENTED ANALYSIS AND DESIGN TO LEGISLATIVE DRAFTING

*Thomas F. Blackwell\**

Introduction .....	228
I. Prior Work on the Theory of Legislative Drafting.....	234
A. Legislative Drafting in Common Law Jurisdictions in the United States .....	235
1. Legal Dialectic.....	235
2. Symbolic Logic .....	237
B. Legislative Drafting in Civil Jurisdictions.....	241
II. An Example: The Texas Business Entity Code .....	249
A. The “Hub-and-Spoke” Model .....	250
B. Difficulties Presented by the Model: “Quasi-Hubs” and Bridging Entities .....	251
C. Organizational and Use Considerations .....	255
III. The Hypertext Solution .....	258
A. Hypertext: A Partial Solution to the Problem of Coordination of Scattered Sections .....	258
B. Limitations of Hypertext.....	259
IV. Object-Oriented Analysis and Design.....	268

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1. POLONIUS: What do you read, my lord?  
 HAMLET: Words, words, words.  
 POLONIUS: What is the matter, my lord?  
 HAMLET: Between who?  
 POLONIUS: I mean, the matter that you read, my lord.  
 HAMLET: Slanders sir, for the satirical rogue says here that old men  
 have grey beards, that their faces are wrinkled, their eyes purging thick  
 amber and plumtree gum, and that they have a plentiful lack of wit, to-  
 gether with most weak hams. All which sir, though I most powerfully and  
 potently believe, yet I hold it not honesty to have it thus set down. For  
 yourself, sir, should be old as I am, if like a crab you could go backward.  
 POLONIUS: [Aside] Though this be madness, yet there is method in 't.

WILLIAM SHAKESPEARE, *HAMLET* act 2, sc. 2.

\* Assistant Professor, Appalachian School of Law. The author wishes to thank his colleagues at Chicago-Kent College of Law, particularly Molly Warner Lien and Philip N. Hablutzel, for their comments on earlier drafts of this article.

A.	Description of Object-Oriented Analysis and Design.....	268
B.	Principles of Object-Oriented Analysis and Design in Software Design .....	270
1.	Analysis: Building a Conceptual Model of the Problem .....	270
2.	Design: Creation of Interaction Diagrams ....	274
3.	Design: Use of Patterns .....	275
a)	The Expert Pattern .....	277
b)	The Creator Pattern .....	277
c)	The Low Coupling Pattern.....	278
d)	The High Cohesion Pattern .....	278
e)	Using Patterns in Combination .....	279
4.	Construction of Code from Design .....	280
C.	Application of Object-Oriented Analysis and Design to Legislative Drafting .....	281
1.	Analysis .....	281
2.	Design .....	283
3.	Construction of Code (Legislative Text) from Design .....	286
a)	Classes and Attributes .....	286
b)	Associations and Navigability.....	286
c)	Creation of Statutory Text .....	287
D.	Inconsistencies in Fit for Legislative Drafting .....	287
V.	Specific Applications .....	288
A.	Possible Areas of Best Fit .....	288
B.	Inappropriate Uses .....	288
	Conclusion .....	289
	APPENDIX: States with Statutes On-line.....	290

## INTRODUCTION

Unfortunately, the profession that faces man's most sophisticated communication problems is still unable to produce an approach to legal drafting sophisticated enough to cope with the increasingly complicated problems generated by our exploding legal culture.<sup>2</sup>

—Professor F. Reed Dickerson, 1978

Concern has long been expressed that statutes are often poorly drafted.<sup>3</sup> Although a myriad of legislatures in this country and abroad

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2. F. Reed Dickerson, *Legal Drafting: Writing as Thinking, or, Talk-Back from Your Draft and How to Exploit It*, 29 J. LEGAL EDUC. 373, 378 (1978).

3. See, e.g., Middleton Beaman, *Bill Drafting*, 7 L. LIBR. J. 64, 64, 66 (1914) (noting that “[m]any people think that we legislate on too many subjects and too much

have drafted numerous statutes on countless subjects,<sup>4</sup> and although multitudes of judges and lawyers have labored through the years to interpret those statutes,<sup>5</sup> there has been relatively little recent scholar-

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on each subject, but most of you will agree that what we suffer from chiefly is not too many statutes, but too many badly constructed statutes," and proposing suggestions on how drafting process might be improved through use by legislatures of "experts," including lawyers, in process). For evidence concerning the volume of legislation in more recent times, see *infra* note 4; for further comments on the importance of legal drafting and the generally poor quality of existing drafting, see Layman E. Allen & C. Rudy Engholm, *Normalized Legal Drafting and the Query Method*, 29 J. LEGAL EDUC. 380 app. A at 408-10 (1978).

4. Judge Jack Landau notes that the Oregon legislature enacts nearly 1,000 bills per session and has marked a general upward trend over the last century. See Jack L. Landau, *Some Observations About Statutory Construction in Oregon*, 32 WILLAMETTE L. REV. 1, 1 & n.1 (1996). Similarly, during the 104th Congress (1995-1996), 6,545 bills and 263 joint resolutions were introduced in both Houses of Congress. See CHARLES W. JOHNSON, HOW OUR LAWS ARE MADE, S. DOC. NO. 105-14, at 5 (1998), available in *Congressional Bills*, UNITED STATES CONGRESS (last modified Apr. 26, 1999) <<http://www.access.gpo.gov/congress/cong009.html>>. Of those bills, 333 were enacted into public laws. See Omnibus Park and Public Lands Management Act of 1996, Pub. L. No. 104-333, 110 Stat. 4093. This growth in statutory enactments over the years is not a new development:

A single volume of 320 octavo pages contains all the laws passed by Congress during its first five years, when measures were devised for getting the new government under way; 26 acts were passed in the 1789 session, 66 in 1790, 94 in 1791, 38 in 1792, 63 in 1793. For the single session of the 70th Congress, to take a pre-depression period, there are 993 enactments in a monstrous volume of 1014 pages—quarto not octavo—with a comparable range of subject matter. Do you wonder that one for whom the Statutes at Large constitute his staple reading should have sympathy, at least in his moments of baying at the moon, with the touching Congressman who not so long ago proposed a "Commission on Centralization" to report whether "the Government has departed from the concept of the founding fathers" and what steps should be taken "to restore the Government to its original purposes and sphere of activity"? Inevitably the work of the Supreme Court reflects the great shift in the center of gravity of law-making. Broadly speaking, the number of cases disposed of by opinions has not changed from term to term. But even as late as 1875 more than 40% of the controversies before the Court were common-law litigation, fifty years later only 5%, while today cases not resting on statutes are reduced almost to zero.

Felix Frankfurter, *Some Reflections on the Reading of Statutes*, 47 COLUM. L. REV. 527, 527 (1947). Cf. Max Radin, *Statutory Interpretation*, 43 HARV. L. REV. 863, 863 (1930) ("Anglo-American law is in a fair way of becoming statutory, not by a great act of summation like the *Bürgerliches Gesetzbuch* or the Swiss Code, but piecemeal by the relentless annual or biennial grinding of more than fifty legislative machines.").

5. See, e.g., Landau, *supra* note 4, at 2 n.3 (noting that in 1995, approximately two-thirds of all written opinions of Oregon Supreme Court involved matters of statutory construction); Frankfurter, *supra* note 4, at 527; Richard R. Powell, *Construction of Written Instruments*, 14 IND. L.J. 199, 200 (1939) (noting increase in number of pages (from 44 to 246) of summaries of decisions concerning statutory interpretation listed in Decennial Digests over four decades from 1897 to 1936).

ship within the American legal system regarding the possibility of legislative *design*, as opposed to mere drafting.<sup>6</sup> Most of the resources available for legal drafters stress the technical aspects of the craft, rather than discussing theoretical concerns.<sup>7</sup> This article focuses on how technological developments and lessons learned from revolutionary changes in the field of software design in the last few decades provide new insights into the underlying principles of legislative drafting, particularly with regard to areas of the law where conceptual interrelationships are complex.

This article begins by providing background information on prior scholarly work dealing with the problems of legislative drafting. Next, the article considers a particular example of the difficulties involved in drafting a conceptually complex statute—the recent attempt in Texas to draft a unified Business Entity Code. The drafting difficulties that this Code presented and the techniques the drafting committee used to handle them are discussed in detail.

The article then considers a technological tool—hypertext—that may be useful in connection with the drafting of conceptually complex statutes, and describes the operational and potential legal problems raised by its use in legislative drafting. Finally, the article proposes the use of object-oriented analysis and design, a concept borrowed from the field of software design, as a more useful tool for improving

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6. In contrast, civil law jurisdictions, particularly Germany, have a fairly long history of “legal science” scholarship based on the position espoused by Friedrich Karl von Savigny that studying a legal system in its historical context would yield a set of essential principles that could be studied and systematically restated. See JOHN HENRY MERRYMAN, *THE CIVIL LAW TRADITION* 31, 61-67 (2d ed. 1985). For a discussion of legislative drafting theory in civil law jurisdictions, see *infra* Part I.B. In saying that there has not been an excessive amount of legal scholarship on legislative drafting theory, however, it is important to note that the *possibility* of extensive legal drafting or codification projects has long fascinated lawyers, legislators, and commentators in common law. See, e.g., Roscoe Pound, *Sources and Forms of Law*, 22 *NOTRE DAME LAW.* 1, 61-80 (1946) (tracing history of significant, but often unsuccessful, codification efforts in common law jurisdictions, starting with proposal made by Francis Bacon in 1614 to codify common law, and including efforts by India (under English law, starting in 1837), New York (in connection with codes prepared at instigation of David Dudley Field from 1840s to 1860s), Massachusetts (as result of report of commission on codification that was appointed in 1835), Georgia (as result of efforts of commission formed in 1858), England again (under Lord Westbury’s proposal in 1860s), and Victoria (in 1880s); discussing “gradual codification” of particular branches of law (such as efforts of National Conference of Commissioners on Uniform State Laws) and “private codification” efforts (such as American Law Institute’s Restatements of Law); and discussing possibility and advisability of creating civil code in common law jurisdictions).

7. See, e.g., TEXAS LEGISLATIVE COUNCIL, *TEXAS LEGISLATIVE COUNCIL DRAFTING MANUAL* 77-113 (1998) (setting out rules of style for drafting legislation in Texas), available in <<http://www.capitol.state.tx.us/capitol/drafting/cover.htm>>.

legislative drafting. Object-oriented analysis and design is discussed first in the context of its original use for development of computer software, and then in terms of its possible application to the legislative drafting process, paying particular attention to areas of best fit, as well as areas where its use may be inappropriate.

This article does not, however, approach legislative drafting from the perspective of statutory interpretation. Although there is a significant amount of scholarly literature analyzing the theory of statutory interpretation, the principal lesson to be gleaned from this literature is that the primary goal of legal drafting is to make the language of the statutes as clear and unambiguous as possible, thus aiding those courts whose theory of interpretation is predominantly textual. In addition, drafters should thoroughly document their intent in drafting such provisions to guide intentionalist courts.<sup>8</sup>

Focusing exclusively on principles of statutory interpretation may be a poor, or at least an incomplete, foundation for the investigation of principles of legal drafting. Lessons learned in interpreting statutes may not be entirely helpful in creating other statutes.<sup>9</sup> Although it seems clear that there is some value in drafters striving for clarity and

8. See Carlos E. Gonzalez, *Reinterpreting Statutory Interpretation*, 74 N.C. L. REV. 585, 594 (1996). Intentionalist theories of statutory interpretation attempt to discern the intention of the legislative body as a basis for interpretation of the statutes that it enacted. See *id.* Compare this theory with the guidelines stated by Frederick J. de Sloovère (which are similar to, but slightly different from, those stated in Heydon's Case, 3 Co. Rep. 7a, 76 Eng. Rep. 637 (Ex. 1584)):

every statute must be interpreted in light of (1) the subject-matter with which it deals; (2) the reason or purpose behind its enactment as found in the text and the evil toward which it was directed (including here extrinsic aids and the common law); and (3) the meanings of the several other relevant parts of the same statute or of statutes *in pari material*. Likewise, the obvious meaning is not the correct one unless it is sensible.

Frederick J. de Sloovère, *Contextual Interpretation of Statutes*, 5 FORDHAM L. REV. 219, 219-20 (1935). Also compare the provision of the Italian Civil Code of 1942 that dealt with the interpretation of statutes:

In interpreting the statute, no other meaning can be attributed to it than that made clear by the actual significance of the words according to the connections between them, and by the intention of the legislature.

If a controversy cannot be decided by a precise provision, consideration is given to provisions that regulate similar cases or analogous matters; if the case still remains in doubt, it is decided according to general principles of the legal order of the State.

CODICE CIVILE [C.C.] Disposizioni Sulla Legae in Generale [Provisions on the Law in General] art. 12 (Italy), translated in MERRYMAN, *supra* note 6, at 44. The provision is available in the original Italian at *Il Codice Civile Italiano*, CARDOZO ELECTRONIC L. BULL. (last updated Oct. 13, 1999) <[http://www.jus.unitn.it/cardozo/Obiter\\_Dictum/codciv/home.html](http://www.jus.unitn.it/cardozo/Obiter_Dictum/codciv/home.html)>.

9. See Frank E. Horack, Jr., *The Disintegration of Statutory Construction*, 24 IND. L.J. 335, 347 (1949).

documenting their intent to facilitate subsequent interpretation, there may be interpretive problems that cannot be addressed in the drafting stage and drafting principles that are not readily apparent from reviewing the canons of construction.

As an example of the former, some interpretive problems result from changed circumstances that were not contemplated by the legislative drafters. Although it may be reasonable to expect that drafters will anticipate likely contingencies in drafting statutes,<sup>10</sup> it is unrea-

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If courts believe, as they say, that legislatures are presumed to know of past judicial decisions and that statutes are drafted with a knowledge of them, they must recognize that they have given legislative draftsmen poor guides for future action. To be sure, the draftsman knows that if his statute is held to be penal it will be strictly construed, while if it is considered to be remedial the interpretation will be "liberal"; that if he uses enumeration he must face the rule of *ejusdem generis*; while if he uses words of general import the statute may be "void for vagueness." But he does not know when the court will determine that one set of rules is applicable and when the other. For him the rules of statutory construction are at best, meaningless; at worst, they are unseen and "extraconstitutional obstacles" that he must avoid if possible.

*Id.* Scholars who have written about the need for better legislative drafting, however, often seem to base their arguments upon the difficulty in interpreting and applying poorly drafted statutes. See, e.g., Beaman, *supra* note 3, at 64-65 (listing number of faults in existing statutes, such as statutes that are "awkward, verbose, and even ungrammatical," statutes where "the language is perfectly clear, but it does not say what it was meant to say," statutes that "contain provisions inconsistent with other provisions found in the same act or in other acts," statutes that are unconstitutional, and statutes that are "mistaken in the policies that they embody and . . . fail to provide for all the contingencies within the scope of their subject matter."); Frank E. Horack, Jr., *In the Name of Legislative Intention*, 38 W. VA. L.Q. 119, 130-31 (1932) [hereinafter Horack, *Name*].

The solution of the problem which makes interpretation necessary is largely with the legislature. There is less necessity for interpretation, particularly of the objectionable character, if the statutes are carefully drafted. Most interpretive problems arise from legislation prepared by careless and un-skilled legislators who still believe that there is something thaumaturgic about the phrase "Be it enacted."

Horack, *Name*, *supra*, at 130-31.

10. See Beaman, *supra* note 3, at 65-66 (quoting C.C. Bonney in address to American Bar Association in 1884 [no cite given]).

Statute-making is not only strictly professional work, it is the very highest order of such work. The text book of Story on Equity Pleadings tells us that the drawing of a well constructed bill in equity requires great accomplishments, and the endowments which belong only to highly gifted minds, and yet that is a summer-day pastime compared with the difficult task of framing a wise and well constructed bill for enactment into a law by the legislature. Because the bill in equity deals only with the facts which exist, while the statute maker must look into the future, and endeavor to perceive the various contingencies and difficulties which may arise.

*Id.* Compare the observations of Professor Herman:

sonable to expect that they anticipate sweeping changes in industries or in society as a whole, such as those seen as a result of the advance of technology, particularly in recent decades.<sup>11</sup> The only response to this type of problem is amendment or replacement of existing statutes or the creation of new statutes to address the changes. One principle of drafting that might be applied here would involve structuring existing or newly created statutes in such a way that future amendments could be made rapidly and easily, with minimal disruption to the existing statutory scheme. Possible means for applying this principle are discussed below.<sup>12</sup>

The need for clear organization of conceptually complex materials is one example of a drafting principle that is not readily apparent from the canons of construction.<sup>13</sup> As discussed below, the organiza-

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Whatever the content of the legal propositions themselves, we act as though their drafters were nearly omniscient. We invest the code with conceptual and terminological coherence even though we know that a provision in question was formulated to regulate an infinite flux of phenomena that the legislator could never have foreseen. In the plenitude of human experience, historical data are bound to outstrip the human imagination. As every lawyer learns, if something can happen, then in time it will.

Shael Herman, *The "Equity of the Statute" and Ratio Scripta*, 69 TUL. L. REV. 535, 537 (1994) [hereinafter Herman, *The "Equity of the Statute" and Ratio Scripta*].

11. The obvious example of such sweeping technological change is, of course, the burgeoning growth of the Internet and the World Wide Web in the past decade, and the resulting strains as legal systems around the world attempt to apply old laws to the new circumstances of transborder communications and commerce and fluidity of digital media. See generally DAVID HENRY ET AL., U.S. DEP'T OF COM., EMERGING DIGITAL ECON. II (2d. ed. 1999) (discussing growth of e-commerce), available in <<http://www.ecommerce.gov/ede/report.html>>.

12. See *infra* Part IV.C.

13. In speaking about problems with structural ambiguity in statutes, Professor Layman Allen and C. Rudy Engholm note that:

[t]o achieve clarity, short sentences and simple words can be helpful, but they alone are not enough to do the job. It is also necessary to pay close attention:

(1) to the structure within a sentence by which a part of that sentence is related

- (a) to other parts of that sentence or
- (b) to constituent sentences within that sentence, and

(2) to the structure within a sentence by which a constituent sentence of that sentence is related to other constituent sentences of that sentence, and

(3) to the structure between two or more sentences by which a part of one of those sentences is related

- (a) to parts of another sentence or
- (b) to constituent sentences within those other sentences, and

(4) to the structure between two or more sentences by which one of those sentences (or one of the constituent sentences within it) are related to those other sentences (or constituent sentences within them).

tion of materials that have more than one set of conceptual linkages is one of the most difficult tasks involved in drafting complex statutes.<sup>14</sup> A principle for handling this difficulty is not immediately suggested by traditional canons of statutory interpretation.

As a result of the partial mismatch between lessons learned from statutory interpretation and the needs involved in formulating principles of good legislative drafting, it is necessary to look for additional solutions to the problem of providing guidance for intelligent legislative drafting. These solutions might focus either upon the semantics involved in the language of the statutes (the meaning of the language involved and the interpretation of that meaning) or on the structure of the statutes themselves. Although they are discussed briefly in the following subsection, the semantic difficulties involved in legislative drafting are not the primary focus of this article. The remainder of the article discusses structural issues in detail.

## I

### PRIOR WORK ON THE THEORY OF LEGISLATIVE DRAFTING

As noted above, much prior scholarship has focused on the technical side of legal and legislative drafting, with little attention paid to the theoretical underpinnings of how legislative drafting should be done. There are, however, some scholarly works which have paid attention to the underlying principles of such drafting; of these, the works of Professor F. Reed Dickerson on legislative drafting in general,<sup>15</sup> Professor Layman E. Allen on uses of symbolic logic in drafting,<sup>16</sup> and "legal scientists" in civil law jurisdictions<sup>17</sup> are discussed in this section.

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Layman E. Allen & C. Rudy Engholm, *The Need for Clear Structure in "Plain Language" Legal Drafting*, 13 U. MICH. J.L. REFORM 455, 456 (1980); see generally C. Rudy Engholm, Note, *Logic and Laws: Relief from Statutory Obfuscation*, 9 U. MICH. J.L. REFORM 322 (1976) (discussing use of "normalization" to relieve problems of syntactic ambiguity in statutes). The process of "normalizing" statutory structure suggested by Professor Allen and Engholm as a remedy for structural ambiguities in statutory language does not, however, clearly deal with the types of conceptual complexities described below.

14. See *infra* Parts II.C, III.A.

15. For a discussion of this work, see *infra* notes 18-28 and accompanying text.

16. For a discussion of this work, see *infra* notes 34-39 and accompanying text.

17. For a discussion of this work, see *infra* Part I.B.

A. *Legislative Drafting in Common Law Jurisdictions in the United States*

1. *Legal Dialectic*

Much of the scholarship on legal drafting in the United States has been led by Professor F. Reed Dickerson. According to Professor Dickerson, legal drafting is “the crystallization and expression in definitive form of a legal right, privilege, function, duty, status or disposition. It is the development and preparation of legal instruments such as constitutions, statutes, regulations, ordinances, contracts, wills, conveyances, indentures, trusts and leases.”<sup>18</sup> In discussing the current state of the art of legal drafting, Professor Dickerson comments that,

Despite their increasing sensitivity to social issues and moral considerations, and their better grasp of sociology, economics and some of the rigorous disciplines of science, such as symbolic logic, and most recently, computer technology, lawyers have adjusted inadequately to the world of nonjudicial law making: the world of statutes, administrative rule making, and private ordering through consensual arrangements.<sup>19</sup>

Because of this inadequate adjustment, Professor Dickerson opines that “the law needs a heavy dose of legal dialectic by which lawyers are trained to develop and communicate useful ideas couched in legal form that is free of concessions to persuasion and free of fallacies attributable to a misunderstanding of the workings of language in its interaction with thought.”<sup>20</sup> Much of Professor Dickerson’s work on the science and art of legal drafting is an attempt to provide this “heavy dose of legal dialectic.”

Professor Dickerson emphasizes a tight connection between language and thought, which in turn calls to mind the impact that good legal drafting may have on the substantive policies sought to be advanced by the drafted documents. Professor Dickerson notes that the drafter’s main tools for positively affecting these substantive policies are consistency, sound arrangement, and normal usage.<sup>21</sup> Of these

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18. F. REED DICKERSON, *THE FUNDAMENTALS OF LEGAL DRAFTING* § 1.2, at 3 (2d ed. 1986).

19. *Id.* § 1.3, at 6.

20. *Id.* § 1.3, at 7. Professor Dickerson points out in the footnote that “‘Dialectic’ is used here in its classical sense of the art of ascertaining ‘truth’ (or ‘the good’), which Plato differentiated from ‘rhetoric’ (the art of persuasion), but only as a severable tool of it . . . . Dialectic apparently includes generalization, definition, and ‘division into species.’” *Id.* § 1.3, at 7 n.1.

21. See *id.* § 2.3, at 15-18; see also Reed Dickerson, *Obscene Telephone Calls: An Introduction to the Reading of Statutes*, 22 HARV. J. ON LEGIS. 173, 182-83 (1985) (stating these same three principles with somewhat more elaboration).

three tools, this article is most concerned with “sound arrangement.”<sup>22</sup> Writers on the topic of legislative drafting and manuals for doing such drafting espouse sound arrangement or logical organization.<sup>23</sup> They suggest that in order to accomplish these goals drafters should first “[e]stablish a single principle of division and use that principle to divide the subject matter into major topics,” then “organize the subject matter of the document by major topics” and, finally, “[a]rrange the items within a topic in a logical sequence . . . that is helpful to the audience . . . address[ed].”<sup>24</sup> The use of these tools in legislative drafting is intended to enhance conceptual clarity, a fundamental concern of legal drafting.

Conceptual clarity depends in part upon the concepts selected by the drafter:

In his search for the right concepts, the draftsman does not search for objective fact or “truth.” As with Euclidean geometry or modern quantum mechanics, he asks not whether the underlying concepts are “real” or “true” but whether, for the purposes at hand, they are the most useful. Utility and clarity depend largely on the conceptual simplicity inherent in an economy of ideas. This economy depends, in turn, on achieving the greatest degree of generality consistent with the objectives to be expressed.<sup>25</sup>

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22. This focus on organization is by no means intended to denigrate the values of consistency or normal usage. Consistency in reference is absolutely required in legal writing, in part because of the interpretive presumption that use of a different term implies reference to a different object. See HOLLIS T. HURD, *WRITING FOR LAWYERS* 53 (1986). Moreover, much has been written elsewhere on the value of the use of “plain English” in legal writing and drafting. See, e.g., MARTIN CUTTS, *THE PLAIN ENGLISH GUIDE* 3-8 (1995) (tracing “plain English movement” from fourteenth century writings by Chaucer to President Carter’s “plain English” executive order, Exec. Order No. 12,044, 43 Fed. Reg. 12,661 (1978), *revoked by* Exec. Order No. 12,291, 46 Fed. Reg. 13,193 (1981), and EC Council Directive 93/13/EEC, 1993 O.J. (L 9) 33, which required terms of contracts “offered to the consumer” to always “be drafted in plain, intelligible language”). But see, e.g., Frank P. Grad, *Legislative Drafting as Legal Problem Solving – Form Follows Function*, in *DRAFTING DOCUMENTS IN PLAIN LANGUAGE* 481, 489 (Duncan A. MacDonald ed., 1979) [hereinafter Grad, *Legislative Drafting*], reprinted in OTTO J. HETZEL ET AL., *LEGISLATIVE LAW AND PROCESS: CASES AND MATERIALS* 1313, 1316 (2d ed. 1993) (stating that “‘Plain English’ is a false issue. Many problems that need legislative resolution are complex and difficult . . . . We need complex language to state complex problems of law or fact.”). Important as the principles of consistency and normal usage are, however, the primary focus of this article is on the use of organizational devices to improve conceptual clarity in conceptually complex documents.

23. See DICKERSON, *supra* note 18, § 2.3, at 16-17. See also TEXAS LEGISLATIVE COUNCIL, *supra* note 7, at 77; Office of the Federal Register, *Drafting Legal Documents*, NAT’L ARCHIVES AND RECORDS ADMIN. (last modified Dec. 6, 1999) <<http://www.nara.gov/fedreg/dldarrgt.html>>.

24. Office of the Federal Register, *supra* note 23.

25. DICKERSON, *supra* note 18, § 2.4, at 19 (footnote omitted).

Furthermore,

the job of selecting the most appropriate concepts and then fitting them together is unquestionably the most elusive part of drafting. The specific pieces should cover the intended areas, and they should leave no gaps; they should not duplicate each other or overlap, and they should not contradict each other.<sup>26</sup>

In short, the drafter should separate the subject of a particular piece of legislation into its underlying concepts and map out the relationships between these concepts. Although this analysis is critical to the drafting process, the literature discussing legislative drafting pays little attention to its details. Discussions of this aspect of the task of drafting rarely go beyond broad statements about its difficulty or “elusiveness.”<sup>27</sup>

In seeking to select and organize concepts, legislative drafters engage in a process of identifying similarities and differences in objects involved in the subject matter at hand.<sup>28</sup> The organized classification of objects into conceptual categories requires the creation of an underlying ontology, or classification scheme. In the case of legislative drafting, the underlying ontology is limited to the objects to be addressed by the legislation in question and the applicable legal principles.<sup>29</sup> Unfortunately, the development of an underlying ontology for a particular legislative need is not an exact science; in fact, it is somewhat of an arcane art. It may be possible, however, to add new intellectual rigor to this art through the adoption of principles developed in the unrelated field of computer software design.<sup>30</sup>

## 2. *Symbolic Logic*

The search for conceptual clarity in legislative drafting is often stymied by ambiguities resulting from syntactical imprecision or uncertainties in the meanings of particular words. These problems might be impossible to eradicate without switching to an artificial language

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26. *Id.* § 4.4, at 59 (footnote omitted).

27. *See, e.g., id.*

28. F. Reed Dickerson, *Toward a Legal Dialectic*, 61 *IND. L.J.* 315, 325 n.36 (1986) (“Concepts arise from a sense of sameness, where differences are unobserved, irrelevant, insignificant, uncritical, or (conceivably) nonexistent.”).

29. The difficulties of creating a more universal ontology for classifying knowledge have been the subject of renewed interest since the development of the World Wide Web on the Internet. *See* Steve G. Steinberg, *Seek and Ye Shall Find (Maybe)*, *WIRED* (visited Mar. 28, 2000) <[http://www.wired.com/wired/archive/4.05/indexweb\\_pr.html](http://www.wired.com/wired/archive/4.05/indexweb_pr.html)>.

30. *See infra* Part IV.

such as Esperanto,<sup>31</sup> Loglan,<sup>32</sup> or a symbolic logic.<sup>33</sup> Professor Al-

31. Esperanto is an artificial “planned international language” first developed by Dr. Lejzer (Ludovic) Zamenhof, in 1887. See Mark Fettes, *About Esperanto*, ESPERANTIC STUDIES FOUND. (last updated May 1997) <<http://infoweb.magi.com/~mfettes/espe.html>>. The lexicon for Esperanto derives primarily from Western European languages; it originally consisted of about 1,000 roots, and now contains approximately 15,000 to 20,000 roots, from which approximately 150,000 words may be formed. See *id.* Proponents of Esperanto tout its “consistent and logical grammar,” see *Esperanto*, UNIVERSAL SURVEY LANGUAGES (visited Apr. 1, 2000) <<http://www.teleport.com/~napoleon/esperanto/index.html>>, which consists of only sixteen rules, see Donald J. Harlow, *The Sixteen Rules of Esperanto Grammar* (last updated Dec. 2, 1995) <<http://www.webcom.com/~donh/Esperanto/rules.html>>, and the direct correspondence between written and spoken language (each written character has one and only one sound, and all characters are pronounced). See *Esperanto*, *supra*. Estimates of the number of Esperanto speakers worldwide range from tens of thousands to millions. See Donald J. Harlow, *Esperanto — An Overview* (last updated Mar. 31, 1999) <<http://www.webcom.com/~donh/efaq.html>>.

32. Loglan (the name is taken from the words “logical” and “language”) is an artificial language invented in the 1950s by James Cooke Brown. See JAMES COOKE BROWN, *LOGLAN 1: A LOGICAL LANGUAGE* § 1.1 (4th ed. 1989), available in <<http://rmcivor.home.sprynet.com/l-one/chap1.html>>. Loglan was first publicly described in an article published by Brown in *Scientific American* magazine in 1960. See James Cooke Brown, *Loglan*, *SCI. AM.*, June 1960, at 53, 55. Loglan was “originally devised to test the Sapir-Whorf hypothesis that the structure of language determines the boundaries of human thought,” *id.*, and to do so, was intended to have a “hyperlogical linguistic structure.” BROWN, *supra*. Specifically, Brown designed the language “to facilitate certain limited kinds of thought: namely those kinds which proceed by the transformation of sentences into other sentences in such a way that if the first are true so also are the second” and to “minimize, or help prevent, the errors that are usually made in performing such deductive operations.” *Id.* § 1.2. Brown disclaims, however, that the language is either *wholly* internally consistent, reasonable or self-evident. See *id.* In creating this logical structure, Loglan was designed to include [ ] speakable provisions for (i) the propositional calculus, including the unique determination of connective scope; (ii) the apparatus of quantification theory, including a clear distinction between bound and unbound variables; (iii) clear distinctions between all known modes of designation and description; and last, and most tellingly, perhaps, (iv) a word-classification scheme that (a) allows all claims to be expressed in the predicate calculus and (b) treats all predicates indiscriminately except as they are distinguished by the number of their places.

*Id.* One variation of Loglan, which shares Loglan’s structure but uses a different vocabulary, is known as “Lojban” (derived from *Loglan*—as opposed to English—words for “logical” and “language”). See *Lojban — The Logical Language*, THE LOJBAN BROCHURE (last modified May 14, 1999) <<http://www.animal.helsinki.fi/lojban/lojbroch.html>>. The split between Loglan and Lojban apparently resulted from a copyright dispute over the original language. See Gavin Edwards, *Dejpu’bogh Hov rur qabli!*, WIRE (Aug. 1996) <[http://www.wired.com/wired/4.08/es.languages.html?pg=1&topic=&topic\\_set=>](http://www.wired.com/wired/4.08/es.languages.html?pg=1&topic=&topic_set=>)>. The number of Loglan/Lojban speakers worldwide is estimated at less than 200. Historically, there have been at least 700 artificial, planned languages other than Esperanto and Loglan; none of these has attracted a following as large as Esperanto. Interestingly, the artificial language that has been described as “the fastest-growing artificial language today” is Klingon, which was created by linguist Marc Okrand for the movie *Star Trek III: The Search for Spock* at

len's proposal in his article *A Razor-Edged Tool for Drafting and Interpreting Legal Documents*<sup>34</sup> involves the use of six logical connectives<sup>35</sup> and a process that he calls "systematic pulverization."<sup>36</sup> The drafter uses these tools to separate each statement in a legal document (including a statute) into the constituent elements of the statement and then to determine and clearly state the logical relationships between the components:<sup>37</sup>

By using systematic pulverization a draftsman can more exactly express his intended meaning, so that those who must interpret and apply the instrument need not speculate as much about probable intention. At the same time, the draftsman will be alerted against the inadvertent inclusion of ambiguity, which may lead to unnecessary litigation. Furthermore, in the interpretation of instruments drafted in the traditional manner, systematic pulverization can be used to discover the wide variety of possible interpretations that are logically available.<sup>38</sup>

Professor Allen did admit, however, that his approach has limitations:

Symbolic logic is not a miracle tool that will accomplish tasks of analysis that no other approach can duplicate. In some simple situations the English language can be just as effective a tool for analy-

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the request of the film's producers. *See id.* (title of Edwards' article is in Klingon; it translates as "Your face looks like a collapsed star!"). Unfortunately, due to its limited vocabulary (about 2,000 words) and difficult sentence structure, *see id.*, Klingon appears to be an unlikely candidate for a universal, logical legislative drafting language.

33. *See* Layman E. Allen, *Symbolic Logic: A Razor-Edged Tool for Drafting and Interpreting Legal Documents*, 66 *YALE L.J.* 833, 833 (1957) [hereinafter Allen, *Razor-Edged Tool*] (describing use of "certain elementary notions of symbolic logic" in order to eliminate or minimize inadvertent ambiguity in written legal instruments). *But see* Robert S. Summers, *A Note on Symbolic Logic and the Law*, 13 *J. LEGAL EDUC.* 486 (1961) (criticizing Professor Allen's proposal as being "of inconsequential value to most lawyers" because syntactical ambiguity that it exposes in legal documents is relatively minor source of legal disputes); Layman E. Allen, *Symbolic Logic and Law: A Reply*, 15 *J. LEGAL EDUC.* 47 (1962) [hereinafter Allen, *Symbolic Logic and Law*] (responding to Professor Summers' criticisms).

34. Allen, *Razor-Edged Tool*, *supra* note 33, at 833.

35. Those six are conjunction (the connective "AND"), *see id.* at 837-40, exclusive disjunction ("OR"), *see id.* at 842-47, inclusive disjunction ("AND/OR"), *see id.* at 847-48, negation ("NOT"), *see id.* at 848, implication ("IF . . . THEN"), *see id.* at 833-37, and complication ("IF AND ONLY IF"), *see id.* at 840-42.

36. *See id.* at 855.

37. *See id.*

38. *Id.* Professor Allen is not the only advocate of this type of use; other authors have also proposed extending the use of symbolic logic in legislative drafting through the use of computers. *See. e.g.,* Thomas Haines Edwards & James P. Barber, Comment, *A Computer Method for Legal Drafting Using Propositional Logic*, 53 *TEX. L. REV.* 965 (1975).

sis. However, as complexity increases, symbolic logic can do relatively effortlessly tasks that would be formidable projects if analyzed in a natural language. This is a difference that it is only reasonable to expect between language systems that are carefully constructed according to precise rules and languages that have evolved rather haphazardly with the growth of the community. It is in dealing with complex situations that symbolic logic will justify the time required for lawyers to train themselves in its use.<sup>39</sup>

It may be impossible to eradicate syntactical imprecision even if an alternative language is used for statutory drafting. Changing to a different language might make it significantly easier to structure statutes; however, because a translation interface would be required, uncertainty may nonetheless result. In other words, if statutes are drafted in unambiguous, symbolic form, any uncertainties eliminated by the use of symbolic language in the statute are re-introduced in the translation of the statute from the language with which it is applied to the language of the "real world."<sup>40</sup> Addressing these difficulties in the meaning of particular language is beyond the scope of this article. Instead, the sections that follow take up the issue of dealing with structural difficulties in legislative drafting, starting with a particular legislative drafting example.

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39. Allen, *Symbolic Logic and Law*, *supra* note 33, at 54 (quoting Layman E. Allen & Gabriel Orechkoff, *Toward a More Systematic Drafting and Interpreting of the Internal Revenue Code: Expenses, Losses and Bad Debts*, 25 U. CHI. L. REV. 1, 61 (1957)).

40. "One of the essential problems of language is the nature of the relationship between words and concepts and the material world of sensed perception." JC Smith, *Machine Intelligence and Legal Reasoning*, 73 CHI.-KENT L. REV. 277, 289 (1998). Smith goes on to point out, first, that words do not gain meaning by "pointing to things," but instead that the meaning of particular words is formed in terms of a discourse "from which [the particular word] cannot be separated as a single unit and still retain its meaning." *Id.* at 289-90. Second, Professor Smith notes that:

The nature of the relationship between the discourse of legal doctrine (the Law) and the discourse of the observations, information, and data of everyday life (the Facts) is one of the most difficult issues facing the practitioners of AI [Artificial Intelligence] and law, working in the area of case-based reasoning and legal expert systems . . . . Because the relationship is indeterminate and shifting, simulating legal reasoning in the computer presents an overwhelming challenge.

*Id.* at 292. Although Professor Smith is addressing a problem separate from the legislative drafting issue presented in this article, his difficulties with representing the messy, imprecise natural world with precise, ordered computer code are parallel to the difficulties involved in drafting statutes that are well-structured and still relevant to the physical word to which they are intended to apply.

### B. Legislative Drafting in Civil Jurisdictions

Although legislative drafting theory has received only sporadic attention in the United States, civil law jurisdictions, particularly Germany, have a long tradition of scholarship focused on legislative drafting. Although the civilian doctrine of legal science has fallen into some disrepute,<sup>41</sup> civil law has had a significant influence on common law, particularly in America.<sup>42</sup> Thus, civil codes may provide some useful examples of the type of conceptual classification and organization essential for effective legislative drafting.<sup>43</sup>

As has been pointed out by Professor John Henry Merryman, the deepest roots of the civil law tradition lie in the *Corpus Iuris Civilis*, a compilation and codification of Roman law that was created in the

41. See *infra* notes 72-77 and accompanying text.

42. See Michael H. Hoeflich, *Bibliographical Perspectives on Roman and Civil Law*, 89 L. LIBR. J. 41 (1997) [hereinafter Hoeflich, *Bibliographical Perspectives*] (discussing principal sources of Roman Civil Law and how their principles and ideas spread through British Common Law to United States); Michael H. Hoeflich, *Roman Law in American Legal Culture*, 66 TUL. L. REV. 1723 (1992) [hereinafter Hoeflich, *Roman Law in American Legal Culture*] (stating that eighteenth- and nineteenth-century legal culture, as evidenced by collections in large libraries and literary circles in Boston and New York, preserved Roman Civil Law and integrated it into modern American common law).

43. As Professor Shael Herman has observed,

Civilian drafters, freed to do their work properly, show more confidence than do their common-law counterparts in the ability of lawyers to make connections among seemingly unrelated areas of legislation. Typically, therefore, a civilian drafter frames rules more generally and abstractly than does an Anglo-American statute drafter, who by contrast assumes that his product should be more particularistic so as not to derogate from the common law.

Shael Herman, *Detrimental Reliance in Louisiana Law—Past, Present and Future (?)*: *The Code Drafter's Perspective*, 58 TUL. L. REV. 707, 756 (1984) (citations omitted). The civil law's usefulness as a source of conceptual categories flows in part from the underlying "grammar of law" recognized by Mirjan Damaška as being present in civil law systems. See Mirjan Damaška, *A Continental Lawyer In an American Law School: Trials and Tribulations of Adjustment*, 116 U. PA. L. REV. 1363, 1365 & n.1 (1968), reprinted in JOHN HENRY MERRYMAN ET AL., *THE CIVIL LAW TRADITION: EUROPE, LATIN AMERICA, AND EAST ASIA* 841-47 (1994) (noting that term "grammar of law" was borrowed from THOMAS E. HOLLAND, *THE ELEMENTS OF JURISPRUDENCE* 7 (7th ed. 1895), and "is not used on the Continent"). Damaška describes the grammar of law as "a network of precise interrelated concepts, broad principles and classificatory ideas," resulting from a "conceptual digestion of the law," and notes that the traditional justifications for Continental legal grammar are that it results in economy of thought and clarity of vision, and is "an essential prerequisite for the satisfactory drafting of comprehensive legislation and the successful ordering of judge-made law," offering "a basis for logical rather than alphabetical arrangement of subject matter." *Id.* at 1366-67 & n.4, reprinted in MERRYMAN ET AL., *supra* 841-47 (1994). Damaška further opines that "it is possible that only legal grammar of some sophistication can provide a basis for avoiding antinomies and omissions in interrelated provisions." *Id.*

year 533 under the Emperor Justinian.<sup>44</sup> Justinian's primary motivations for ordering the preparation of the *Corpus Iuris Civilis* were the restoration of the purity and grandeur of the Roman legal system after several centuries of deterioration, and the codification of the law to eliminate incorrect, obscure, or redundant statements of the law, resolve conflicts and doubts, and systematize the remainder.<sup>45</sup> Interest in the *Corpus Iuris Civilis* was revived in Bologna, Italy, late in the eleventh century,<sup>46</sup> in part because of its "high intellectual quality,"<sup>47</sup> and it eventually formed the basis (together with works of scholars studying and explaining the *Corpus Iuris Civilis*) of an early common law of Europe, the *jus commune*.<sup>48</sup> The subject matter of this law eventually appeared in the civil codes of the principal states of Europe that were adopted in the nineteenth century, including the French Code Napoléon of 1804.<sup>49</sup>

A second factor that Professor Merryman identifies in the evolution of the civil law tradition is the intellectual revolution that took place in Europe and America in the late eighteenth and early nineteenth centuries.<sup>50</sup> In this "Age of Reason,"

Rationalism was a dominant intellectual force. It was assumed that reason controlled men's activities and that all obstacles would fall before the proper exercise of careful thought by intelligent men . . . . It was optimistically assumed that existing laws and institu-

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44. See MERRYMAN, *supra* note 6, at 6; see also BARRY NICHOLAS, AN INTRODUCTION TO ROMAN LAW 39-42 (1969), reprinted in MERRYMAN ET AL., *supra* note 43, at 246-48 (describing historical circumstances surrounding creation of various works that make up *Corpus Iuris Civilis*, *Digest*, *Institutes*, second *Code*, and *Novels*). For more information on the bibliographic history of the *Corpus Iuris Civilis* and prior and subsequent Roman law publications, see Hoeflich, *Bibliographical Perspectives*, *supra* note 42, at 41-54.

45. See MERRYMAN, *supra* note 6, at 7; Herman, *The "Equity of the Statute" and Ratio Scripta*, *supra* note 10, at 548-49 (describing circumstances and motivations of Justinian's codification).

46. See David S. Clark, *The Medieval Origins of Modern Legal Education: Between Church and State*, 35 AM. J. COMP. L. 653, 671-75 (1987), reprinted in MERRYMAN ET AL., *supra* note 43, at 282-85.

47. MERRYMAN, *supra* note 6, at 8-9; see also M.H. Hoeflich, *Law & Geometry: Legal Science from Leibniz to Langdell*, 30 AM. J. LEGAL HIST. 95, 97-98 (1986) [hereinafter Hoeflich, *Law & Geometry*] (noting "revival" of Roman law in Western Europe from twelfth through fifteenth centuries, based in part upon "principled deductive aspect" of legal argument preserved in *Digest*).

48. MERRYMAN, *supra* note 6, at 9; see also MERRYMAN ET AL., *supra* note 43, at 325-26 (describing *jus commune* as a "fusion of Roman Law, as developed by glossators and commentators, with canon law," that eventually spread throughout Europe).

49. CODE CIVIL [C. CIV.] (Fr.); see MERRYMAN, *supra* note 6, at 10.

50. See MERRYMAN, *supra* note 6, at 14-18.

tions would be repealed, and new ones, rationally derived from unimpeachable first principles, put in their place.<sup>51</sup>

In this environment there developed two distinct versions of the civil law.

On the one hand, under what Professor Merryman calls the “rampant rationalism” of the time, the French codifiers who created the Code Napoléon operated under the assumptions that “an entirely new legal system, incorporating only certain desirable aspects of the generally undesirable prior legal system, could be created and substituted for the old system” and that “by reasoning from basic premises established by thinkers of the secular natural law school, one could derive a legal system that would meet the needs of the new society and the new government.”<sup>52</sup>

At the same time, some French scholars, as a result of their experience with pre-Revolutionary courts, distrusted judicial lawmaking disguised as interpretation of laws.<sup>53</sup> This distrust led to demands on the proposed product of the French codification process that eventually resulted in the Code Napoléon:

But if the legislature alone could make laws and the judiciary could only apply them (or, at a later time, interpret and apply them), such legislation had to be complete, coherent and clear. If a judge were required to decide a case for which there were no legislative provision, he would in effect make law and thus violate the principle of separation of powers. Hence it was necessary that the legislature

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51. See *id.* at 16; see also Hoefflich, *Law & Geometry*, *supra* note 47, at 98-100 (connecting juristic move during this period “away from ‘chaotic’ national customary laws towards ‘elegance of Roman legal method’” with movement of contemporary scientists “away from medieval alchemy and primitive experimental science towards development of a new, systematic scientific paradigm,” and noting “geometric paradigm” popularized and explicated by Gottfried Wilhelm Leibniz, that “law, indeed, must be understood as a principled deductive science on the model of classical geometry and that legal reasoning must follow the deductive, demonstrative model used in geometric proofs”); Shael Herman, *Legislative Management of History: Notes on the Philosophical Foundations of the Civil Code*, 53 TUL. L. REV. 380, 385-92 (1979) [hereinafter Herman, *Legislative Management of History*] (explaining influence of Descartes’s rationalism and mathematical methods on development of civil code).

52. See MERRYMAN, *supra* note 6, at 28. Compare the remarks of Professor Herman:

By the time of the French Revolution, French Jurists had practiced for centuries reading a comprehensive law code and speculating on how to fit its pieces, however disparate, into a harmonious whole. When the French exegetical school emerged in the early decades of the nineteenth century, its members predictably treated the Code Napoleon as if it had fallen out of the sky and invested the document with a theological importance akin to that bestowed on Justinian’s compilation by the glossators.

Herman, *supra* note 10, at 550 (footnote omitted).

53. See MERRYMAN, *supra* note 6, at 29.

draft a code without gaps. Similarly, if there were conflicting provisions in the code, the judge would make law by choosing one rather than another as more applicable to the situation. Hence there could be no conflicting provisions. Finally if a judge were allowed to decide what meaning to give an ambiguous provision or an obscure statement, he would again be making law. Hence the code had to be clear.<sup>54</sup>

In contrast to the inventive approach taken to codification in France after the French Revolution, Germany, where the *jus commune* had been formally “received” as binding law,<sup>55</sup> adopted its civil code<sup>56</sup> as the product of a lengthy study of existing German law and its historical development.<sup>57</sup> In this study, under the influence of Friedrich Karl von Savigny and his followers in the “historical school” of German legal scholarship,<sup>58</sup> the components of the German legal system were examined to “determine the more general principles of which they were specific manifestations” so that the reconstruction of

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54. *Id.* Professor Merryman goes on to note that:

If insistence on total separation from legislative power dictated that codes be complete, coherent and clear, the prevailing spirit of optimistic rationalism persuaded those in its spell that it was possible to draft systematic legislation that would have those characteristics to such a degree that the function of the judge would be limited to selecting the applicable provision of the code and giving it its obvious significance in the context of the case. Actually, the Code Napoléon is not the most extreme example of this type of codification. That dubious honor falls to the Prussian Landrecht of 1794, enacted under Frederick the Great and containing some seventeen thousand detailed provisions setting out precise rules to govern specific “fact situations.” The French Civil Code was drafted by experienced and intelligent jurists who were familiar with the rather spectacular failure of the Prussian attempt to spell it all out.

*Id.*

55. See *id.* at 10; K.W. RYAN, AN INTRODUCTION TO THE CIVIL LAW 19-22 (1962), reprinted in MERRYMAN ET AL., *supra* note 43, at 335-38 (describing adoption of Roman Law in Germany).

56. BÜRGERLICHES GESETZBUCH (Civil Code) [BGB] (F.R.G.).

57. See MERRYMAN, *supra* note 6, at 30; see also Herman, *The “Equity of the Statute” and Ratio Scripta*, *supra* note 10, at 550 (“A century after the enactment of the Code Napoleon and on the other side of the Rhine, the German Civil Code emerged from the hands of German Lawyers as a finely tuned instrument.”). For a detailed description of the events involved in the creation and adoption of the BGB, see the excerpt by Professor Ernst Freund, from *A General Survey of Continental Legal History*, in 1 CONTINENTAL LEGAL HIST. SERIES 447-512 (1912), reprinted in HENRY M. HART, JR. & ALBERT M. SACKS, THE LEGAL PROCESS: BASIC PROBLEMS IN THE MAKING AND APPLICATION OF LAW 752-54 (William N. Eskridge, Jr. & Philip P. Frickey eds., 1994).

58. See Hoeflich, *Law & Geometry*, *supra* note 47, at 106. Savigny’s 1828 work that began the “historical school” was FREDERICK CHARLES VON SAVIGNY, OF THE VOCATION OF OUR AGE FOR LEGISLATION AND JURISPRUDENCE (Abraham Hayward trans., Legal Classics Library 1986) (1831).

the German legal system would be a *scientific* reconstruction.<sup>59</sup> The German codifiers of the historical school sought not “to find true principles of law from assumptions about man’s nature, as the French did under the influence of secular national law,” but rather “to find fundamental principles of German law by scientific study of the data of German law: the existing German legal system in historical context.”<sup>60</sup> Once these fundamental principles had been identified and properly stated, they could be arranged into a coherent system.<sup>61</sup>

The debate on codification in Germany continued for nearly one hundred years because of the triumph of the legal scholars of the historical school over those who were in favor of immediate codification along the lines of the French effort. The resulting study of German law and its underlying Roman law principles led to the Pandectist movement.<sup>62</sup> Ultimately, because the principles contained in the *Digest* of Justinian’s *Corpus Iuris Civilis* had been received into and formed a significant part of the German legal system prior to codification, the codification process focused on these principles as they were received into German law and later modified by additional Germanic laws.<sup>63</sup> As part of the extensive review of German law that took place under the influence of the historical school,<sup>64</sup> German legal scholars produced highly systematic treatises<sup>65</sup> and, ultimately, the German

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59. See MERRYMAN, *supra* note 6, at 31.

60. *Id.* at 31-32.

61. See *id.* at 61. Hoeflich notes:

for Savigny, law and legal notions derive from a nation’s unique historical experience. Once so derived, however, they must be reduced to leading principles, the equivalent of mathematical axioms, so that jurists may ‘calculate with their notions.’ For Savigny, systematization does not require the derivation of law from reason, but only the application of reason to legal ideas once derived.

Hoeflich, *Law & Geometry*, *supra* note 47, at 107.

62. The Pandectists were staunch proponents of codification along the lines of the French model (and were thus opposed by Savigny, even though he supported logical application of legal principles in a way similar to that proposed by the Pandectists). See Hoeflich, *Law & Geometry*, *supra* note 47, at 106-08. For a discussion of Savigny’s position, see *supra* notes 58-61 and accompanying text. Their name derives from the German word *Pandekten* (“digest”) and results from their study of Justinian’s *Digest*. See MERRYMAN, *supra* note 6, at 62.

63. See MERRYMAN, *supra* note 6, at 62.

64. This process was also greatly concerned with the Roman civil law that formed the heart of the German legal system of the time. See *id.*

65. See, e.g., ANTON FREIDRICH JUSTUS THIBAUT, AN INTRODUCTION TO THE STUDY OF JURISPRUDENCE (Nathaniel Lindley trans., Rothman 1985) (1855); BERNHARD WINDSCHEID, PANDEKTENRECHT (Keip Verlag 8th ed. 1997) (1862).

Civil Code.<sup>66</sup> The resulting school of legal scholarship, known as “legal science,”

rests on the assumption that the materials of the law (statutes, regulations, customary rules, etc.) can be seen as naturally occurring phenomena, or data, from whose study the legal scientist can discover inherent principles and relationships, just as the physical scientist discovers natural laws from the study of physical data.<sup>67</sup>

At first glance, legal science seems to be an area of civil law scholarship that would be useful in developing theoretical legislative drafting principles in common law jurisdictions.<sup>68</sup> For example, Pro-

66. MERRYMAN, *supra* note 6, at 62. The influence of the Pandectists on the code was clear:

The structure and style of the Civil Code [BGB] clearly mark it as the ultimate triumph of the Pandectists. It opens with a General Part that arches over the whole, cast at the highest level of abstraction. It then proceeds through descending levels of generality – all obligations, then contractual obligations, then particular contracts and noncontractual obligations, and so on. These provisions all interlock and all must be constantly kept in mind. The language is in effect copied from Pandectist textbooks, though extremely condensed; it is a special language, artificial and refined, and is used throughout with a rigorous consistency. Intelligibility to laymen could have been no object. It was addressed to lawyers, for whom each key word should strike a chord resonating back on their own well-tempered scale. Regulation in detail was rarely attempted. The bias of the draftsmen and their faith in the results already achieved led them repeatedly to prefer general over more specific language. Furthermore, they were well aware that some scope was needed in interpretation and that problems would arise in forms not previously foreseen. But for all such problems the Code should provide answers when read against the great accumulated reservoir of doctrine which the Code expressed in shorthand.

JOHN P. DAWSON, *THE ORACLES OF THE LAW 460 (1968)*, reprinted in MERRYMAN ET AL., *supra* note 43, at 492.

67. MERRYMAN ET AL., *supra* note 43, at 492.

68. Professor Hoeflich points out that the geometric paradigm of law that was popularized on the European Continent in the seventeenth and eighteenth centuries also spread to the common law jurisdictions of England, Scotland, and the United States under the influence of writers and jurists such as Francis Bacon, Matthew Hale, William Blackstone, Dugald Stewart, John Austin, Hugh Swinton Legaré, David Hoffman, and Daniel Mayes, ultimately culminating in the scientific approach pioneered by Langdell in the 1870s. See Hoeflich, *Law & Geometry*, *supra* note 47, at 108-21. See also Michael H. Hoeflich, *Roman Law in American Legal Culture*, *supra* note 42, at 1723-43 (describing strong influence of Roman law on American legal culture in eighteenth and nineteenth centuries). Along these same lines, Professor Shael Herman notes:

The United States also had true believers in codification. Among twentieth century proponents of legislation as a means of unifying and organizing law, Karl Llewellyn, the father of the Uniform Commercial Code, was the most prominent. Though Llewellyn did not advertise the fact, he had studied law in Germany and had authored a German study of judicial method entitled *Präjudizienrecht und Rechtsprechung in Amerika*.

fessor Merryman notes that “[m]uch scholarly effort [by legal science scholars] has gone into the development and refinement of definitions of concepts and classes . . . .”<sup>69</sup> Indeed, former United States Attorney General Hugh Swinton Legaré wrote:

Whatever may be the comparative merits of these two systems of jurisprudence [civil and common law], considered *per se*, it is certain that the Civil law has greatly the advantage of ours in the manner in which it has expounded and illustrated . . . . In comparing what the civilians have written on any subjects that have been treated by the English text writers, or discussed in the English Courts, it is, we think, impossible not to be struck with the superiority of their truly elegant and philosophical style of analysis and exposition. Their whole arrangement and method—the division of the matter into natural parts, the classification of it under the proper predicaments, the discussion of principles, the deduction of consequences and corollaries—every thing, in short, is more luminous and systematic—every thing savors more of a regular and exact science.<sup>70</sup>

Similarly, it is clear that classification and arrangement was a primary concern of drafters of the Code Napoléon:

The design of this book [*Les Lois Civiles dans Leur Ordre Naturel*, later ‘dubbed the preface to the Code Napoléon’] is to put the civil laws in their natural order, to distinguish the subjects of law and to assemble them according to their rank in the body they naturally compose; to divide each subject according to its parts; and to arrange in each part the detail of its definitions, of its principles and rules, advancing nothing either not clear in itself or not preceded by all that is necessary to make it understood.<sup>71</sup>

However, Professor Merryman goes on to criticize legal science as teaching those definitions “in a fairly mechanical, uncritical way,”<sup>72</sup> as being too abstract and involving principles that have been removed from their factual and historical context,<sup>73</sup> and as being colored by

Llewellyn was fully familiar with the history of European codification and with civilian writers such as Francois Geny and Rudolph von Jhering. Herman, *The “Equity of the Statute” and Ratio Scripta*, *supra* note 10, at 543 (footnotes omitted).

69. MERRYMAN, *supra* note 6, at 63.

70. HUGH SWINTON LEGARÉ, *Kent’s Commentaries*, in 2 THE WRITINGS OF H.S. LEGARÉ 102, 110 (1845).

71. J. Rémy, *Préface de l’éditeur* to 1 OEUUVRES COMPLETES DE DOMAT at vi (J. Rémy ed., 1835) (quoting Jean Domat but not identifying source of quotation), *quoted in* Herman, *Legislative Management of History*, *supra* note 51, at 388 (emphasis in original removed in intermediate source).

72. *See* MERRYMAN, *supra* note 6, at 63.

73. *See id.* at 64.

unacknowledged underlying assumptions and values.<sup>74</sup> Professor Merryman points out that although legal science was an underlying influence on the case method of instruction in the United States and on the Restatement of the Law, it “has been essentially discredited in the United States”<sup>75</sup> as a result of criticism by legal realists.<sup>76</sup> Moreover,

German legal science has been the object of satire, ridicule and direct attack by legal thinkers in Germany and elsewhere from the time of its emergence. More recently, and particularly since World War II, its critics have begun to have more effect. There is a growing group of scholars who call for a fresh approach to legal scholarship. Some of them demand rejection of all that legal science has accomplished. Others treat legal science as a valid but spent phase in the evolution of the civil law tradition; they wish to preserve the gains made by it, particularly the provision of order and system in the law, and build on them.<sup>77</sup>

For the purpose of developing principles of legislative drafting in common law jurisdictions, the second perspective is perhaps better; although legal science and its attention to the structure of concepts in the law may provide helpful insights,<sup>78</sup> its tendency to over-abstract

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74. *See id.* at 65.

75. *Id.* at 66-67.

76. *See id.* The American Restatements of the Law, published by the American Law Institute, which were heavily influenced in their original conception by German legal science and the historical school, *see id.* at 79, are one target of such criticism. *See, e.g.,* James Gordley, *European Codes and American Restatements: Some Difficulties*, 81 COLUM. L. REV. 140 (1981) (suggesting that clarity and simplicity, stated objectives of Restatements, “are not advantages that should be sought from a restatement or a civil code: either they cannot be obtained or the cost of obtaining them is too high.”); LAWRENCE M. FRIEDMAN, *A HISTORY OF AMERICAN LAW* 676 (2d ed. 1985), *reprinted in* MERRYMAN ET AL., *supra* note 43, at 505 (“They [the drafters of the Restatements, including Samuel Williston and Austin W. Scott] expended their enormous talents on an enterprise which, today, seems singularly fruitless, at least to those legal scholars who adhere to later streams of legal thought. Incredibly, the work of restating (and rerepeating) is still going on.”).

77. MERRYMAN, *supra* note 6, at 147.

78. The usefulness of these insights may be further limited however, by the foreignness to common law scholars and legislative drafters of the conceptual classification schemes used in many civil codes. For example, the broad divisions of French civil law have been identified as:

1. Law of persons: physical and moral persons, attributes of personality (name, domicile, acts of civil status), capacity of minors and the insane and the protection of their interests.
2. Family law: marriage, divorce, separation, filiation, obligations of maintenance.
3. Property law: movables and immovables, contents and transmission of real rights.
4. Law of obligations: contract in general and particular contracts, delicts, unjust enrichment.

those concepts should be avoided. The object-oriented approach to legislative drafting suggested by this article<sup>79</sup> begins with the real-world situations to be affected or governed by proposed legislative provisions. As a result, this approach avoids the excesses of the legal science movement, while still providing guidance with its lessons in analysis and ordering.

## II

### AN EXAMPLE: THE TEXAS BUSINESS ENTITY CODE

The Business Law Section of the State Bar of Texas formed an Ad Hoc Codification Committee ("Codification Committee") in 1995 for the purpose of studying, drafting, and making recommendations concerning the adoption of a new code that would consolidate all ex-

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5. Law of matrimonial property relations: the statutory community, conventional systems established by the marital contract.
  6. Law of succession: intestate and testamentary.

RENÉ DAVID, *FRENCH LAW: ITS STRUCTURE, SOURCES AND METHODOLOGY* 109 (Michael Kindred trans., 1972), *reprinted in* MERRYMAN ET AL., *supra* note 43, at 1137-38. In addition to the Civil Code (from which these divisions were extracted), the general codification of French law in the early nineteenth century resulted in the Code of Civil Procedure, the Code of Commerce, the Code of Criminal Procedure and the Penal Code (original Code of Commerce has since been largely replaced by various smaller statutes, and original Code of Civil Procedure, Code of Criminal Procedure, and Penal Codes have been replaced with new codes). Denis Tallon, *Reforming the Codes in a Civil Law Country*, 15 J. SOC'Y PUB. TCHRS. L. 33, 34-39 (1980), *reprinted in* MERRYMAN ET AL., *supra* note 43, at 1150. In comparison, the following division of law in Germany has been summarized by Hans Lesser:

- (a) private law and related areas [including the civil code];
- (b) commercial law;
- (c) company law;
- (d) judicature and civil procedure;
- (e) labor and social security law;
- (f) criminal law, criminal procedure, criminology and juvenile law;
- (g) public and constitutional law, including international law and the law of supranational bodies; and
- (h) administrative law [including tax law] and procedure.

NORBERT HORN ET AL., *GERMAN PRIVATE AND COMMERCIAL LAW: AN INTRODUCTION* 52-56 (Tony Wier trans., 1982), *reprinted in* MERRYMAN ET AL., *supra* note 43, at 1148. Perhaps even more interesting, and relevant to some organizational issues discussed below, is the distinction made in the German Civil Code (BGB) between "special" rules and "general" rules, with the "general" rules being collected and presented first in the organization. (This pattern is repeated both in the overall organization of the Code and in the organization of particular subjects contained within the Code, such as the law of obligations.) See E.J. COHN, I *MANUAL OF GERMAN LAW* §§ 101-04, at 62-63 (2d ed. 1968), *reprinted in* MERRYMAN ET AL., *supra* note 43, at 1165-66. For common law lawyers, not only will some of the terminology used in these legal categories be unfamiliar, but the conceptual classification scheme may also seem odd.

79. See *infra* Part IV.

isting Texas statutes governing the formation and internal affairs of for-profit and nonprofit entities in Texas (“Code”). These entities include corporations, partnerships, limited liability companies, real estate investment trusts, and associations.<sup>80</sup> Nearly four years after its formation, the Codification Committee produced a draft of the proposed Code that was introduced into the 76th Texas Legislature as H.B. 2681.<sup>81</sup> The scope of the codification project presented significant challenges in, among other things, organizing the proposed Code.<sup>82</sup>

### A. The “Hub-and-Spoke” Model

Early in the development process for the new Code, the Codification Committee decided to structure the Code in a manner that was dubbed the “hub-and-spoke” model.<sup>83</sup> Provisions that were common to all entities to which the Code was to be applied were gathered in a central “hub”—Title 1 of the Code<sup>84</sup>—and provisions that were unique to particular types of entities were set out in the “spokes” (Title 2 and so forth).<sup>85</sup> Thus, general definitions<sup>86</sup> and provisions governing mergers of entities,<sup>87</sup> which were common to all (or nearly all) entities governed by the Code were placed in Title 1 of the Code, while provisions governing preemptive rights by corporate shareholders<sup>88</sup> were placed in Title 2 of the Code, which governed corporations. The stated objective of the Codification Committee in adopting this

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80. See AD HOC CODIFICATION COMMITTEE, STATE BAR OF TEXAS, PRELIMINARY REPORT OF THE CODIFICATION COMMITTEE OF THE SECTION OF BUSINESS LAW OF THE STATE BAR OF TEXAS ON THE PROPOSED BUSINESS ORGANIZATIONS CODE 1 (Mar. 1999) [hereinafter CODIFICATION COMMITTEE REPORT], available in <<http://www.texasbusinesslaw.org/1999code/originalprelimrpt.html>>. The proposed Organizations Code was not passed by the legislature, and the committee that drafted it was, at the time of this article’s writing, considering revision of the proposed Code for reintroduction to the next session of the Texas Legislature. The author participated in the drafting of the proposed Code, and it is further described in an earlier article, Thomas F. Blackwell, *The Revolution Is Here: The Promise of a Unified Business Entity Code*, 24 J. CORP. L. 333 (1999).

81. H.B. 2681, 76th Leg., Reg. Sess. (Tex. 1999), available in <<http://www.capitol.state.tx.us/tlo/76R/billtext/HB02681H.HTM>>.

82. The bill as originally introduced was voluminous, consisting of approximately 163,000 words and spanning 750 pages. See *id.*

83. See CODIFICATION COMMITTEE REPORT, *supra* note 80, at 3.

84. See Tex. H.B. 2681 tit. 1, available in <<http://www.capitol.state.tx.us/tlo/76R/billtext/HB02681H.HTM>>.

85. See, e.g., *id.* tit. 2 (governing corporations), tit. 3 (governing limited liability companies), tit. 4 (governing partnerships).

86. See *id.* ch. 1, § 1.002.

87. See *id.* ch. 10.

88. See *id.* ch. 21, § 21.203-208.

structure was to simplify and standardize common provisions of the various business entity statutes.<sup>89</sup>

A graphical representation of the hub-and-spoke model is shown in Figure 1.

*B. Difficulties Presented by the Model:  
“Quasi-Hubs” and Bridging Entities*

As the Codification Committee progressed in its creation of the new Code, it became apparent that the proposed hub-and-spoke structure was not as effective in achieving the stated goal of simplification as had been expected.<sup>90</sup> This ineffectiveness resulted from the fact that the amount and type of redundancy and overlap between the various business entity statutes was greater and more complex than had originally been thought.

Entities covered by the new Code included corporations (both for-profit and nonprofit),<sup>91</sup> general partnerships, limited partnerships, limited liability partnerships,<sup>92</sup> limited liability companies,<sup>93</sup> real estate investment trusts,<sup>94</sup> cooperative and other nonprofit associa-

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89. See CODIFICATION COMMITTEE REPORT, *supra* note 80, at 4-5. One major problem that the committee sought to minimize was the recurrence of similar provisions. As pointed out by Professor Dickerson,

Recurring problems [that is, the problem of recurring provisions] that cut across a number of different legal instruments [such as separate business entity statutes] pose an even more extreme dilemma. The desire for contiguity suggests that the rule be stated at each place. The price for this benefit is, again, a multiplicity of provisions, much greater difficulty in amending the rule in all its applications when a change is later necessary, and the corresponding danger in nonuniformity in treatment. The burden of this price depends on the length and complexity of the rule, its importance, and the amount of repetition involved. Conversely, economy, ease of amendment, and uniformity entail the risk of incompleteness, lack of findability, and consequent misunderstanding. Here the draftsman must choose between (1) repeating the provision, (2) placing it where it has its most important application and making it generally applicable, either positively or by incorporation by reference, (3) framing it as an independent instrument, or (4) a combination of these approaches.

DICKERSON, *supra* note 18, § 5.7, at 93. It is interesting to note that the structure chosen by the Codification Committee is similar in overall conceptual structure (but not in substantive detail) to the German Civil Code (BGB). See *supra* note 78 for a description of the German Civil Code.

90. The descriptions of the drafting process of the Texas Business Entity Law are personal observations of the author from his experience as a member of the Codification Committee.

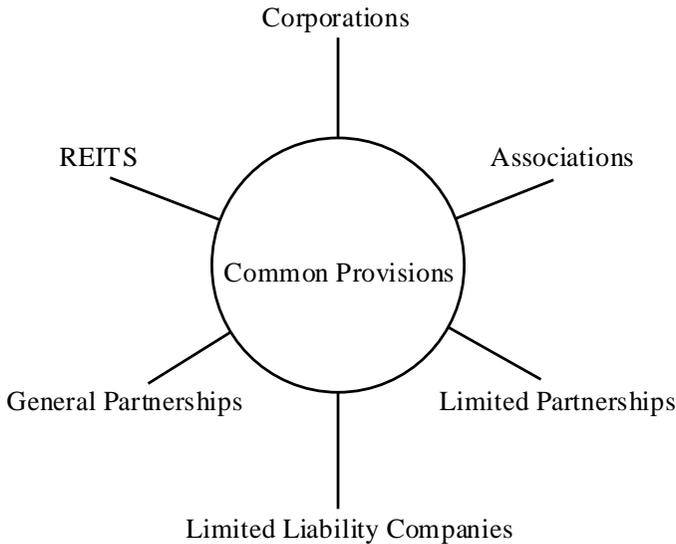
91. See Tex. H.B. 2681 tit. 2, available in <<http://www.capitol.state.tx.us/tlo/76R/billtext/HB02681H.HTM>>.

92. See *id.* tit. 4 (partnerships).

93. See *id.* tit. 3.

94. See *id.* tit. 5.

FIGURE 1



tions,<sup>95</sup> and various professional entities.<sup>96</sup> These different types of entities were grouped into various overlapping categories.<sup>97</sup> Because of this overlap, multiple types of entities were governed by particular Code sections,<sup>98</sup> and a particular type of entity may be governed by sections in different titles of the Code.<sup>99</sup> The resulting situation was considerably more complex than had been originally envisioned by the hub-and-spoke model.

The complexity of the situation was increased by two particular types of overlap between entity characteristics (and resulting applicability of Code sections). First, there were instances where two or more types of entities shared characteristics that were not shared by

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95. *See id.* tit. 6.

96. *See id.* tit. 7.

97. A particular type of entity may fall in several different categories. For example, a nonprofit corporation is both a corporation and a nonprofit entity, and would be governed both by the title of the Code applicable to corporations and by the provisions of the Code applicable to nonprofit entities. A chart showing the relationships between the different entities included in the Code and the definitional terms used to group them can be found at Blackwell, *supra* note 80, at app. A.

98. For example, Title 4 of the proposed Code governs all types of partnerships, including general partnerships, limited partnerships, and registered limited liability partnerships. *See* Tex. H.B. 2681 tit. 4, available in <<http://www.capitol.state.tx.us/tlo/76R/billtext/HB02681H.HTM>>.

99. For example, professional limited liability companies are governed by both Title 3 (limited liability companies) and Title 7 (professional entities). *See id.* at tits. 3, 7.

any of the remaining types. For example, for-profit and nonprofit corporations share many characteristics that are not shared by partnerships.<sup>100</sup> Because these shared characteristics were not universal (or nearly so) among all business entities, it was inappropriate to place the relevant Code sections dealing with these characteristics in the hub. However, because the applicable provisions for both for-profit corporations and nonprofit corporations were identical or nearly so, placing them in separate spokes for each type of corporation resulted in duplication of provisions. For instance, so long as for-profit and nonprofit corporations remain in separate spokes, identical rules governing boards of directors have to be placed in both of those spokes. This duplication ran counter to the objective of simplification.

In order to deal with this type of overlap, the concept of “quasi-hubs” was introduced into the Code. For situations such as the overlap between for-profit and nonprofit corporations, both types of entities were placed into the same spoke<sup>101</sup> with the common provisions placed into a chapter that formed a quasi-hub within the spoke,<sup>102</sup> and the remaining provisions specific to each entity in chapters that formed “sub-spokes.”<sup>103</sup> A graphical representation of this structure is shown in Figure 2.

Although this revised structure solved some of the problems presented by the overlap between entities, it still presented difficulties in maintaining coherence and coordination among the various provisions in the Code that governed particular entities. For entities governed in part by provisions in a quasi-hub, governing provisions would be found in three different places in the Code: the hub, the relevant quasi-hub, and the relevant spoke.<sup>104</sup> A significant amount of discussion occurred in the drafting sessions of the Codification Committee on the potential difficulties for practitioners and others in locating all relevant statutory sections applicable to a given entity as a result of this arrangement of Code provisions. The quasi-hub structure in the

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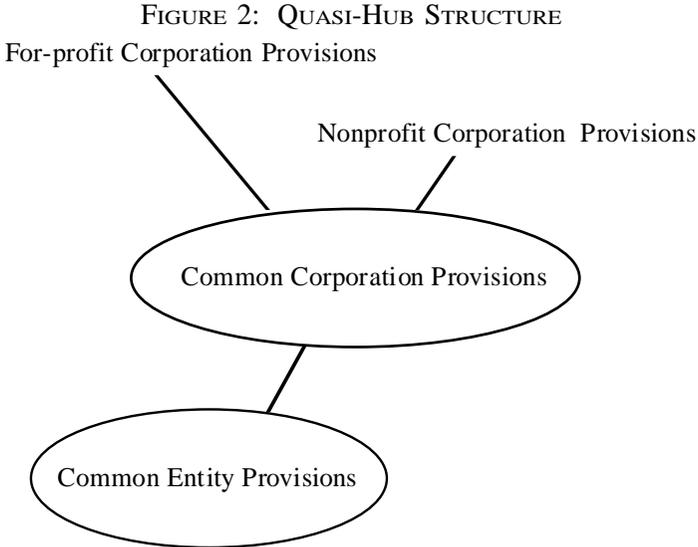
100. For example, both for-profit and nonprofit corporations are governed by a board of directors, while partnerships are not.

101. See Tex. H.B. 2681 tit. 2 (governing corporations), available in <<http://www.capitol.state.tx.us/tlo/76R/billtext/HB02681H.HTM>> .

102. In this case, the quasi-hub is Chapter 20, General Provisions. See *id.* ch. 20.

103. In this case, Chapter 21, For-Profit Corporations, and Chapter 22, Nonprofit Corporations, are the sub-spokes. See *id.* chs. 21-22.

104. For example, provisions governing for-profit corporations were found in the hub (Title 1), quasi-hub (Chapter 20), and the spoke (Chapter 21). See *id.* tit.1, chs. 20-21.



final form of the proposed Code was a compromise among several competing considerations.<sup>105</sup>

Limited liability companies presented the second type of overlap problem. Limited liability companies are a relatively new type of business entity, first having been created by statute in Wyoming in 1977.<sup>106</sup> A limited liability company is a hybrid entity that combines features of both partnerships (flexibility of structure,<sup>107</sup> pass-through federal income tax treatment)<sup>108</sup> and corporations (full limitation of

105. See *infra* note 113.

106. The act was adopted March 4, 1977, and became effective June 30, 1977. See WYO. STAT. ANN. § 17-15-101 (Michie 1977); see also 1977 Wyo. Sess. Laws 158.

107. The management and economic structures of limited liability companies are normally handled in the operating agreement of the limited liability company and are usually subject to minimal statutory restraints. See UNIF. LTD. LIAB. CO. ACT § 103, 6A U.L.A. 434 (1995); cf. REV'D UNIF. LTD. PARTNERSHIP ACT §§ 101(9), 403, 503 (amended 1985), 6A U.L.A. 61, 177, 209 (1976) (defining "partnership agreement" and stating that management powers of general partners and economic structures of limited partnerships are subject to provisions of partnership's partnership agreement). The operating agreement of a limited liability company is often similar to a partnership agreement.

108. Pass-through federal income tax treatment minimizes federal income tax against profits generated by a business. Simplifying greatly, if a particular entity (such as a corporation) is not eligible for pass-through tax treatment, profits are taxed once when received by the entity and are taxed again when distributed by the entity to the owner(s) of the entity, with no offsetting deduction to the entity for the distribution. See HUGH J. AULT ET AL., *COMPARATIVE INCOME TAXATION: A STRUCTURAL ANALYSIS* 285 (1997). In contrast, if the entity (such as a partnership) has pass-through tax treatment, profits of the business are allocated to the owner(s) of the entity and taxed only to them, with no separate tax paid at the entity level. See *id.* Given that at least

owner liability).<sup>109</sup> Thus, even the quasi-hub structure is insufficient to deal with limited liability companies, since some of their characteristics are identical to characteristics of entities in the corporate spoke, while others are identical to characteristics of entities in the partnership spoke. Limited liability corporations must therefore be given their own spoke proceeding directly from the main hub; this spoke will necessarily contain provisions duplicating portions of the corporate and partnership spokes.

### C. Organizational and Use Considerations

Two competing considerations influence the structure of the complex hub-and-spoke type statutes. The first is a desire to simplify the statute and minimize duplication of provisions.<sup>110</sup> The second is a concern that practitioners and other researchers be able to find all relevant provisions of the law.<sup>111</sup> As mentioned above, concerns were raised in Codification Committee meetings about the effect that the hub-and-spoke structure or a more complicated statutory structure would have on the ability of practitioners or others to locate all relevant sections of the Code that apply to a particular type of entity.

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one partner in a partnership is personally liable for the debts of the partnership, *see infra* note 109, the creation of a new type of entity that had the federal tax characteristics of partnership and full liability limitation for all owners was an extremely popular development among business owners. *See* Graeme S. Cooper & Richard K. Gordon, *Taxation of Enterprises and their Owners*, in 2 *TAX LAW DESIGN AND DRAFTING* 811, 826 (Victor Thuronyi ed., 1998). Nevertheless, prior to the adoption effective on January 1, 1997 by the IRS of the “check the box” regulations, *see* 26 C.F.R. § 301.7701-1 to -3, governing (and simplifying) the federal income tax status of unincorporated associations, *see* 61 Fed. Reg. 66,588 (1996) (to be codified at 26 C.F.R. pts. 1, 301, 602) the actual availability of pass-through federal tax status for particular limited liability companies depended upon the specific provisions of the individual state statute governing the limited liability company, and often also the specific provisions of the charter documents for the limited liability company.

109. In corporations, the general rule is that no owner (shareholder) is personally liable for the debts and obligations of the corporation in excess of his or her original capital contribution to the corporation. *See, e.g.*, REV'D MODEL BUS. CORP. ACT § 6.22 (revised through 1991). In contrast, for partnerships, every partner (in general partnerships) or at least one partner (in limited partnerships) is personally liable for the debts and obligations of the partnership. *See, e.g.*, REV'D UNIF. PARTNERSHIP ACT § 306, 6 U.L.A. 45 (1994); REV'D UNIF. LTD. PARTNERSHIP ACT § 403(b). For partners of a general partnership and for multiple general partners of a limited partnership, this liability is joint and several. *See, e.g.*, REV'D UNIF. PARTNERSHIP ACT § 306; REV'D UNIF. LTD. PARTNERSHIP ACT § 403(b). For limited liability companies, like corporations, there is generally no personal owner (member) liability for the debts and obligations of the company. *See, e.g.*, UNIF. LTD. LIAB. CO. ACT § 303.

110. *See* CODIFICATION COMMITTEE REPORT, *supra* note 80, at 5.

111. *See id.* at 4.

The tension between these two considerations was clearly illustrated by an alternative to the hub-and-spoke model that was considered and rejected by the Codification Committee. This alternative structure would have placed in Title 1 all provisions that applied to *all* entities under the Code, with a Title 2 that consisted of all provisions that applied to *less than all* but *more than one* entity under the Code. The remaining titles would contain provisions that were unique to a particular type of entity, grouped by type of entity. On the one hand, this structure is uniquely effective in avoiding duplication, since it allows provisions that would have been found in multiple spokes or quasi-hubs to be placed just once in Title 2. On the other hand, this structure would have been extremely user-unfriendly, with provisions that applied to a particular entity scattered throughout the Code with minimal organizational clarity. As a result, it would be more difficult to locate all relevant sections that applied to particular entities.<sup>112</sup>

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112. This type of problem is discussed more generically in DICKERSON, *FUNDAMENTALS OF LEGAL DRAFTING*, *supra* note 18, § 5.7, at 91-98. Professor Dickerson gives the following example of how a situation similar to that faced in the drafting of the Texas Code was resolved:

An excellent example of how a very complicated problem of this kind was handled appeared in the consolidation of the military laws of the United States (Title 10, "Armed Forces," United States Code). Some of the source laws applied only to a single service (Army, Navy, or Air Force). Others applied to two but not the third (Army and Air Force, Army and Navy, Navy and Air Force). Still others applied to all three. Following the principle that each service ought to have a title containing all the law that applied to it would have produced three titles, but at the expense of stating all bi-service law twice and all tri-service law three times. On the other hand, following the principle of economy that all similar provisions should be consolidated in a single statement would have produced seven titles (General Military Law, Army, Navy, Air Force, Army-Navy, Army-Air Force, and Navy-Air Force). After much soul-searching, it was decided to compromise by stating all tri-service law in one title and repeating the bi-service law. This produced four titles: General Military Law, Army, Navy, and Air Force. It meant that the benefits of consolidating tri-service law could be retained at the expense of requiring a person interested in Air Force Law to look in two titles instead of one. One of these benefits was to facilitate the drafting and enactment of an ever-increasing number of unified military laws.

*Id.* at 92. The military example is not the earliest record of a legislature facing this situation. Previous drafters also balanced usability and avoidance of duplication by using a structure similar to the one adopted in drafting the Texas Code:

"Food Products Regulation No. 1 [9 Fed. Reg. 6711 (1944)] is an attempt to resolve the fundamental dilemma, existing in some fields, between the desirability of consolidation and the desirability of treating different pricing problems differently.

"The conflict is resolved, it is believed, by segregating, standardizing, and unifying the recurring provisions and by stating them in a single autonomous pricing document. The non-recurring provisions, on the

This structure was rejected in part because of a concern that many legal practitioners, not to mention lay persons, would not have any prior knowledge of whether a particular Code provision would apply to one, more than one, or all entities governed by the Code and would thus be hard-pressed to find all of the Code provisions applicable to a given business entity.

Ultimately, the Codification Committee was forced to compromise these competing considerations, and the hub-and-spoke model, with the added feature of quasi-hubs, was the result.<sup>113</sup> This structure reduced some, but not all, of the duplication among existing business entity acts,<sup>114</sup> while still maintaining a fair amount of entity-based organization of statutory provisions to ensure organizational clarity and ease of access.<sup>115</sup> The cost of the compromise was an inability to completely eliminate duplication, so that future legislatures may introduce inconsistencies into the Code by amending one of a set of duplicate Code provisions while neglecting to amend the others. The following section discusses one technological device that could minimize this cost in future drafting projects involving this type of complexity.

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other hand, are stated separately from the recurring provisions and in turn are stated separately from each other according to their natural groupings. In this way, common provisions can be dealt with as a unit, while separate individual pricing methods are handled on an individual basis, with a minimum of confusion.”

*Id.* at 95 (quoting Statement of Considerations Issued with Food Products Regulation No. 1, 9 Fed. Reg. 6711 (1944)); *see also* Reed Dickerson, *FPR No. 1, an Experiment in Standardized and Prefabricated Law*, 13 U. CHI. L. REV. 90 (1945) (describing problems facing Office of Price Administration that led to standardization approach of Food Products Regulation No. 1, and process of using single set of standardized regulation provisions (essentially “hub”) that were incorporated by reference as needed in individual “supplements” (essentially “spokes”) that were separate, autonomous documents). The other example given by Professor Dickerson of this type of structural organization involves form insurance policies that state all possible forms of coverage in a main document, with coverage for particular insurance contracts selected by notation referencing the types of coverage desired. *See id.* at 97-98.

113. *See generally* H.B. 2681, 76th Leg., Reg. Sess. (Tex. 1999), available in <<http://www.capitol.state.tx.us/tlo/76R/billtext/HB02681H.HTM>> .

114. For example, the provisions of Subchapter J of Title Three (relating to derivative proceedings involving limited liability companies), *see id.* § 101.451-463, are nearly identical to the provisions of Subchapter L of Title Two (relating to derivative proceedings involving for-profit corporations), *see id.* § 21.551-.563.

115. For example, one need only consult Titles One and Three to find all of the provisions dealing with non-professional Limited Liability Companies. *See id.* tits.1, 3.

### III THE HYPERTEXT SOLUTION

“Hypertext” is:

A system of writing and displaying text that enables the text to be linked in multiple ways, to be available at several levels of detail, and to contain links to related documents. The term was coined by Ted Nelson to refer to a nonlinear system of information browsing and retrieval that contains associative links to other related documents . . . . The World Wide Web uses hypertext transfer protocol (HTTP) to provide links to pages and multimedia files.<sup>116</sup>

In many ways, hypertext is a technological refinement of a device that drafters have used for a long time: the cross-reference.<sup>117</sup> As discussed below, hypertext may provide at least a partial solution to the organizational problem of linking physically scattered—but conceptually related—provisions of a statute.

#### A. *Hypertext: A Partial Solution to the Problem of Coordination of Scattered Sections*

Hypertext, and to a lesser extent, the use of cross-references in general, may provide a partial solution to the drafting problem of coordinating statutory provisions that are conceptually related but are physically separated in the organization of a statute.<sup>118</sup> It is not uncommon for statutory provisions to contain cross-references to other

116. Vincent James & Erin Jansen, *Hypertext*, NETLINGO: The Internet Language Dictionary (visited Feb. 13, 2000) <<http://www.netlingo.com/lookup.cfm?term=hyper text>>.

117. The Oxford Universal Dictionary lists the first appearance of the word “cross-reference” as occurring in 1834. OXFORD UNIVERSAL DICTIONARY 428 (3d ed. 1955). The actual practice, of course, is probably as ancient as writing (or at least as ancient as *legal* writing), and persists today. See, e.g., HARVARD LAW REVIEW ASSOCIATION, THE BLUEBOOK: A UNIFORM SYSTEM OF CITATION § 4.2 (16th ed. 1996) (setting out rules for use of *supra* and *hereinafter* in cross-references).

118. This type of situation would ordinarily occur where there are multiple sets of conceptual relationships between a particular statutory provision and other statutory provisions. An example of multiple relationships would be some of the provisions of a statute governing nonprofit corporations. There is a conceptual relationship between these provisions and other provisions applicable to for-profit corporations, and a separate conceptual relationship between these provisions and other provisions governing nonprofit entities. See *supra* note 100 and accompanying text. If either of these conceptual relationships is taken as the primary organizational principle for the statutory context including all of these provisions (if the business entity code is organized to put all provisions governing corporations in a particular title), then the other conceptual relationship can be evidenced only by cross-references between provisions that are so related.

statutory provisions.<sup>119</sup> However, the systematic use of cross-references has the potential to show multiple conceptual relationships between scattered statutory sections more clearly and completely than has previously been attempted. The use of hypertext would provide a technological means of implementing that systematic cross-referencing.<sup>120</sup>

### B. *Limitations of Hypertext*

Despite its attractiveness, the use of hypertext as a significant structural feature of statutory design has some significant limitations. Because the use of hypertext is dependent upon the use of electronic media, it presents a limitation that has not previously been present in recordations of statutory material. Although hypertext can be simulated in print media (and other static media such as microfiche), it cannot be exactly duplicated. Thus, a statute that officially includes hypertext as a structural feature cannot be precisely duplicated in print media—an unprecedented state of affairs. Although there has been a gathering movement toward the use of electronic media in legal research resources since the advent of LEXIS in 1973,<sup>121</sup> electronic stor-

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119. *See, e.g.*, TEX. BUS. CORP. ACT ANN. art. 5.19 (West 1998 & Supp. 2000) (“Except as otherwise provided by Article 10.03 of this Act, on the issuance of a certificate of conversion by the Secretary of State, the conversion of a converting entity shall be effective.”).

120. Another example of a statute involving multiple conceptual links that could be cross-referenced using hypertext is the Model Penal Code, which classifies crimes by effect (for example, offenses involving danger to the person, *see* MODEL PENAL CODE §§ 220-24 (1998), offenses against public administration, *see id.* §§ 240-43), but also distinguishes offenses by four different levels of culpability, *see id.* § 2.02, and assesses different penalties based on whether the crime in question is one of three degrees (felonies, misdemeanors, or petty misdemeanors), and whether the convicted “person” is an individual or an entity (corporation or unincorporated association), *see id.* § 6. For example, the Model Penal Code distinguishes between murder, which is defined as criminal homicide (causing the death of another human being) that is committed purposely, knowingly, or in some circumstances recklessly, *see id.* § 210.2, from manslaughter, which is defined as criminal homicide that is committed recklessly, *see id.* § 210.3, and negligent homicide, which is defined as criminal homicide that is committed negligently. *See id.* § 210.4. Each type of criminal homicide is classified as a felony of a different degree, resulting in different penalties. As a result of this conceptual structure that has multiple possible connections (effect, culpability, and penalties), any non-hypertextual arrangement of the statute leaves at least some of the conceptual linkages less obvious than others.

121. In 1966, the Ohio State Bar Association began work on a project to put the case law of Ohio into a central computerized database so that it could be searched by remote users using individual words or phrases as search keys. *See* MORRIS L. COHEN ET AL., HOW TO FIND THE LAW 19 (9th ed. 1989); STEPHEN L. EMMANUEL, LEXIS FOR LAW STUDENTS, I-I, I-II (3d ed. 1997). The Bar Association initially contracted with Data Corporation, a small high-tech company located in Ohio, to accomplish the technical part of the project. *See id.* However, Data Corporation was acquired in

age of statutes, cases and other resources have always supplemented, rather than supplanted, printed copies of these materials. It is unclear whether the law, which has generally been conservative in adapting to change and adopting new technologies,<sup>122</sup> would embrace a *required* adoption of technology.

Factors that may favor a move toward a requirement that statutes be enacted in electronic form, thus permitting use of hypertext links in the official version of the statute, are the increasing, perhaps nearly universal, use of electronic media in the creation of legal documents,<sup>123</sup> including legislative drafting,<sup>124</sup> and the increasing use by state legislatures and Congress of the Internet to make statutes and legislative materials available on-line.<sup>125</sup>

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1968 (before the computerization project was fully under way) by The Mead Corporation, a large paper and printing manufacturer located in Dayton, Ohio. *See id.* Mead formed a new division, Mead Data Central, to complete the project, and launched the service nationally in 1973 under the name LEXIS (as the project was developed, case law from other states and federal case law was added to the original Ohio cases, and statutory and other legal materials were eventually added as well). *See id.*

122. *See* Rosemary Shiels, Essay, *Technology Update: Attorneys' Use of Computers in the Nation's 500 Largest Law Firms*, 46 AM. U. L. REV. 537, 539 (1996) (noting gradual adoption by attorneys of computer use in years from 1986, when only 7% of attorneys had desktop access to computer terminals, to 1995, when 88% of attorneys had desktop access to personal computers). *But see* Molly Warner Lien, *Technocentrism and the Soul of the Common Law Lawyer*, 48 AM. U. L. REV. 85, 87, 93 (1998) (noting "the law's swift embrace of newly available technology" and raising concerns about impact of technology on way law is taught and on way that lawyers think about law).

123. *See* Shiels, *supra* note 122, at 539-41.

124. The author's personal experience in connection with the drafting of the proposed Texas Business Entity Code, *see supra* note 90, is that the use of electronic media in the legislative drafting process has become ubiquitous. All of the materials that were drafted for inclusion in the bill that was eventually produced by that drafting committee were created and maintained on a word processing system, with additional provisions and changes that were drafted by individual committee members also created on word processors and copied into the main body of the bill without retyping them. In addition, over the nearly four-year process of creating the bill, drafts were originally sent to committee members by mail (or by fax, if the drafts were not large), but eventually by e-mailing electronic copies of the bill to save paper (the final bill was 750 pages long), postage, and transit time. The completed bill was sent to the Legislative Council's office in electronic form, and was posted to the Texas Legislature's web site, TEXAS LEGISLATURE ONLINE (last modified Feb. 8, 2000) <<http://www.capitol.state.tx.us/>>, in that form after the bill was introduced.

125. The United States Code may be found on-line at *Office of the Law Revision Counsel*, U.S. HOUSE OF REPRESENTATIVES (visited Feb. 26, 2000) <<http://us-code.house.gov/>>. Forty-nine states have also placed their state statutes on-line; the statute Web sites for those states are listed in the Appendix. (Louisiana statutes appear to be unavailable on-line as of Sept. 8, 1999, although the Louisiana Constitution, *see Louisiana State Constitution*, LA. ST. SENATE (last modified Jan. 2000) <<http://senate.legis.state.la.us/documents/constitution/>>, and Administrative Code, *see Louisiana Register*, LA. ADMIN. CODE (last modified Jul. 12, 1999) <

A number of issues are raised, however, by the potential restrictions on public access to the statute that arise because of the fact that a hypertextual official statute *requires* electronic access to be viewed or communicated *in its official form*. As a result, those persons who do not have electronic access (either because they do not own or have access to a computer, or because they do not have access to the Internet) are unable to gain access to the official form of a hypertextual statute.<sup>126</sup> The potential restrictions on public access raise the possi-

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[www.state.la.us/osr/lac/lac.htm](http://www.state.la.us/osr/lac/lac.htm)), are both available on-line.) Most or all of these states also have some form of on-line access to their state constitutions and to bills and other legislative materials from the current and most recent legislative sessions.

Many of these sites, even though contained in or linked to the "official" state Web site for the respective state, are explicitly marked with disclaimers as "unofficial" versions of the respective state statutes. For example, the Web site for the Illinois Compiled Statutes contains the following disclaimer:

This site contains provisions of the Illinois Compiled Statutes from databases that were created for the use of the members and staff of the Illinois General Assembly. The provisions have NOT been edited for publication, and are NOT in any sense the 'official' text of the Illinois Compiled Statutes as enacted into law. The accuracy of any specific provision originating from this site cannot be assured, and you are urged to consult the official documents or contact legal counsel of your choice. This site should not be cited as an official or authoritative source. Court decisions may affect the interpretation and constitutionality of statutes.

Legislative Reference Bureau, *Illinois Compiled Statutes* (visited Sept. 7, 1999) <<http://www.legis.state.il.us/ilcs/chapterlist.html>>. There are a number of privately-maintained compilations of links to on-line versions of state statutes; one example is *Full-Text State Statutes and Legislation on the Internet*, SCRUFFY HOME (visited Sept. 8, 1999) <<http://www.prairienet.org/~scruffy/f.htm>>.

126. This restriction on access is of concern in part because it is likely that the impact of the restriction will fall disparately on those who cannot *afford* access. Although access to computers is increasing in the United States, and access to the Internet is increasing among those who have access to computers, such access is far from universal. Data gathered by the U.S. Census Bureau indicate that the percentage of U.S. households with a computer rose from 8.2% in 1984 to 22.8% in 1993; similarly, the percentage of persons of all races who had "access to a computer" at least doubled in that same period. See *Level of Access and Use of Computers: 1984, 1989, and 1993*, U.S. CENSUS BUREAU (visited Feb. 14, 2000) <<http://www.census.gov/population/socdemo/computer/report93/compusea.txt>>. The percentage of whites listed as having "access to a computer" was at least twice as high in each age group, however, as the percentages for respondents who were black or of Hispanic origin. See *id.* In a more recent study, the U.S. Commerce Department determined that, although computer ownership among U.S. households continues to increase (to over 40% in 1998) and a significant number of households have access to the Internet (25% in 1998),

Accompanying this good news, however, is the persistence of the digital divide between the information rich (such as Whites, Asians/Pacific Islanders, those with higher incomes, those more educated, and dual-parent households) and the information poor (such as those who are younger, those with lower incomes and education levels, certain minorities, and

bility of violations of due process,<sup>127</sup> equal protection,<sup>128</sup> and First Amendment rights.<sup>129</sup>

With respect to the issue of due process rights, most of the jurisprudence dealing with the implications of restriction of access to laws has involved questions of copyrightability of statutes and judicial opinions, and many of the cases were decided in the nineteenth

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those in rural areas or central cities). The 1998 data reveal significant disparities, including the following:

- Households with incomes of \$75,000 and higher are more than twenty times more likely to have access to the Internet than those at the lowest income levels, and more than nine times as likely to have a computer at home. (Chart I-2)
- Whites are more likely to have access to the Internet from home than Blacks or Hispanics have from any location.
- Black and Hispanic households are approximately one-third as likely to have home Internet access as households of Asian/Pacific Islander descent, and roughly two-fifths as likely as White households. (Chart I-22)
- Regardless of income level, Americans living in rural areas are lagging behind in Internet access. Indeed, at the lowest income levels, those in urban areas are more than twice as likely to have Internet access as those earning the same income in rural areas.

For many groups, the digital divide has widened as the information “haves” outpace the “have nots” in gaining access to electronic resources. The following gaps with regard to home Internet access are representative:

- The gaps between White and Hispanic households, and between White and Black households, are now more than 6 percent larger than they were in 1994.
- The digital divides based on education and income level have also increased in the last year alone. Between 1997 and 1998, the divide between those at the highest and lowest education levels increased 25 percent, and the divide between those at the highest and lowest income levels grew 29 percent.

National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide*, U.S. DEPT OF COM. (visited Sept. 13, 1999) <<http://www.ntia.doc.gov/ntiahome/fttn99/execsummary.html>>. Growth of access to the Internet apparently continues; a poll conducted in early 1999 indicated that more than half of U.S. households are currently on-line. Ninety percent of these households use the Internet. See Harris Interactive, *PC Penetration Increases in U.S.*, NUA INTERNET SURVEYS (visited Apr. 2, 2000) <[http://www.nua.ie/surveys/?f=VS&art\\_id=905355625&rel=true](http://www.nua.ie/surveys/?f=VS&art_id=905355625&rel=true)>.

127. “No person shall . . . be deprived of life, liberty, or property, without due process of law . . . .” U.S. CONST. amend. V. Similarly, “nor shall any State deprive any person of life, liberty, or property, without due process of law . . . .” U.S. CONST. amend. XIV, § 1.

128. “No State shall . . . deny to any person within its jurisdiction the equal protection of the laws.” U.S. CONST. amend. XIV, § 1.

129. “Congress shall make no law . . . abridging the freedom of speech, or of the press . . . .” U.S. CONST. amend. I. State constitutions may also grant similar rights with respect to freedom of expression.

century.<sup>130</sup> More recently, in deciding a dispute over the copyrightability of a state building code that was based upon a privately drafted model building code, the First Circuit stated that:

Due process requires people to have notice of what the law requires of them so that they may obey it and avoid its sanctions. So long as the law is generally available for the public to examine, then everyone may be considered to have constructive notice of it; any failure to gain actual notice results from simple lack of diligence. But if access to the law is limited, then the people will or may be unable to learn of its requirements and may be thereby deprived of the notice to which due process entitles them.<sup>131</sup>

A number of federal cases tracing the boundaries of this due process rule may lend support to the proposition that a hypertextual statute, disseminated on-line in its official form and accessible only with a computer, would be sufficiently available to satisfy citizens' right of access to the law. Courts considering the issue have recognized that there may be some restrictions on access; often such restrictions relate to the preservation of the underlying information by preventing people with access to the information from altering, disordering, or destroying it. For example, it has been held that legislative acts are "public records, subject to inspection by every one, under such rules and regulations as will secure their preservation."<sup>132</sup> Similarly, it has been held that the reporter of a state supreme judicial court may "make such reasonable regulations, as to the method of examining and obtaining

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130. See, e.g., *Wheaton v. Peters*, 8 U.S. (1 Pet.) 591, 668 (1834) ("[N]o reporter has or can have any copyright in the written opinions delivered by this court; and . . . the judges thereof cannot confer on any reporter any such right."); *Banks v. Manchester*, 128 U.S. 244, 253 (1888) ("The whole work done by the judges constitutes the authentic exposition and interpretation of the law, which, binding every citizen, is free for publication to all, whether it is a declaration of unwritten law, or an interpretation of a constitution or statute." (citing *Nash v. Lathrop*, 6 N.E. 559, 560 (1886))).

131. *Building Officials & Code Adm'rs Int'l, Inc. v. Code Tech. Inc.*, 628 F.2d 730, 734 (1st Cir. 1980); accord *Banks & Bros. v. West Publ'g Co.*, 27 F. 50, 57 (C.C.D. Minn. 1886) ("But it is a maxim of universal application that every man is presumed to know the law, and it would seem inherent that freedom of access to the laws, or the official interpretation of those laws, should be co-extensive with the sweep of the maxim. Knowledge is the only just condition of obedience . . . . Each citizen is a ruler—a law-maker—and as such has the right of access to the laws he joins in making and to any official interpretation thereof.").

132. *Davidson v. Wheelock*, 27 F. 61, 62 (C.C.D. Minn. 1866) (holding that, although publisher may be entitled to copyright on combination and analysis of statutes involved in compilation of laws, he cannot obtain copyright for publication of laws alone); cf. *Ex parte Brown*, 78 N.E. 553, 558 (1906) (holding that commercial publisher of legal opinions had no unrestricted or unconditional right of access to opinions and decisions of state supreme court, but rather clerk of court had right and duty to control, by reasonable rules, inspection and handling of records).

copies of [the court's opinions], as he may deem necessary to secure the safety of his papers, and the orderly administration of the affairs of his office."<sup>133</sup> In addition, at least one court has held that the due process right of "access" to laws does not mean that the text of the law be made available "in the most convenient manner."<sup>134</sup> In *Veeck v. Southern Building Code Congress International, Inc.*, a recent case involving a copyright dispute over publication of a model building code on the Internet, the court rejected the defendant's claim that "it was necessary to publish the standardized codes on the Internet in order to provide free access of the law to the public."<sup>135</sup> The court noted that although the relevant code could not be published on the Internet, printed copies were available upon request.<sup>136</sup> This level of access was sufficient for the court to find that "the citizens of the communities wherein these codes have been adopted do have access to them," and held that the assertions of due process violations were without merit.<sup>137</sup> Thus, due process does not require the government to publish laws in every medium available, but may be satisfied by publication in only one medium. Perhaps electronic publication alone would satisfy this lower standard.

These cases do not, however, negate the possibility that the use of a statutory format requiring electronic access might violate due process rights. If the official version of a statute required the use of hypertext (and thus the use of computers to access that official version), anyone who did not have access to a computer would arguably be denied access to the text of the law. This would not be a case, as in *Veeck*, of access not being "in the most convenient manner"—instead, those who were denied access in this manner would be *completely* denied access to the official text of the law; any printed version would only be an approximation or paraphrase of the official version, and the more complex the statute, the more approximate the printed paraphrase.<sup>138</sup>

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133. *Nash v. Lathrop*, 6 N.E. 559, 563 (1886).

134. *Veeck v. Southern Bldg. Code Congress Int'l, Inc.*, 49 F.Supp.2d 885, 889 (E.D. Tex. 1999).

135. *Id.*

136. With one exception, there was no municipality where the defendant sought a copy of the relevant code and was unable to obtain access to it. *See id.*

137. *Id.*

138. It is interesting to note that in at least one of the nineteenth-century cases involving access to court opinions, the court focused in part on issues of *speedy* public access to the opinions. *See Peck v. Hooker*, 23 A. 741, 744 (Conn. 1892). The court in *Peck* noted:

Suppose that the recent opinions of this court construing the secret ballot act, or its opinion in *State v. Bulkeley* were denied to the inspection of the

If the impact of this denial of access were to fall disparately on citizens who were racial minorities or members of some other protected class, the use of a hypertextual statute might also be subject to claims that it violated equal protection rights.<sup>139</sup> Given current statistics on the lower level of computer and Internet access among minorities and persons with lower income levels,<sup>140</sup> that result seems likely. For whatever reasons, income,<sup>141</sup> race,<sup>142</sup> and education<sup>143</sup> seem to

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citizens and the newspapers, and the public referred for information to the official report to appear in the spring, summer, or autumn of 1892, would it not universally be denounced, and justly, as an outrageous denial of the public rights? But the rights of newspapers and politicians to a speedy knowledge of political law are no higher nor more sacred than the rights of the banker to know the law of negotiable paper, of the savings bank officer to know the law of mortgages, or of the lawyer, whose profession and source of living is his knowledge of the law, to know the law of his state on every topic, and to know it as soon as, by the adjudication of this court, it has become law. Our legislature carefully provides that statutes passed by them shall not take effect till there has been time for the printed pamphlets to circulate throughout the state. It is no less a violation of public right that the opinions of this court, filed to-day, and immediately becoming the established law of the state, should be refused publication till the slow processes of official publication are completed.

*Id.* at 744 (citations omitted). The court went on to point out that at the time the opinion was being written, only one other opinion issued by the court in 1891 had been made accessible to the general public, and the latest opinions officially published in advance parts were seven months old, while “the latest number of the West Publishing Company’s reports which has been delivered contains 72 cases, of which only three are over six weeks old and one is less than three weeks old.” *Id.* The nature of the Internet as a medium of nearly instantaneous publication implies that the *Peck* court’s concern could be met with an efficiency undreamed of by the court.

139. *See, e.g.,* Regents of the Univ. of Cal. v. Bakke, 438 U.S. 265, 291 (1978) (“Racial and ethnic distinctions of any sort are inherently suspect and thus call for the most exacting judicial examination.”); *cf. Griggs v. Duke Power Co.*, 401 U.S. 424, 431 (1971) (holding that under Title VII of Civil Rights Act of 1964, 42 U.S.C. § 2000e, employers were prohibited from engaging in “practices that are fair in form, but discriminatory in operation.”). *But see* United States v. North Carolina, 914 F. Supp. 1257, 1265-67 (E.D.N.C. 1996) (and cases cited therein) (describing how U.S. Supreme Court, in cases decided subsequent to *Griggs*, has moved away from doctrine that “employers who apply objective, neutral criteria in hiring and promotion may be found guilty of ‘unintentional discrimination’ if such neutral standards have a ‘disproportionate’ impact upon any identified group” to require that “discriminatory intent, not disproportionate impact, is necessary to show a denial of Equal Protection.”).

140. *See supra* note 126 (providing statistics on computer usage).

141. *See* National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-12: Percent of U.S. Households with a Computer by Income by Rural, Urban, and Central City Areas 1998*, U.S. DEP’T OF COM., (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-12.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-12.html)>.

142. National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-13: Percent of U.S. Households*

have a significant impact on computer ownership. Household type (for example, single-parent families as opposed to married couples with children),<sup>144</sup> age,<sup>145</sup> and geographic region<sup>146</sup> also have some effect. The same factors also seem to affect Internet access.<sup>147</sup> As a result of these significant differentials in access to technology, the cre-

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*with a Computer by Race/Origin by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-13.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-13.html)>.

143. National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-17: Percent of U.S. Households with a Computer by Education by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-17.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-17.html)>.

144. National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-18: Percent of U.S. Households with a Computer by Household Type by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-18.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-18.html)>.

145. National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-19: Percent of U.S. Households with a Computer by Age by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-19.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-19.html)>.

146. National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-20: Percent of U.S. Households with a Computer by Region by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-20.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-20.html)>.

147. National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-21: Percent of U.S. Households Using the Internet by Income by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-21.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-21.html)>; National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-22: Percent of U.S. Households Using the Internet by Race/Origin by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-22.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-22.html)>; National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-25: Percent of U.S. Households Using the Internet by Race/Origin by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-25.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-25.html)>; National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-26: Percent of U.S. Households Using the Internet by Household Type by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-26.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-26.html)>; National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-27: Percent of U.S. Households Using the Internet by Age by Rural, Urban, and Central City Areas 1998*, U.S. DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-27.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-27.html)>; National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide, Chart I-28: Percent of U.S. Households Using the Internet by Region by Rural, Urban, and Central City Areas 1998*, U.S.

ation of a statute that requires technology for proper and complete access could be subject to charges of denial of equal protection rights.

The potential of denial of access to hypertextual statutes also raises the specter of First Amendment violations. For example, the United States Supreme Court has held that access to information is essential to our democratic political system and is thus close to the heart of First Amendment concerns.<sup>148</sup> Furthermore, the Second Circuit has specifically held that the First Amendment can entitle a publisher to electronic copies of state legislative material.<sup>149</sup> In reaching this conclusion, the court found that a state statute that effectively prohibited a commercial republisher of legislative information from receiving and republishing the full text of pending bills violated the republisher's right of publication as well as a First Amendment right of access to information.<sup>150</sup> The court noted that information about legislative proceedings is "vital to the functioning of government and to the exercise of political speech, which is at the core of the First Amendment."<sup>151</sup> It is a small step from this holding to the claim that an individual's First Amendment right to access information has been violated when the official form of a statute is not readily available because of technological constraints. As one commentator has pointed out:

The First Amendment is concerned with public debate. Certain content is closer to the core of that concern than are other contents. For example, the proceedings of a state legislature are much easier to relate to robust public debate than are the records of public utility easements across private property.<sup>152</sup>

This First Amendment guarantee of public access, applied by the court to the proceedings of the legislature because of its close relation to public debate, must apply a fortiori to the results of those proceedings—the statutes passed by that legislature.

The use of hypertext may be further limited in some instances by state constitutions. The constitutions of New York and New Jersey forbid incorporation by reference in statutes,<sup>153</sup> and most state consti-

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DEP'T OF COM. (visited Sept. 14, 1999) <[http://www.ntia.doc.gov/ntiahome/fttn99/FTTN\\_I/Chart-I-28.html](http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-28.html)>.

148. See *Turner Broad. Sys., Inc. v. FCC*, 512 U.S. 622, 663 (1994) (recognizing importance of access to information to "values central to the First Amendment").

149. See *Legi-Tech, Inc. v. Keiper*, 766 F.2d 728 (2d Cir. 1985).

150. See *id.* at 732.

151. *Id.*

152. Henry H. Perritt, Jr., *Sources of Rights to Access Public Information*, 4 WM. & MARY BILL RTS. J. 179, 210 (1995) (citation omitted).

153. N.J. CONST. art. IV, § VII(5); N.Y. CONST. art. III, § 16.

tutions forbid laws from addressing more than one subject.<sup>154</sup> Although neither of these forms of limitations would prevent the use of hypertext as an advanced form of cross-reference within individual statutes, they could limit more aggressive uses of the technique in statutory drafting.<sup>155</sup>

#### IV

##### OBJECT-ORIENTED ANALYSIS AND DESIGN

A more comprehensive and less controversial solution to the problems in statutory drafting described above may be found in the software creation field of object-oriented analysis and design.<sup>156</sup> This discipline or art has been widely recognized as the basis for a revolution in the creation of computer software, with significant implications for the implementation of such software in business contexts.<sup>157</sup> This section extracts principles from software object-oriented analysis and design that should be useful in drafting complex legislation.

##### A. *Description of Object-Oriented Analysis and Design*

Object-oriented analysis and design “emphasiz[es] considering a problem domain and logical solution from the perspective of objects (things, concepts or entities).”<sup>158</sup> Several of these terms have special-

154. See ALA. CONST. art. IV, § 45; ALASKA CONST. art. II, § 13; ARIZ. CONST. art. IV(2), § 13; CAL. CONST. art. IV, § 9; COLO. CONST. art. V, § 21; DEL. CONST. art. II, § 16; FLA. CONST. art. III, § 16; GA. CONST. art. III, § V, par. III; HAW. CONST. art. III, § 14; IDAHO CONST. art. III, § 16; ILL. CONST. art. IV, § 8; IND. CONST. art. 4, § 19; IOWA CONST. art. III, § 29; KAN. CONST. art. 2, § 16; KY. CONST. § 51; LA. CONST. art. III, § 15; MD. CONST. art. III, § 29; MICH. CONST. art. IV, § 24; MINN. CONST. art. IV, § 17; MO. CONST. art. III, § 23; MONT. CONST. art. V, § 11; NEB. CONST. art. III, § 14; NEV. CONST. art. IV, § 17; N.J. CONST. art. IV, § VII(4); N.M. CONST. art. IV, § 16; N.Y. CONST. art. III, § 15; N.D. CONST. art. IV, § 33; OHIO CONST. art. II, § 15; OKLA. CONST. art. V, § 57; OR. CONST. art. IV, § 20; PA. CONST. art. III, § 3; S.C. CONST. art. III, § 17; S.D. CONST. art. III, § 21; TENN. CONST. art. II, § 17; TEX. CONST. art. III, § 35; UTAH CONST. art. VI, § 22; VA. CONST. art. IV, § 12; WASH. CONST. art. II, § 19; W. VA. CONST. art. VI, § 30; WIS. CONST. art. IV, § 18; WYO. CONST. art. III, § 24; see also DICKERSON, *supra* note 18, § 13.1 at 280-81 & app. D; Millard H. Ruud, *No Law Shall Embrace More Than One Subject*, 42 MINN. L. REV. 389, 390 (1958).

155. The most obvious limit would be on cross-linking between statutes. These constitutional limitations might also prevent the passage of amendatory statutory provisions that contained links to existing statutory provisions.

156. The techniques described in this part are not exclusive of other tools for drafting; for example, they might work well if coupled with the use of hypertext, as discussed above. See *supra* Part III.

157. See generally MICHAEL GUTTMAN & JASON R. MATTHEWS, *THE OBJECT TECHNOLOGY REVOLUTION* (1995).

158. CRAIG LARMAN, *APPLYING UML AND PATTERNS: AN INTRODUCTION TO OBJECT-ORIENTED ANALYSIS AND DESIGN* § 1.4, at 6 (1998).

ized meanings in this context: “analysis” is defined as “*investigation* of a problem rather than how a solution is defined,”<sup>159</sup> while “design” is defined as the “*logical solution*, how the system fulfils the requirements”<sup>160</sup> specified by the analysis. “Objects,” as noted above, include “things, concepts or entities”<sup>161</sup> or “‘concept[s], abstraction[s] or thing[s] with crisp boundaries and meaning for the problem at hand.’”<sup>162</sup> The “things” referred to in the definitions “‘are likely to fall into the following five categories: Tangible things, Roles, Incidents, Interactions, and Specifications.’”<sup>163</sup> By way of comparison, an object has been defined in a business computing context as “a reusable, self-contained component of a business computing model.”<sup>164</sup> Objects are grouped into classes or types. A class is defined as “‘a description of a set of objects that share the same attributes, operations, methods, relationships, and semantics.’”<sup>165</sup>

Similarly, in the legislative drafting context, an appropriate definition of an object might be a reusable, self-contained concept (statu-

159. *Id.* § 1.3, at 6.

160. *Id.*

161. *Id.* § 1.4, at 6.

162. Robert John Hathaway III, *Object FAQ*, OBJECT-ORIENTED FAQ § 1.1 (last modified Dec. 27, 1997) <<http://www.cyberdyne-object-sys.com/oofaq2/>> (quoting JAMES RUMBAUGH ET AL., OBJECT-ORIENTED MODELING AND DESIGN 460 (1991)).

163. Hathaway, *supra* note 162, § 1.1 (quoting SALLY SHLAER & STEPHEN J. MELLOR, OBJECT-ORIENTED SYSTEMS ANALYSIS: MODELING THE WORLD IN DATA § 3.2, at 15-16 (1988)).

164. GUTTMAN & MATTHEWS, *supra* note 157, at 42. An object has also been defined, perhaps less helpfully for the purposes of this article, as an “instance of a class that encapsulates state and behavior.” LARMAN, *supra* note 158, at 500. For a definition of “class,” see *infra* note 165 and accompanying text. The “system” of a statute does not have a direct analog to behavior effected by a software system because the behaviors effected by the statute are external to the statute itself. As a result, it does not serve any useful purpose in this article to focus on the behavioral attribute of an object.

165. LARMAN, *supra* note 158, at 497 (citing GRADY BOOCH ET AL., OMG UNIFIED MODELING LANGUAGE SPECIFICATION B-4 <[www.omg.org/cgi-bin/doc?ad/99-06-08.pdf](http://www.omg.org/cgi-bin/doc?ad/99-06-08.pdf)>, available in *The UML Specification Documents* (visited Feb. 16, 2000) <<http://www.rational.com/uml/resources/documentation/index.jhtml>>). In contrast, a type is defined as “a description of a set of like objects with attributes and operations, but which may not include any methods.” *Id.* at 502. A method, which appears to be the distinguishing difference between classes and types, is defined as an “implementation or an algorithm of an operation for a class,” *id.* at 500, while an operation is “‘a service that can [be] requested from an object to effect behavior.’” *Id.* (citing GRADY BOOCH ET AL., OMG UNIFIED MODELING LANGUAGE SPECIFICATION B-4 <[www.omg.org/cgi-bin/doc?ad/99-06-08.pdf](http://www.omg.org/cgi-bin/doc?ad/99-06-08.pdf)>, available in <<http://www.rational.com/uml/resources/documentation/index.jhtml>>). Because the “system” of a statute does not have a direct analog to behavior effected by a software system, see *supra* note 164, it does not serve any useful purpose in this article to distinguish between classes and types; as a result, the terms will be used interchangeably.

tory section or subsection) that is required or useful in the legislation under consideration. Here, too, objects can be grouped into classes. For example, in the drafting of a penal code, a provision creating a given criminal penalty would constitute an object, which would in turn be part of a class including all of the criminal penalty provisions in the code. In a business entity code, the requirement that a filing fee be paid on the establishment of a corporation would be an object, while all filing fee provisions would together constitute a class. By applying concepts of objects and classes to the legislative drafting context, this article will examine how drafters can approach the questions of how statutory objects should be grouped into classes and how the classes and objects interact. This process will help drafters to arrange statutes soundly so as to enhance conceptual and linguistic clarity.

### *B. Principles of Object-Oriented Analysis and Design in Software Design*

As indicated above, the term “object-oriented analysis and design” reflects the division of the process into two parts: analysis, or investigation of the problem, and design, or creation of a logical solution to the problem that satisfies the constraints of the problem.<sup>166</sup> Key aspects of each of these parts are discussed below. In software development, the cycle of analysis and design is often iterative; that is, the product of one cycle of analysis and design (such as a particular software component) may be used by a subsequent cycle of analysis and design to create a later product.<sup>167</sup> In the development of complex systems, it would be rare that all analysis would be completed before design begins, in part because the behavior of a particular component of the system and its interaction with other components of the system may not be known before that component (and perhaps the other, interacting components) is completed.<sup>168</sup> As a result, the analysis of larger components or subsystems that include the smaller components depends upon the completion of the design of the smaller components. Nevertheless, for the purposes of this article, it is sufficient to consider a single cycle of analysis and design.

#### *1. Analysis: Building a Conceptual Model of the Problem*

Craig Larman notes that:

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166. See LARMAN, *supra* note 158, § 1.1, at 6.

167. See *id.* § 2.4, at 20.

168. See *id.* § 37.4, at 435-36.

Object-oriented analysis is concerned with creating a specification of the problem domain and the requirements from the perspective of classification by objects, and from the perspective of understanding the terms used in the problem domain. A decomposition of the problem domain involves an identification of the concepts, attributes and associations in the domain that are considered important. The result can be expressed in a CONCEPTUAL MODEL, which is illustrated in a set of diagrams that depict concepts (objects).<sup>169</sup>

This detailed specification of the problem domain is critical to an understanding of the concepts involved in the problem, the relationships between those concepts, and the constraints on the problem. As a part of such specification, it may be helpful to “create models which organize and communicate the important details of the real-world problem [that the models are] related to and of the system to be built.”<sup>170</sup> In creating such models, the designer first determines the requirements for the ultimate product, trying to define such requirements unambiguously.<sup>171</sup> Artifacts produced by this examination of requirements may include, among other things, lists of assumptions made in connection with the analysis, lists of dependencies, and a glossary of relevant terms.<sup>172</sup>

The software analysis phase next moves to examination of “use cases,” which are descriptions of the “sequence of events, actions and transactions, from start to finish, that are required to produce or com-

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169. *Id.* § 1.6.2, at 11. The account of the object-oriented analysis process that follows is only one possible characterization of the process; others have been described that vary in terminology, but follow essentially the same steps (often with some adjustments to facilitate interaction between analysis and subsequent design steps). For example, some authors have described the generic steps of the analysis phase as follows:

A software development process is guided by broad scenarios, particular plans, and situation-dependent factors. A generic recommended scenario for the OO [object-oriented] analysis phase includes default steps:

1. Obtain “complete” requirements.
2. Describe system-context interaction.
3. Delineate subsystems.
4. Develop vocabulary by identifying instances with their classes, ensembles and relationships.
5. Elaborate classes and relationships by defining their generic static structure and describing their generic dynamic dimension.
6. Construct a model in which the dynamics of objects are wired together.

DENNIS DE CHAMPEAUX ET AL., OBJECT-ORIENTED SYSTEM DEVELOPMENT ch. 12 (1993), available in <<http://gee.cs.oswego.edu/dl/oosdw3/ch12.html>>.

170. LARMAN, *supra* note 158, § 3.2, at 29-30.

171. *See id.* § 5.2, at 41.

172. *See id.* § 5.8, at 46.

plete something of value to an organization or actor.”<sup>173</sup> These use cases, which help analyze relevant processes involved in the problem domain, are then used to create a conceptual model that illustrates meaningful concepts in the problem domain.<sup>174</sup> The most important things shown by a conceptual model include concepts in the domain, associations between those concepts, and attributes of concepts.<sup>175</sup> Once the concepts have been identified, the associations can be drawn between the concepts, creating a map of relationships.<sup>176</sup> Finally, in order to complete the conceptual model, the important attributes of the concepts can be added to clarify the requirements and constraints of the system with respect to those concepts.<sup>177</sup>

A conceptual model is organized as a collection of interconnected boxes, representing the concepts or objects making up the model.<sup>178</sup> Each box is divided by a horizontal internal line; the top portion of the box contains a name or label for the object represented in that box, and the bottom portion of the box contains a list of any identified attributes of the object. Associations between objects are shown with lines connecting the associated boxes. A short description of the association is attached to the connecting line, and any multiplicity of connection (if the connection is to multiple instances of one or both of the objects so connected) is represented by numbers attached to the connecting lines near the object subject to the multiplicity.<sup>179</sup> If needed

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173. *Id.* § 6.7, at 54.

174. *See id.* § 7.1, at 73, § 8.1, at 81, § 9.3, at 87-91, § 9.4, at 91-94.

175. *See id.* § 9.3, at 87.

176. *See id.* §10.1, at 105, § 10.10, at 113.

177. *See id.* § 9.6.1, at 96.

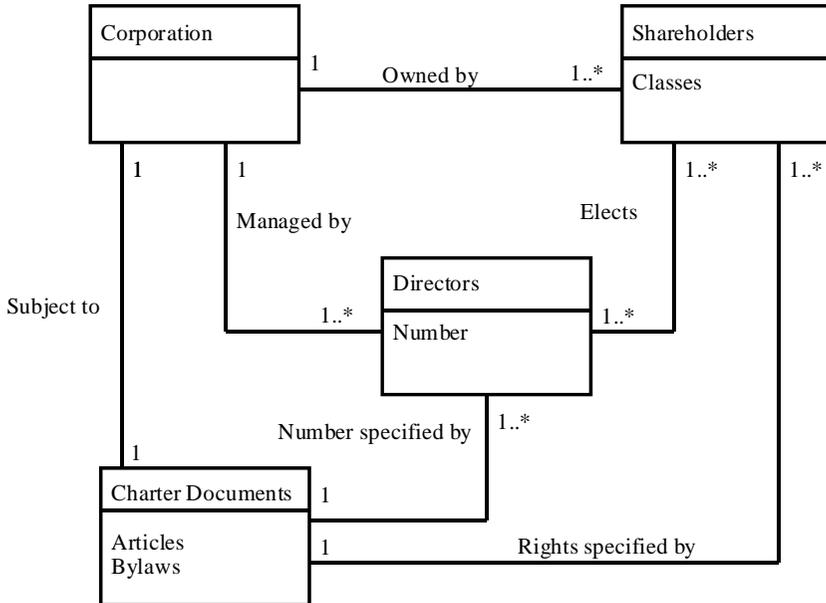
178. *See, e.g., id.* § 9.3, at 88 fig.9.1. The use of graphical techniques to illustrate relationships between concepts or steps in a process has a relatively long history in software development. Prior to the development of object-oriented analysis and design, programmers often began the software development process with flowcharts that assisted the programmers with problem-solving by mapping steps in the problem-solving process to be implemented by the programs. *See generally* MARILYN BOHL, FLOWCHARTING TECHNIQUES at ix, 1-18, 53-57, 71-77 (1971) (describing how to develop flowcharts using 1970 revision of American Standard for flowcharting developed by American National Standards Institute, and noting importance of flowcharts as means of communication, as analytical tool, as means of “laying out the logic” in testing various approaches to problem, and as documentation to assist in analyzing logic of program); RONALD E. ELLIOTT, PROBLEM SOLVING AND FLOWCHARTING at v, 1-8 (1972) (listing steps to use in problem-solving, describing flowcharting as graphic method for indicating proposed or actual solution to problem (specifically, “the first [and most basic] step in problem solving,” *see id.* at 1), and noting that flowcharting helps with organization of ideas and conveying those ideas to others); *cf.* P.C. Wason, *The Drafting of Rules*, 118 NEW L.J. 548 (1968) (describing use of “logical trees” to express rules in visual graphs and structural lists).

179. Variable multiplicities are shown with a range of values, and unlimited values are shown with an asterisk. Thus, a range of 1 to 4 connections with an object would

for clarity, arrows can be added to associational lines to indicate directionality.<sup>180</sup>

An example of a partial, simplified conceptual model is shown in Figure 3.

FIGURE 3: CONCEPTUAL MODEL DIAGRAM



The analysis phase and its development of conceptual models are necessarily iterative. “For most systems, the insight of the analyst into the problem domain’s behavior and structure will increase as he progresses in the development of the system.”<sup>181</sup> This increase in insight

be represented with the range “1 . . . 4,” while a potentially unlimited number of connections would be represented by the range “1 . . . \*.” LARMAN, *supra* note 158, § 10.7.1, at 110-11.

180. See *id.* § 10.3, at 107.

181. JOHAN LEWI ET AL., OBJECT ORIENTED SOFTWARE DEVELOPMENT WITH ER-OOS: THE ANALYSIS PHASE § 2.1.3 (1993), available in <<http://www.cs.kuleuven.ac.be/cwis/research/som/publications/CW169-E.shtml>>. EROOS is a method of object-oriented software development developed at the Department of Computer Science at the Katholieke Universiteit Leuven in Belgium. See *id.* The term EROOS stands for “Entity-Relationship Object-Oriented Specifications.” See *id.* One salient feature of this particular method of object-oriented analysis and design is its focus on step-by-step development of analysis models as a means for controlling complexity: “A conceptual model is developed in steps of growing complexity, starting with the modeling of a mini-system behavior. At each step of the analysis more detailed behavior is taken into account until the complete system is covered.” *Id.* § 1.2.

is based upon observation of the real-world situation that is being modeled in the conceptual model and comparison of those observations to the model of the problem domain that has been developed thus far in the analysis process.

An analysis model is built by making a sequence of observations derived from an informal notion of the real world. For each such observation, we can derive the basic building blocks that have to be added to the model. The advantage of this method is that a developer can start from very simple observations and gradually evolve to more complex ones. At the end of each step, a model is obtained that describes more information regarding the real world than the previous one, or, in other words, that is a closer approximation of the real world. This idea of approximation is fundamental, since it enables the developer to gradually learn about the problem domain as he progresses in the construction of his model.<sup>182</sup>

In summary, the analysis phase involves (1) identification of relevant concepts in the real world; (2) identification of attributes of those concepts; (3) identification of relationships between those concepts; and (4) reassembly of those concepts, attributes, and relationships into a conceptual model that accurately and unambiguously describes the problem domain. This conceptual model is then refined through successive iterations until it is complete. Only after the analysis phase has been completed does the design phase begin.<sup>183</sup>

## 2. *Design: Creation of Interaction Diagrams*

Once the analysis phase has been completed, it is possible to move to the related design phase to develop a logical solution to the problem based on the results of the analysis.<sup>184</sup> “The heart of this solution is the creation of interaction diagrams, which illustrate how objects will communicate in order to fulfill the requirements.”<sup>185</sup>

Designers of object-oriented software use interaction diagrams to understand and assign responsibilities to objects.<sup>186</sup> These responsi-

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182. See *id.* § 2.1.1.

183. This last statement is accurate primarily on a component-size scale; it is entirely possible that later design-phase problems in creation of a larger system may force the need to create new system components that were not contemplated in the original analysis. The development cycle for these new components would of course begin with a new analysis phase that *follows or runs concurrently with* the design phase for other system components and the larger system as a whole. See *supra* note 168 and accompanying text.

184. See LARMAN, *supra* note 158, § 15.2, at 162.

185. *Id.*

186. See *id.* § 17.1, at 167, § 18.5, at 189.

bilities are usually grouped into two types: “knowing” responsibilities and “doing” responsibilities.<sup>187</sup> “Knowing” responsibilities of an object include knowing about data contained within the object, knowing about related objects, and knowing about things that the object can derive or calculate.<sup>188</sup> “Doing” responsibilities of an object include actions that the object undertakes itself, actions that it initiates in other objects, and the control and coordination of activities in other objects.<sup>189</sup> Interaction diagrams, particularly a category of interaction diagrams known as collaboration diagrams, show choices in assigning responsibilities to objects.<sup>190</sup> Collaboration diagrams illustrate interactions between objects in a graph or network format.<sup>191</sup> These objects are drawn in part from the conceptual model that was produced as part of the analysis phase,<sup>192</sup> but the collaboration diagrams represent objects in the system that is being designed, rather than objects in the real world that are represented in the conceptual model. Larman suggests that “patterns” (discussed in more detail below) be used to develop good designs in collaboration diagrams. An example of a partial collaboration diagram showing interactions between portions of a limited partnership statute is shown as Figure 4.

### 3. *Design: Use of Patterns*

“In object technology, a pattern is a named description of a problem and solution that can be applied to new contexts; ideally, it provides advice on how to apply it in varying circumstances.”<sup>193</sup> Larman

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187. *See id.* § 18.4, at 187.

188. *See id.* § 18.4, at 188.

189. *See id.*

190. *See id.* § 18.5, at 189.

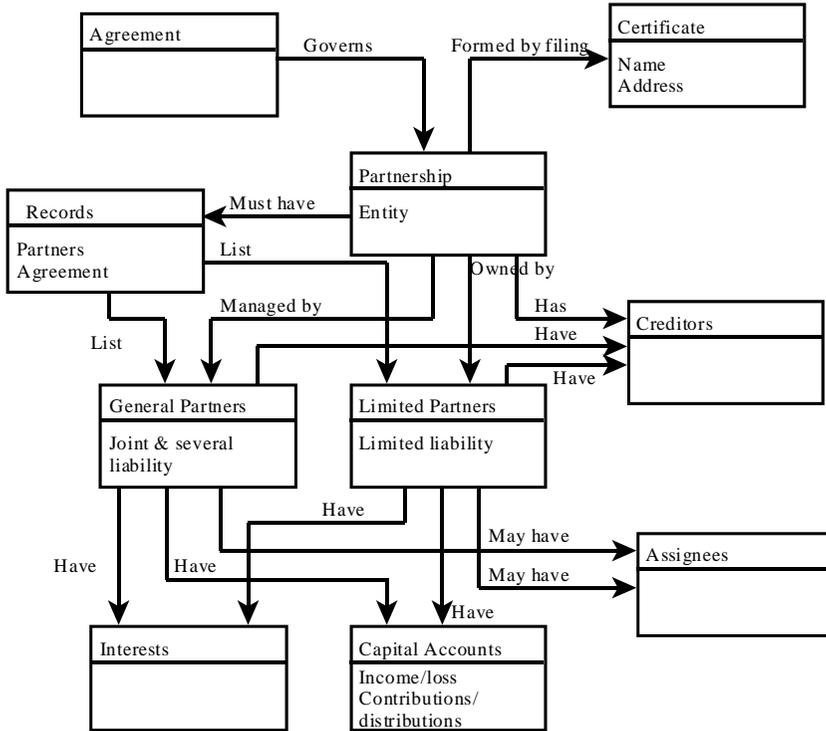
191. *See id.* § 17.3, at 169.

192. *See id.* § 19.2.4, at 221.

193. *Id.* § 18.6, at 189 (citing CHRISTOPHER ALEXANDER ET AL., *A PATTERN LANGUAGE—TOWNS-BUILDING-CONSTRUCTION* at x (1977) (originating formal notion of patterns with architectural patterns)); *see also* K. Beck, *Patterns and Software Development*, DR. DOBB’S J., Feb. 1994 (applying patterns to software development); J. Coplien, *The History of Patterns* (last modified Mar. 23, 2000) <<http://c2.com/cgi/wiki?HistoryOfPatterns>>. The use of patterns in the object-oriented software development community has been further described as a shared problem-solving language:

Fundamental to any science or engineering discipline is a common vocabulary for expressing its concepts, and a language for relating them together. The goal of patterns within the software community is to create a body of literature to help software developers resolve recurring problems encountered throughout all of software development. Patterns help create a shared language for communicating insight and experience about these problems and their solutions. Formally codifying these solutions and their relationships lets us successfully capture the body of knowledge which defines our understanding of good architectures that meet the

FIGURE 4: PARTIAL INTERACTION DIAGRAM



describes a number of patterns that are useful in object-oriented software design.<sup>194</sup> The most important of these are collected as GRASP (General Responsibility Assignment Software Patterns) patterns.<sup>195</sup> Of the nine GRASP patterns, four in particular, the Expert, Creator, Low Coupling, and High Cohesion patterns, are applicable to

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needs of their users. Forming a common pattern language for conveying the structures and mechanisms of our architectures allows us to intelligibly reason about them. The primary focus is not so much on technology as it is on creating a culture to document and support sound engineering architecture and design.

Brad Appleton, *Patterns and Software: Essential Concepts and Terminology*, BRAD APPLETON'S HOME PAGE (last modified Nov. 20, 1997) <<http://www.enteract.com/~bradapp/docs/patterns-intro.html>>.

194. See LARMAN, *supra* note 158, § 18.9-13, at 193-215, § 34.2-.5, at 394-403, § 35.2-.7, at 406-24.

195. See *id.* § 18.7, at 191. The GRASP patterns are Expert, see *id.* § 18.9, at 193-96; see also *infra* Part IV.B.3.a; Creator, see *id.* § 18.10, at 197-99; see also *infra* Part IV.B.3.b; Low Coupling, see *id.* § 18.11, at 200-02; see also *infra* Part IV.B.3.c; High Cohesion, see *id.* § 18.12, at 203-05; see also *infra* Part IV.B.3.d; Controller, see *id.* § 18.13, at 206-15; Polymorphism, see *id.* § 34.2, at 394-95; Pure Fabrication, see *id.*

legislative drafting. Each of these four is discussed more thoroughly below.

a) *The Expert Pattern*

The Expert pattern is identified as “the most basic principle by which responsibilities are assigned in object-oriented design.”<sup>196</sup> Briefly stated, the problem to be addressed by the pattern is to provide a basic principle by which responsibilities may be assigned in object-oriented design. The solution provided by the pattern is to assign a responsibility to the class of objects that has the information necessary to fulfill the responsibility.<sup>197</sup> This pattern is based on the analogy that responsibility is given to individuals who have the knowledge to perform the task in question; software objects designed using the Expert pattern do those operations that are normally done by the “real-world thing” that the software object represents. Thus, a software object representing a sale in an object-oriented point-of-sale software system would be expected to “know” or calculate the grand total of any particular sales transaction. This responsibility may in turn be shared by other related or interacting classes of objects in the system, which collaborate by sending messages among themselves to accomplish the necessary work.<sup>198</sup>

b) *The Creator Pattern*

The Creator pattern is used to assign responsibilities for the creation of new instances of some class. The solution provided by the pattern is to “[a]ssign class B the responsibility to create an instance of class A if one of the following is true:

B *aggregates* A objects

B *contains* A objects

B *records* instances of A objects

B *closely uses* A objects

B *has the initializing data* that will be passed to A when it is created (thus B is an Expert with respect to creating A).”<sup>199</sup>

The Creator pattern assigns responsibilities based upon the concept of aggregation for things that are in a strong whole-part relation-

§ 34.3, at 396-98; Indirection, *see id.* § 34.4, at 398-400; and Don’t Talk to Strangers, *see id.* § 34.5, at 400-03.

196. *Id.* § 18.9, at 193. However, the Low Coupling and High Cohesion patterns described below may be more useful in application of object-oriented analysis and design to principles of legislative drafting. *See infra*, Sections IV.B.3.c, IV.B.d.

197. *See id.* § 18.9, at 193.

198. *See id.* § 18.9, at 193-96.

199. *Id.* § 18.10, at 197.

ship, and facilitates encapsulation of the component parts.<sup>200</sup> In the legislative drafting context, counterparts of the Expert and Creator patterns would be similar, and would include use of subsections to encapsulate separate but related concepts contained within a unifying section.

*c) The Low Coupling Pattern*

The Low Coupling pattern is used to assure low dependency between objects and increased reuse of objects and classes. The solution provided by the pattern is to assign responsibility so that coupling remains low.<sup>201</sup> “Coupling is a measure of how strongly one class is connected to, has knowledge of, or relies upon other classes.”<sup>202</sup> A class with low or weak coupling is not dependent upon too many other classes, given the context, while a class with high or strong coupling does rely on too many other classes. As a result, classes with high coupling create difficulties in system maintenance because changes in related classes force additional local changes in the highly coupled classes; the highly coupled classes are harder to understand in isolation, and the highly coupled classes are harder to reuse because their reuse requires the presence of the other classes on which the highly coupled classes are dependent.<sup>203</sup>

Low Coupling is not considered in isolation from other patterns; rather, it is “included as one of several design principles that influence a choice in assigning a responsibility.”<sup>204</sup> The amount of importance that is placed on Low Coupling depends in part on how much reuse of objects and classes is anticipated. Increased possibility of reuse indicates increased importance of Low Coupling, subject to a cost-benefit analysis that includes consideration of the effort involved in making components reusable. Classes that are “inherently very generic in nature, and with a high probability of reuse, should have especially low coupling.”<sup>205</sup>

*d) The High Cohesion Pattern*

The High Cohesion pattern is a response to the problem that complexity must be kept manageable.<sup>206</sup> In this pattern, “cohesion (or more specifically, functional cohesion) is a measure of how strongly

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200. *See id.* § 18.10, at 198-99.

201. *See id.* § 18.11, at 200.

202. *Id.*

203. *See id.*

204. *Id.* § 18.11, at 202.

205. *Id.*

206. *See id.* § 18.12, at 203.

related and focused the responsibilities of a class are. A class with highly related responsibilities, and which does not do a tremendous amount of work, has high cohesion.”<sup>207</sup> Stated differently, “high functional cohesion [exists] when the elements of a component (such as a class) ‘all work together to provide some well-bounded behavior.’ ”<sup>208</sup> Descriptions of differing levels of cohesion include:

1. *Very low cohesion.* A class is solely responsible for many things in very different functional areas . . . .
2. *Low cohesion.* A class has sole responsibility for a complex task in one functional area . . . .
3. *High cohesion.* A class has moderate responsibilities in one functional area and collaborates with other classes to fulfill tasks . . . .
4. *Moderate cohesion.* A class has lightweight and sole responsibilities in a few different areas that are logically related to the class concept, but not to each other.<sup>209</sup>

Designing classes with high cohesion leads to an increase in clarity and ease of comprehension of the design, simplification of maintenance and enhancements, support of low coupling, and an increase in reuse potential (because the “fine grain of highly related functionality” means that “a highly cohesive class can be used for a very specific purpose”).<sup>210</sup>

#### *e) Using Patterns in Combination*

Use of these patterns in combination provides even more benefits than isolated application of each pattern; this synergy results from the complementary nature of the different patterns. For example, the Expert pattern provides benefits that include encapsulation of data within objects, which supports Low Coupling<sup>211</sup> and thus leads to more robust and maintainable systems.<sup>212</sup> Expert also supports High Cohesion,<sup>213</sup> because “[b]ehavior is distributed across the classes that have the required information, thus encouraging more cohesive ‘lightweight’ class definitions that are easier to understand and maintain.”<sup>214</sup> Similarly, the Creator pattern supports Low Coupling as a

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207. *Id.*

208. *Id.* § 18.12, at 204 (quoting GRADY BOOCH, OBJECT-ORIENTED ANALYSIS AND DESIGN 137 (1994)).

209. *Id.* § 18.12, at 204-05.

210. *Id.* § 18.12, at 205.

211. *See supra* Part IV.B.3.c.

212. *See* LARMAN, *supra* note 158, § 18.9, at 196.

213. *See supra* Part IV.B.3.d.

214. LARMAN, *supra* note 158, § 18.9, at 196.

result of encapsulation of component parts.<sup>215</sup> Finally, High Cohesion and Low Coupling are design principles important enough to be used in evaluating all design decisions.<sup>216</sup>

#### 4. *Construction of Code from Design*

Once the collaboration diagrams have been prepared (preferably using the patterns described above), the final specifications for the system are worked out in design class diagrams that, while resembling the original conceptual model and the resulting collaboration diagrams, also illustrate:

- classes, associations and attributes
- interfaces, with their operations and constants
- methods
- attribute type information
- navigability [and]
- dependencies[.]<sup>217</sup>

The design class diagrams show particular definitions for software entities to be used in the designed system.<sup>218</sup>

Once the design class diagrams have been completed, they are used to generate actual software code.<sup>219</sup> The design class diagrams should provide a significant amount of the information necessary to produce the code, and if the system has been well designed, the translation of diagrams to code should be straightforward and relatively mechanical.<sup>220</sup> This translation is made possible by the use of an object-oriented programming language such as Java,<sup>221</sup> C++,<sup>222</sup> or Smalltalk.<sup>223</sup> Although additional changes will be made and problems discovered and resolved in this step, the original design should “provide a resilient core that scales up with elegance and robustness to meet the new problems encountered during programming.”<sup>224</sup>

215. *See id.* § 18.10, at 199.

216. *See id.* § 18.12, at 204.

217. *Id.* § 21.5, at 257-58.

218. *See id.*

219. *See id.* § 23.1, at 295, § 23.3, at 298-308.

220. *See id.* § 23.2, at 297.

221. *See The Source for Java™ Technology*, SUN MICROSYSTEMS, INC. (last modified Oct. 19, 1999) <<http://java.sun.com/nav/whatis/>>.

222. *See DevCentral Learning Center*, INTERFACE TECHNOLOGIES, INC. (visited Feb. 13, 2000) <<http://devcentral.iftech.com/learning/tutorials/subcpp.asp>> (providing links to tutorials in C and C++ programming).

223. *See Main Page*, WWW.SMALLTALK.ORG™ (visited Feb. 13, 2000) <<http://www.smalltalk.org/>>.

224. LARMAN, *supra* note 158, § 23.2.1, at 297.

C. *Application of Object-Oriented Analysis  
and Design to Legislative Drafting*

1. *Analysis*

First, the “problem domain” must be identified and described. In the legislative drafting context, the problem domain is a description of the situation that the legislation is intended to address. This description must necessarily include not only the real-world situation that has resulted in the (perceived) need for legislation, but must also include the surrounding legal context: the existing laws and legal principles that will shape the drafting of the new legislation. In order to properly describe the problem domain, the drafter must be intimately familiar with not only the factual situation underlying the proposed legislation, but also the legal context of the problem to be addressed by the proposed legislation.<sup>225</sup>

In adequately describing the problem domain, the drafter must decompose the problem into its underlying concepts and their attributes and associations. These concepts should include real-world objects affecting or affected by the proposed legislation. For example, in a limited partnership statute, real-world concepts involved in the legislation might include, among other things, the partners who would form a partnership governed by the statute, the written agreement between those partners, and the certificate of limited partnership that the partners file to organize the partnership. The concepts to be included in the description of the problem domain should also include existing laws and legal concepts that affect or are affected by the proposed legislation. In the limited partnership statute context, existing laws that may interact with the problem domain would include state and federal tax laws,<sup>226</sup> and perhaps existing laws governing the use of assumed names by a business.<sup>227</sup> Existing legal concepts that may

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225. Cf. Grad, *Legislative Drafting*, *supra* note 22, at 484-86, *reprinted in* HETZEL ET AL., *supra* note 22, at 1313-1316 (describing use of legal research as drafting tool); Alfred R. Menard, *Legislative Bill Drafting*, 26 ROCKY MTN. L. REV. 368, 370 (1954) [hereinafter Menard, *Legislative Bill Drafting*], *reprinted in* HETZEL ET AL., *supra*, at 1319-20 (listing “consideration of existing statutes in the general field” and “consultation of comparable statutes from other jurisdictions and of the list of uniform and model acts of the Commissioners on Uniform State Laws” among preliminary steps in statutory drafting); James C. Peacock, *Drafting a Proposed Statute*, 1 PRAC. LAW. 19 (1955) [hereinafter Peacock, *Drafting a Proposed Statute*], *reprinted in* HETZEL ET AL., *supra*, at 1317 (“Before developing new legislation, or even when formulating an amendment to existing statutes it should be apparent to any but the uninitiated that one must first look to see what exists before proceeding to create anew.” (appears in reprint, but not in original)).

226. See, e.g., 26 U.S.C. §§ 701-61 (1994).

227. See, e.g., TEX. BUS. & COM. CODE ANN. § 36.11 (West Supp. 2000).

affect the problem domain include the concept of limited liability for limited partners.<sup>228</sup> In addition to a listing of all of these concepts, the description of the problem domain must also include the concepts' attributes (such as residence requirements—or lack thereof—for the partners,<sup>229</sup> or restriction of the limitation of liability to *limited* partners of the partnership)<sup>230</sup> and the relationships between the concepts (for example, the partnership is *owned* by the partners,<sup>231</sup> and the partnership agreement *governs* the affairs of the partnership).<sup>232</sup>

It may be valuable to create “use cases” describing actors, events, actions, and transactions that may be involved in the problem domain. Use cases should be created that not only describe the expected scenarios, but also test the outer limits of the problem domain to discover possible gaps in the description of the domain. Close examination of the transactions and parameters involved in use cases may suggest ways in which those parameters may be varied to test the limits of the problem domain. For example, in the partnership situation, a use case might be created that describes the creation, operation, modification, and eventual dissolution of a typical partnership. Transactions involved in the use case might include subscription for interests, creation of the entity, infusion of capital (both initially and subsequent to formation), management of the ordinary affairs of the entity, extraordinary actions (such as mergers or amendment of the governing documents of the entity), approval of those extraordinary actions, business transactions between the partnership and its partners, distributions to partners (both distributions of profits in normal operation and distributions of assets upon termination), withdrawal of individual partners, and dissolution and winding up of the entity.

Analysis of the parameters involved in these transactions may suggest questions that need to be answered in fully describing the

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228. See, e.g., REV'D UNIF. LTD. PARTNERSHIP ACT § 303 (amended 1985), 6A U.L.A. 61, 144-45 (1976).

229. Neither the Revised Uniform Partnership Act nor the Revised Uniform Limited Partnership Act have a residence requirement for partners, although some state business entity statutes (particularly those dealing with entities providing professional services) may impose such a requirement. See, e.g., ALASKA STAT. § 08.04.240(a)(3) (Michie 1998) (requiring that for partnerships engaged in practice of public accounting, each partner personally engaged in Alaska in practice of public accounting as member of that partnership must be certified public accountant in good standing in Alaska).

230. See, e.g., REV'D UNIF. LTD. PARTNERSHIP ACT §§ 303, 403; REV'D UNIF. PARTNERSHIP ACT § 306, 6A U.L.A. 45 (1994).

231. See, e.g., REV'D UNIF. PARTNERSHIP ACT §§ 101(7), 201, 202, 502; REV'D UNIF. LTD. PARTNERSHIP ACT §§ 101(10), 701, 702.

232. See, e.g., REV'D UNIF. PARTNERSHIP ACT § 101(5); REV'D UNIF. LTD. PARTNERSHIP ACT § 101(9).

problem domain. For example, the partners themselves figure directly in many of these transactions. The drafter may examine whether there are any characteristics of partners suggested by or limited by the various transactions involved in the use cases. The drafter may also examine use cases for situations where the operation or priority of competing concepts come into conflict, such as a possible conflict between the limitation of liability of limited partners and a statutory or contractual requirement that limited partners be obligated in certain situations for additional capital contributions, possibly resulting in a limited partner indirectly being held liable for the obligations of the entity. This employment of use cases in the drafting process should seem familiar to the legal drafter; it is merely a more structured version of the time-honored drafting technique of attempting to imagine all potential future scenarios arising out of a transaction, or scenarios affecting the parties to a contract or subjects of a statute, as a means of providing for each of these scenarios.<sup>233</sup>

The description of the problem domain that emerges from this analysis should be expressed in a conceptual model that shows the relationships between concepts, describes relevant attributes of and dependencies between the concepts, and defines relevant vocabulary. Particularly when the relationships between concepts in the problem domain are complex, it may be helpful to diagram the problem domain, either in the manner described above<sup>234</sup> or using some other graphical representation that clearly shows the relationships between concepts.<sup>235</sup>

## 2. Design

Once the problem domain has been adequately described, the object-oriented legislative drafter can move into the design phase of the drafting project. In creating a logical solution to the problem based

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233. See Peacock, *Drafting a Proposed Statute*, *supra* note 225, at 20, *reprinted in* HETZEL, *supra* note 225, at 1318.

234. See *supra* Part IV.B.1.

235. One other possible candidate for graphical representation of the elements of the problem domain is Petri nets, a graphic tool used primarily for modeling complex activities performed by the hardware and software of modern computer systems, but also useful for modeling systems of human activity. For a discussion of the application of Petri nets to model the operation of a statute, see Jeffrey A. Meldman & Sanford J. Fox, *Concise Petri Nets and Their Use in Modeling the Social Work (Scotland) Act 1968*, 30 EMORY L.J. 583 (1981). Professors Meldman and Fox note that "Petri nets are particularly useful for describing activity that is composed of the concurrent, interacting, asynchronous behavior of several subsystems or of individual participants." *Id.* at 584. As a result, they may be useful in mapping out relationships and transactions between participants in the problem domain.

upon the results of the analysis phase, the drafter will begin to create interaction diagrams that illustrate how objects in the resulting statute will interact to fulfill the requirements of the problem domain.<sup>236</sup>

By creating these interaction diagrams, the drafter is seeking to understand and assign responsibilities to the objects to be included in the statute (where these objects correlate to the concepts identified in the problem domain). Drawing parallels to the software design process,<sup>237</sup> these responsibilities might include actions that the object undertakes itself (self-executing provisions of the statute), actions that the object initiates in other objects (conditions that a statutory section imposes upon, or modifications that the section makes to the action of, other statutory provisions), control and coordination of activities in other objects (specification of applicability of other statutory provisions), and knowledge of data or other objects (included provisions or cross references to other statutory sections).

Due to the likely complexity of these interaction diagrams, it may be necessary to break the proposed solution into components and diagram the interactions involved in each component separately.<sup>238</sup> The interaction of the components can then be diagrammed in a separate, higher-level diagram that does not include the internal interactions of each component. In this way, a complex solution can be diagrammed completely in a hierarchical manner while still retaining sufficient simplicity and coherence in individual diagrams to permit comprehension.

Patterns may also be used to standardize the handling of recurring structures and relationships. As discussed above,<sup>239</sup> likely candidates for the object-oriented legislative drafting process would be similar to the Expert, Creator, Low Coupling, and High Cohesion patterns described by Larman. In the legislative context, the use of the Expert or Creator patterns would suggest organization of objects so that necessary information for the use or operation of a legislative object (statutory provision) is encapsulated within that object whenever possible. Use of the Low Coupling pattern would suggest minimization of cross-references between sections. The High Cohesion pattern requires that the responsibilities of each object be strongly related and

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236. See, e.g., *supra* Part IV.B.1 fig.3.

237. See *supra* notes 186-192 and accompanying text.

238. Cf. LARMAN, *supra* note 158, § 37, at 433 (describing successful software development processes as “iterative and incremental” in part because of need to manage complexity).

239. See *supra* Part IV.B.3.

focused. These and other patterns could be used by the drafter to standardize treatment of similar drafting issues.

For example, comparison and conceptual analysis of statutes relating to business entities may reveal similar conceptual components, such as ownership,<sup>240</sup> management and control,<sup>241</sup> limitation of liability,<sup>242</sup> and allocation of economic rights.<sup>243</sup> If the interaction between these concepts is similar in each type of entity, it may be possible to create standard “business entity” patterns that could be applied to object-oriented revisions of each statute (even if the separate statutes are not being combined, as in the case of the proposed Texas Business Entity Code described above).<sup>244</sup> Similarly, the analogous structure of criminal statutes may suggest “criminal code” patterns that would assist in an object-oriented restructuring of those statutes.

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240. Ownership has been a conceptual component in a variety of business statutes. *See, e.g.*, REV'D MODEL BUS. CORP. ACT § 1.40(21) (1998) (shareholders as owners in case of corporations); REV'D UNIF. PARTNERSHIP ACT §§ 101(4), 401, 502; REV'D UNIF. LTD. PARTNERSHIP ACT §§ 101(7), 701 (partners as owners in case of general and limited partnerships); UNIF. LTD. LIAB. CO. ACT §§ 201, 501, 6A U.L.A. 443, 467 (1995) (members as owners in case of limited liability companies).

241. The conceptual component of management and control is used in a variety of business statutes to describe rights and duties with respect to the entity and its owners. *See, e.g.*, REV'D MODEL BUS. CORP. ACT §§ 8.01, 8.30 (directors' rights and duties in case of corporations); REV'D UNIF. PARTNERSHIP ACT § 401(f); REV'D UNIF. LTD. PARTNERSHIP ACT § 40 (rights and duties of general partners or managing partners in case of partnerships); UNIF. LTD. LIAB. CO. ACT § 404 (rights and duties of managers and managing members in case of limited liability companies).

242. This is available for at least some owners of business entities, *See, e.g.*, REV'D MODEL BUS. CORP. ACT § 6.22 (corporations); REV'D UNIF. LTD. PARTNERSHIP ACT § 303 (limited partnerships); UNIF. LTD. LIAB. CO. ACT § 303 (limited liability companies).

243. Economic rights of owners are subject to, at the least, default rules for some business entities. *See, e.g.*, REV'D MODEL BUS. CORP. ACT §§ 6.23, 6.40 (default rules for corporations which provide for distributions to be made to owners on basis of share ownership); REV'D UNIF. PARTNERSHIP ACT § 401; UNIF. LTD. LIAB. CO. ACT § 405 (default rules for general partnerships and limited liability companies which provide for equal sharing of income and losses unless partnership agreement or limited liability company documents provide otherwise); REV'D UNIF. LTD. PARTNERSHIP ACT § 503 (default rules for limited partnerships which provide for sharing of income and losses based on value of contributions received by partnership and not yet returned, unless partnership agreement provides otherwise).

244. Commonalties are suggested, for example, in the selection of topics that were shifted to the “hub” section of the proposed Texas Business Entity Code, and in the structure followed in organizing the various “spoke” provisions of that proposed Code. *See supra* Part II.A; *see also* Blackwell, *supra* note 80, app. B at 376-78 (providing possible alternative structure for unified business entity code).

### 3. *Construction of Code (Legislative Text) from Design*

Following the object-oriented analysis and design model, the next step in legislative drafting would be to begin creation of the final specifications for the system (statute) being designed. One creates these specifications for each of the statutory objects involved by crafting “design class diagrams” that illustrate classes and attributes, and associations and navigability.<sup>245</sup> Each of these terms is “translated” into more familiar legislative drafting terms below.

#### *a) Classes and Attributes*

In object-oriented legislative design, the term “class” would refer to a set of similar types of statutory objects.<sup>246</sup> This similarity is defined in terms of the “attributes,” or named characteristics, of the statutory objects, which might include definitional provisions, provisions permitting activity, provisions restricting activity, and provisions describing relationships between real-world objects, as well as details of the specific concepts handled by the statutory objects (such as liability limitation, ownership characteristics, or voting restrictions). Thus, the design class diagram for each legislative object would include a description of the attributes of that object, along with an identification of the class of objects to which that object belongs.

#### *b) Associations and Navigability*

“Associations” between legislative objects would include conceptual connections between the objects in question, whether explicit (cross-referential) or implied (organizational). The design class diagrams should be drawn to reflect the associations between objects, or at least the explicit associations (for purposes of specifying explicit references necessary for the finished statutory language). Implied associations may also be noted to facilitate grouping of objects in the final drafting process.<sup>247</sup>

In addition, where these associations are directional (for example, when a partner owns an interest in a partnership, this relationship between the partner and the interest is unidirectional rather than bi-directional), the directionality should be noted with navigability arrows and appropriately labeled.<sup>248</sup>

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245. *Cf. supra* note 217 and accompanying text (describing “design class” diagrams).

246. *Cf. supra* note 165 and accompanying text (providing definition of “class”).

247. These associations might be noted in a manner similar to the notation used by Larman for noting dependency relationships (dashed, arrowed lines). *See* LARMAN, *supra* note 158, § 21.8.10, at 267-68.

248. *See supra* Part IV.B.1 fig.3.

c) *Creation of Statutory Text*

Finally, the drafter will use the design class diagrams created for the various statutory objects as a tool to “generate” the actual statutory language. As in the software design process, the diagrams should provide a significant amount of the information needed to produce the drafted text, and the translation of the diagrams to text should be straightforward. At this stage in the process, much of the conventional wisdom about legislative drafting, such as the use of plain language, will come into play. The organizational insights resulting from the object-oriented analysis and design and the decomposition of monolithic statutory structures into discrete conceptual objects will contribute to the simplicity, and hopefully, to the elegance of the drafting. In addition, it may be helpful to use hypertext to provide linkages among conceptually related sections that are physically separated within the statute for organizational reasons.<sup>249</sup>

D. *Inconsistencies in Fit for Legislative Drafting*

Application of the object-oriented model of software analysis and design to the field of legislative drafting is not an exact fit. Specifically, the software object-oriented analysis and design model must be simplified, in part, because the provisions of a statute do not actively “do” anything in exactly the way that objects in computer software “run” or “operate” to instruct the computer to perform certain actions.<sup>250</sup> Also, as a result of the difference between “active” software objects and “inert” statutory provisions, some of the components of an object-oriented view of software are not easily translated into the legislative drafting context.<sup>251</sup> Finally, because legislative drafting is done in a natural language, such as English, rather than an artificially

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249. See *supra* Part III, see *Partial Draft of Hyper-linked, Modular Statutory Provisions*, N.Y.U. J. LEGIS. & PUB. POL’Y (last modified Feb. 24, 2000) <<http://www.nyu.edu/pubs/jlpp/vol3num2/partner.html>> for an example of an initial draft of some limited partnership statute provisions, drafted based on the partial interaction diagram shown in fig.4, *supra* Part IV.B.2.

250. For some reasons, though, this inactivity of statutory provisions is highly desirable. For example, because the computer instructions contained in computer software are stored electronically in exactly the same way as the data upon which such instructions act, it is possible for programmers to write computer programs that have the ability to modify themselves. As programs have grown increasingly complex, it becomes difficult for the original programmers to confidently predict the results of such self-modification. If statutes were created with similar self-modification abilities (perhaps if such statutes were stored and maintained on computers), it is conceivable that the end result might be laws that would be created without direct human intervention and laws that could not be confidently predicted in advance by the original drafters.

251. See *supra* note 165 and accompanying text (providing definition of “class”).

limited language such as a computer programming language, the translation from diagram to finished product is not as mechanical a process, and thus is subject to more work and errors by drafters.

## V

### SPECIFIC APPLICATIONS

#### A. *Possible Areas of Best Fit*

The real strength of the object-oriented method of analysis and design is in identifying, simplifying, and describing the relationships between concepts in a conceptually complex problem domain, and then producing resulting designs that are robust, easy to understand, and easily maintainable. For this reason, the technique may be most useful to someone drafting legislation which involves a complex set of ideas that are interrelated in multiple ways. The discussion above suggests that business entity statutes may present one such subject.<sup>252</sup> Criminal statutes, with their multiple relationships between types and elements of offenses and penalties for offenses, may be another candidate for this technique.<sup>253</sup>

Even in areas of statutory law that are not so obviously complex, the object-oriented method of analysis of the subject matter may prove useful in identifying conceptual linkages that have not been previously recognized, or in confirming the perceived conceptual simplicity of such subjects.

#### B. *Inappropriate Uses*

The object-oriented approach to legislative drafting may not be appropriate for some legislative tasks. Given the extra effort involved in such an approach to drafting, if the subject matter of the legislation is not conceptually complex, the organizational benefits of this approach may not outweigh the costs or time involved. For example, in most cases there would be no reason to apply these principles to small, single-subject bills, appropriations bills, and simple amendments to existing statutes.<sup>254</sup>

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252. See *supra* Part II.

253. See *supra* note 120 (discussing multiple conceptual links contained in model criminal statutes).

254. In some cases, however, such as amendments to existing complex statutes, it may be appropriate for the drafters of the amendments to perform some object-oriented analysis (or, if such analysis was done in preparing the underlying statute, to consult the analysis documentation from the earlier statutory preparation) as a prerequisite for drafting the amendment to ensure consistency in treatment and use of good drafting practices.

## CONCLUSION

Legislative drafting in common law jurisdictions has not received much scholarly attention except from a standpoint of style and technique. Given the volume of legislation that is drafted annually in the United States, this lack of underlying theory has resulted in legislation of poor quality. Redundancy, inconsistency, ambiguity, and overall lack of coordination are the hallmarks of poorly designed statutes. Although some guidance may be obtained from the lengthy history of legal science and codification efforts in civil law jurisdictions, the conceptual disparities between common and civil law systems, along with the criticism by many current schools of legal thought of restatement and codification efforts, make it unlikely that legislative drafters will be willing to undertake systematic codification of laws in American jurisdictions.

Nevertheless, two recent innovations from the field of computer technology may provide some assistance for legislative drafters. The use of hypertext and object-oriented analysis and design techniques should offer benefits of simplification, clarity, ease of access, and ease of maintenance. Statutes drafted using one or both of these tools should be more understandable, more flexible, and easier to update in a structured and consistent manner. The benefits of these methods should be particularly profound where the statute in question involves complex relationships among distinct concepts. In particular, object-oriented analysis and design should provide a structured method for analyzing the underlying problem to be addressed by the statute and constructing an effective legislative solution. Statutes drafted using techniques derived from object-oriented analysis and design will feature a segmented and coordinated structure with many advantages. Their structure will allow close consistency with both the real-world situations addressed, and the legal principles applied, by the statute. It should also allow—and even facilitate—flexibility and consistency in amendment. These analytical and design tools rooted in recent technology should provide an opportunity for the next generation of legislative drafting, so that the rise in quality of legislation will finally begin to keep pace with the rise in quantity.<sup>255</sup>

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255. These tools may also provide the possibility of technological administration of statutes. See Layman E. Allen & Tomoyuki Ohta, *Better Organization of Legal Knowledge*, 1969 U. Tol. L. Rev. 491, 491 (proposing “a technique for improving the legal communications network by clarifying its messages, making them amenable for more organized storage, and thereby simplifying their retrieval.”).

## APPENDIX: STATES WITH STATUTES ON-LINE

Alabama: *The Code of Alabama 1975*, OFFICIAL WEBSITE ALA. LEGISLATURE (visited Feb. 9, 2000) <<http://www.legislature.state.al.us/CodeofAlabama/1975/main.htm>>.

Alaska: *The Alaska Statutes – 1998*, ALASKA ST. LEGISLATURE (last modified Nov. 1999) <<http://www.legis.state.ak.us/cgi-bin/folioisa.dll/statx98>>.

Arizona: *Arizona Revised Statutes*, ALIS ONLINE (visited Feb. 9, 2000) <<http://www.azleg.state.az.us/ars/ars.htm>>.

Arkansas: *Arkansas Code of 1987*, ARK. 82ND GEN. ASSEMBLY (visited Feb. 9, 2000) <<http://www.arkleg.state.ar.us/lpbin/lpext.dll>>.

California: *California Law*, OFFICIAL CAL. LEGIS. INFO. (visited Feb. 9, 2000) <<http://www.leginfo.ca.gov/calaw.html>>.

Colorado: *Colorado Statute Manager*, INTELLINET (visited Feb. 9, 2000) <<http://165.212.243.216/stat99/>>.

Connecticut: *General Statutes of Connecticut, Revised to 1997*, CONN. STATE LIBR. (last modified Apr. 21, 1999) <<http://www.cslnet.ctstateu.edu/statutes/index.htm>>.

Delaware: *Delaware Code Unannotated*, LEXIS PUB. (visited Feb. 9, 2000) <[http://www.lexislawpublishing.com/sdCGI-BIN/om\\_isapi.dll?clientID=3071&infobase=decode.NFO&softpage=browse\\_frame\\_pg](http://www.lexislawpublishing.com/sdCGI-BIN/om_isapi.dll?clientID=3071&infobase=decode.NFO&softpage=browse_frame_pg)>.

Florida: *Florida Statutes and Constitution*, ONLINE SUNSHINE: THE FLA. LEGISLATURE (visited Feb. 9, 2000) <<http://www.leg.state.fl.us/citizen/documents/statutes/index.html>>.

Georgia: *Georgia Code*; STATE OF GA. (*unannotated*) (visited Feb. 9, 2000) <<http://www.ganet.org/services/ocode/ocgsearch.htm>>.

Hawaii: *Hawaii State Legislature Status and Documents*, HAW. ST. LEGISLATURE (visited Feb. 9, 2000) <<http://www.capitol.hawaii.gov/site1/docs.asp/press1=docs>>.

Idaho: *Idaho Statutes*; STATE OF IDAHO HOME PAGE (visited Feb. 9, 2000) <<http://www3.state.id.us/idstat/TOC/idstTOC.html>>.

Illinois: *Illinois Compiled Statutes*, LEGIS. REFERENCE BUREAU (visited Feb. 9, 2000) <<http://www.legis.state.il.us/ilcs/chapterlist.html>>.

Indiana: *Indiana Laws/Administrative Rules*, ACCESS IND. INFO. NETWORK (visited Feb. 9, 2000) <[http://www.state.in.us/legislative/laws\\_rules.html](http://www.state.in.us/legislative/laws_rules.html)>.

Iowa: Iowa General Assembly, *Iowa Code 1999*, IOWA GEN. ASSEMBLY (last modified Mar. 18, 1999) <<http://web.legis.state.ia.us/IACODE/1999/>>.

Kansas: *Kansas Statutes*, KAN. LEGIS. SERV. (last modified Jan. 11, 2000) <<http://www.ink.org/public/statutes/statutes.cgi>>.

Kentucky: *Kentucky Revised Statutes*, KY. LEGISLATURE (last modified Dec. 28, 1998) <<http://www.lrc.state.ky.us/statrev/frontpg.htm>>.

Maine: Office of the Revisor of Statutes, *Constitution, Statutes and Session Laws of Maine*, ME. ST. LEGISLATURE (visited Feb. 9, 2000) <<http://janus.state.me.us/legis/ros/meconlaw.htm>>.

Maryland: *Statute Text 2000 Session*, MD. GEN. ASSEMBLY HOME PAGE (visited Feb. 9, 2000) <[http://mlis.state.md.us/cgi-win/web\\_statutes.exe](http://mlis.state.md.us/cgi-win/web_statutes.exe)>.

Massachusetts: *The General Laws of Massachusetts*, OFFICIAL WEBSITE COMMONWEALTH OF MASS. (visited Feb. 9, 2000) <<http://www.state.ma.us/legis/laws/mgl/index.htm>>.

Michigan: *Michigan Compiled Laws: Complete Through PA 194 of 1999*, MICH. LEGISLATURE (visited Feb. 9, 2000) <<http://www.michiganlegislature.org/law/>>.

Minnesota: *Minnesota Statutes and Session Laws*, MINN. LEGIS. INFO. SERV. (last modified Dec. 16, 1999) <<http://www.leg.state.mn.us/leg/statutes.htm>>.

Mississippi: Mississippi Secretary of State, *Unannotated Code Lookup*; MISS. SECRETARY ST. - MAIN (visited Feb. 9, 2000) <[http://www.sos.state.ms.us/policy\\_admin/mscode/](http://www.sos.state.ms.us/policy_admin/mscode/)>.

Missouri: *Missouri Revised Statutes*, MO. GEN. ASSEMBLY (visited Feb. 9, 2000) <<http://www.moga.state.mo.us/homestat.htm>>.

Montana: *Montana Code Annotated*, LIST MONT. INFOBASES (visited Feb. 7, 2000) <[http://statedocs.msl.state.mt.us/cgi-bin/om\\_isapi.dll?clientID=239&infobase=MCA\\_97.NFO&softpage=Browse\\_Frame\\_Pg](http://statedocs.msl.state.mt.us/cgi-bin/om_isapi.dll?clientID=239&infobase=MCA_97.NFO&softpage=Browse_Frame_Pg)>.

Nebraska: *Nebraska Statutes*, NEB. UNICAMERAL (visited Feb. 4, 2000) <<http://www.unicam.state.ne.us/statutes.htm>>.

Nevada: *1999 Nevada Revised Statutes*, NEV. ST. LEGISLATURE HOME PAGE (last modified Nov. 10, 1999) <<http://www.leg.state.nv.us/NRS/>>.

New Hampshire: New Hampshire State Government, *New Hampshire Revised Statutes*, WEBSTER: N.H. ST. GOV'T ONLINE (visited Feb. 4, 2000) <<http://199.92.250.14/rsa/>>.

New Jersey: *New Jersey Permanent Statutes*, N.J. ST. LEGISLATURE HOME PAGE (visited Feb. 7, 2000) <[http://www.njleg.state.nj.us/cgi-bin/om\\_isapi.dll?clientID=59963&depth=2&expandheadings=](http://www.njleg.state.nj.us/cgi-bin/om_isapi.dll?clientID=59963&depth=2&expandheadings=)

on&headingswithhits=on&infobase=statutes.nfo&softpage=TOC\_Frame\_Pg42>.

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