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# Computer Data and reliability: A Call for Authentication of Business Records under the Federal Rules of Evidence

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# COMPUTER DATA AND RELIABILITY: A CALL FOR AUTHENTICATION OF BUSINESS RECORDS UNDER THE FEDERAL RULES OF EVIDENCE†

RUDOLPH J. PERITZ\*

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### I. Introduction

The traditional business records exception to the hearsay rule is based upon the recognition of two practicalities: Necessity and reliance. Shop books as evidence are thought necessary for adjudication on the merits: unless business records can be used in court without the testimony of every employee involved in the transaction, no one need ever satisfy obligations to large or complex firms.<sup>1</sup> Moreover, records are seen as reliable evidence because of the business community's day-to-day reliance on them. This inference of trustworthiness or reliability makes sense with traditional leatherbound shop books, in part because the opposing party is thought to have a reasonable opportunity to uncover errors and deletions.

But does the same inference make sense with computerized record-keeping and accounting systems? This question deserves attention not only because most business records are now computerized, but also because our reliance on computers belies the lingering mystification of electronic data processing<sup>2</sup> and the questionable reliability of its output—whether the output be an erroneous monthly credit statement<sup>3</sup> or the false reports generated in the Equity Funding fraud.<sup>4</sup> Should courts continue to infer trustworthiness simply from the traditional elements of the shop-book rule, or should proof of computer system reliability constitute part of a more comprehensive foundation for qualifying computerized business records?

Certainly the practicalities that engendered the business record ex-

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1. The classic statement of the necessity argument for the business records exception is found in *Massachusetts Bonding & Ins. Co. v. Norwich Pharmaceutical Co.*, 18 F.2d 934, 937 (2d Cir. 1927) (L. Hand, J.).

2. See *infra* notes 214-23 and accompanying text.

3. See, e.g., *Ford Motor Credit Co. v. Swarens*, 447 S.W.2d 53 (Ky. 1969).

4. R. LOEFFLER, REPORT OF THE TRUSTEE OF EQUITY FUNDING CORPORATION OF AMERICA—PURSUANT TO 167(3) OF THE BANKRUPTCY ACT 88 (describing how false information was generated by computer in order to perpetrate and then to obscure the Equity Funding fraud); see also Allen, *Embezzler's Guide to the Computer*, HARV. BUS. REV., July-Aug. 1975, at 79.

ception remain with us. Given their size, complexity, and geographic dispersion, many businesses would face not only great expense but perhaps the impossibility of proof without recourse to their computerized information. Moreover, because of the business community's reliance on computerized shop books, these books meet the traditional conditions for circumstantial trustworthiness.

Although some commentators have expressed concern over the reliability of computerized business records,<sup>5</sup> federal judges substantially agree that computer output should be qualified like any other business record, despite the fact that computer systems store, retrieve, and manipulate information in ways significantly different from earlier manual or mechanical systems. This judicial consensus has evolved since the passage of the Federal Rules of Evidence in 1975.<sup>6</sup> Before the passage of the Rules, some courts required a more comprehensive foundation for qualifying business records stored and maintained by computer. More recently, all courts have required proponents to meet only the business records standard, and thereby have required the objector to assume the burden of persuading the trier of fact that such records lack probative value.

Under the Rules, a trial court rarely excludes an offer of computerized business records or reports not specially prepared for trial.<sup>7</sup> Moreover, courts of appeals almost always uphold a lower court's finding of proper foundation for computerized business records, even when the lower court's finding is questionable.<sup>8</sup> Appellate court opinions offer two rationales for their rubberstamps of approval. First, they grant trial judges broad discretion in admitting evidence.<sup>9</sup> Thus, the party opposing admission must carry the formidable burden of persuading an appellate court that the trial court judge abused her discretion. Second, federal judges define objections to admissibility as arguments about probative value.<sup>10</sup> In practical terms, this means that the opponent is left

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5. See, e.g., *infra* notes 39-41 and accompanying text.

6. See *infra* text accompanying note 62 for excerpt of FED. R. EVID. 803(6).

7. See, e.g., *Perma Research & Dev. v. Singer Co.*, 542 F.2d 111, 125 (2d Cir.) (Van Graafeiland, J., dissenting) (distinguishing business records from documents specially prepared for trial), *cert. denied*, 429 U.S. 987 (1976). *But see* *United States v. Russo*, 480 F.2d 1228 (6th Cir. 1973) (treating an annual computer run as business record), *cert. denied*, 414 U.S. 1157 (1974).

8. See, e.g., *United States v. Fendley*, 522 F.2d 181, 191 (5th Cir. 1975) (Godbold, J., dissenting).

9. See, e.g., *United States v. Vela*, 673 F.2d 86 (5th Cir. 1982); D. BENDER, *COMPUTER LAW: EVIDENCE AND PROCEDURE* 6-31 (1978).

10. *United States v. Vela*, 673 F.2d 86 (5th Cir. 1982); *Rosenberg v. Collins*, 624 F.2d 659 (5th Cir. 1980); *United States v. Scholle*, 553 F.2d 1109 (8th Cir.), *cert. denied*, 434 U.S. 940 (1977). By probative value, I mean argument to the trier of fact, after the evidence already has been qualified, about the weight to be given the evidence.

with a Sisyphean task—arguing that the judge erred in granting *any* probative value to the business records and thus that she should not have permitted the jury to consider them at all. Given the context of trial court discretion, the probability of carrying that burden approaches zero.

The authority for such appellate self-restraint, though familiar, bears repetition. An ideological mandate for trial on the merits provides the framework for the Federal Rules of Civil Procedure.<sup>11</sup> Outcomes based on technicalities are viewed as trickery. Given the corollary that more evidence makes for a fairer trial, courts have interpreted the Federal Rules of Evidence according to a canonical presumption in favor of admissibility. The hearsay rule, however, stands in opposition to this canon. It constitutes the traditional presumption against admissibility—that in order to evaluate a statement's credibility, jurors must see the declarant speak. They must literally *hear him say* his piece. A living, breathing person must submit to the ritual of oath-taking and to the scrutiny of the jury. He must survive the ordeal of cross-examination.<sup>12</sup> Documents are simply insufficient for these purposes. Yet in recent years, exceptions have outflanked the hearsay rule.<sup>13</sup> The proliferation of exceptions to the hearsay rule is consistent with the notion that the courts can optimize fairness by maximizing the amount of permissible evidence. In particular, the business record exception's single-handed overpowering of this exclusionary rule represents the triumph of the general presumption in favor of admissibility.

Although the judiciary's treatment of computerized records is supported by the general presumption in favor of admissibility, it is at odds with the authoritative *Manual for Complex Litigation (Manual)*, promulgated by the Federal Judicial Center.<sup>14</sup> The *Manual's* recommendations regarding a more comprehensive foundation occupy the abandoned position taken by the pre-Rules opinions that expressed concern over the reliability of computer data—even if qualified as business records.<sup>15</sup> But is it reasonable to apply recommendations addressed to complex litigation to all offers of computerized records? Does it make any difference that under current law the objector rather than the of-

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11. See FED. R. CIV. P. 1. By ideological, I mean a system of ideas and beliefs about trial on the merits.

12. For a brief history of the rule against hearsay, see MCCORMICK ON EVIDENCE §§ 244-245 (E.W. Clary gen. ed. 3d ed. 1984) [hereinafter MCCORMICK. For a more detailed treatment, see 5 J. WIGMORE, EVIDENCE § 1364 (J. Chadbourn rev. ed. 1974); see also *Rules of Evidence for United States Courts and Magistrates*, 56 F.R.D. 183, 288-91 (1972) (Advisory Committee's discussion of the hearsay problem).

13. See, e.g., MCCORMICK, *supra* note 12, § 245, at 728-29. The best examples are FED. R. EVID. 803(24), 804(5).

14. MANUAL FOR COMPLEX LITIGATION (5th ed. 1982) [hereinafter MANUAL].

15. See *infra* notes 50-60 and accompanying text for discussion of pre-Rules opinions

fering party must offer evidence of systemic unreliability? Does it matter that the courts are concerned with the probative value rather than the admissibility of computerized records? If the question of reliability is material, the issue certainly will be raised and argued under either alternative.

In any case, significant consequences do arise from the courts' imposing on the objecting party the burden of disproving systemic reliability after the computer data already have been qualified as business records.<sup>16</sup> The presumption of trustworthiness simply carries too much weight in our recently computerized society. Judges, juries, attorneys, and parties cannot make sound judgments regarding the credibility of computerized records by comparing fairly brief and understandable testimony with recognizable documents, as they could with traditional shop books. Unlike ledgers and books of payables and receivables with individual items, intermediate accounts, and scrivined entries or changes, computer printouts are not records at all, but rather neatly packaged concatenations of information excerpted from numerous records in multiple files. Because program changes or data manipulations can be accomplished without leaving any trace and without affecting the day-to-day operation of a computer system, both unintentional error and intentional fraud are difficult to discover behind a perfect-looking printout. Even if document discovery and deposition of data processing personnel are forthcoming,<sup>17</sup> system examination may be too expensive and time consuming, especially given the frequent confronta-

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and *infra* notes 84-98 and accompanying text for discussion of the recommendations in MANUAL, *supra* note 14, at §§ 2.711-716.

After this article was written, the Federal Judicial Center published the MANUAL FOR COMPLEX LITIGATION, SECOND (1985) [hereinafter MANUAL, SECOND]. Although different in form, the positions taken by the *Manual, Second* regarding the treatment of computer data are substantially the same. See *id.* § 21.446, at 60-62. The revised discussion of computer evidence problems is a shorthand rendition of the *Manual's* six recommendations. See *infra* notes 86, 88 & 90 and accompanying text. Nonetheless, I do take issue with these changes, insofar as they seem to rest on an assumption that judges and counsel no longer need the clarifying structure and explicit guidance of the *Manual's* fuller description of the computer evidence problem. Quite to the contrary, I believe that the case law suggests that clarification and guidance are still called for.

16. Burdens of proof and presumptions encompass a complex subject area whose terrain has been thoroughly explored in the legal literature. For an exhaustive bibliography, see MCCORMICK, *supra* note 12, at 946 n.1. Although the analysis that follows does not specify the nature of the burden to be carried—either producing evidence or persuading the trier of fact—one implication of maximizing admissible evidence would be to prefer the heavier burden of persuasion. On the other hand, requiring the proponent of computerized business records to carry either burden would be a step in the right direction.

17. For an excellent introduction to the problems of computer discovery, see Sherman & Kinnard, *The Development, Discovery, and Use of Computer Support Systems in Achieving Efficiency in Litigation*, 79 COLUM. L. REV. 267 (1979); see also Fromholz, *Discovery, Evidentiary, Confidentiality and Security Problems Associated with the Use of*

tion between the individual objector and large firm or government agency proponent. Computerization clearly magnifies the significance of the evidential tenet that the proponent is in the best position to offer proof about his own system's reliability because his personnel are already familiar with the machinery, programs, operation, and documentation.<sup>18</sup>

Given the judiciary's perception that computerized records have an aura of reliability as well as the broad discretion granted to trial court judges regarding evidentiary questions, the current practice simply does not accord the objecting party a fair chance to argue the reliability question. Because more and better evidence is central to our fundamental commitment to trials on the merits,<sup>19</sup> relying on business reliance is no longer good enough. Rather, courts should apply to all computerized records in all cases the *Manual's* recommendations for more comprehensive qualification and discovery.<sup>20</sup> In sum, a better court practice would take more seriously the traditional policies in favor of requiring in-court testimony to test trustworthiness—here, system reliability.<sup>21</sup>

This Article develops two rationales for an alternative approach to computerized records, founded in the *Manual's* recommendations, that better serves the Rules' overarching concern for fairness. The first rationale is a statutory-construction argument which demonstrates that implementation of the *Manual's* recommendations engenders a more coherent interpretation of the Rules. In particular, the recommendations reconstruct the proper relationship between the business records excep-

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*Computer-Based Litigation Support Systems*, in *THE COMPUTER FRAMEWORK FOR COMPLEX LITIGATION* (1976).

18. The proponent is also in the best position to elicit testimony about his system's reliability from a friendly third-party witness. For a discussion of the proponent's burden of proving the traditional authentication question, see MCCORMICK, *supra* note 12, at §§ 218-220. For a discussion of the reasons for creating presumptions, see *id.* § 343. For the modern practice, see FED. R. EVID. 702, 901.

19. See FED. R. EVID. 102; FED. R. CIV. P. 1.

20. MANUAL, *supra* note 14, at §§ 2.711-716.

21. Proof of system reliability as part of the foundation for qualifying computerized business records can fall under either the hearsay exception, see FED. R. EVID. 803(6), or under the authentication requirement, see FED. R. EVID. 901.

It may be argued that an expanded foundation for admitting computerized business records into evidence, like the one proposed here, would have the undesirable effect of significantly raising litigation costs. This concern is misplaced, because higher litigation costs would turn out to be the exception, rather than the rule, for two reasons. First of all, uncontested offers of computerized business records could be accomplished in much the same way as they are currently—by stipulation of the parties. Second, although contested offers might sometimes involve slightly higher costs on account of a modest increase in the amount of evidence and testimony, the typical case would reflect, for the most part, not an increase, but rather a shift of burden and some expense from the objecting to the offering party.

tion and the authentication requirement.<sup>22</sup>

The second rationale is a pragmatic assessment of computer technology that shows why the *Manual's* approach of lawyerly skepticism reflects more accurately our experience with computers and their limitations. Specifically, this assessment examines system security and user expertise within the context of small computer systems and computer industry marketing practices and system conversion problems concerning large systems.

To build a framework for the two rationales, part II of the Article quickly sketches commentators' concerns about the treatment of computerized business records. Next, part III explores the courts' doctrinal split regarding the admissibility of computerized records under the traditional shop-book rule, then questions the premise of business reliance that underlies the current interpretation of the exception, and finally contrasts this current interpretation with the *Manual's* reliability-based approach of demanding more discovery and a comprehensive foundation for qualification as business records. Within that historical and institutional context, part IV develops the Article's two rationales and argues for the extension of the *Manual's* approach to all computerized records. The argument in part IV is based on a close reading of the Rules and on the practical limitations of computer systems. Part V concludes with some observations about the questions of reliance and reliability within the larger context of the longstanding jurisprudential quest for objectivity in judicial interpretation.

## II. Commentators' Dilemma About Computerized Business Records

Simply encouraging the admission of more evidence cannot guarantee due process, fair outcomes, or even better evidence. If maximizing the amount of evidence advanced our fundamental commitment to fostering trials on the merits, then having no rules of evidence would constitute the most desirable state of affairs. But the idea of a fair trial is complex, and its satisfaction is not determinable by mere reference to the amount of evidence in the trial record. Enforcing the presumptive exclusion of hearsay evidence still makes sense despite a general predisposition to admit evidence because it appears to serve policies that we think are important.<sup>23</sup> This section discusses commentators' concerns about computerized business records in order to dramatize the admissibility dilemma arising from the need for such evidence on the one hand and the uneasiness over questions of reliability on the other.

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<sup>22</sup> FED. R. EVID. 803(6), 901(b)(9).

<sup>23</sup> This proposition is not an uncontroversial assumption. See, e.g., MCCORMICK, *supra* note 12, at § 245.



The traditional common-law rule excluding hearsay evidence and the set of exceptions to the rule reflect a cluster of social policies.<sup>24</sup> Our skepticism regarding the truthfulness of out-of-court statements demands the presence in court of the speaker or writer. According to *McCormick on Evidence (McCormick)*, the rule against hearsay evidence derives from three factors upon which the credibility of testimony depends: the witness' perception, memory, and narration.<sup>25</sup> The rule against hearsay institutionalizes the conditions under which the testimony's three dimensions can be tested. Those conditions are oath, personal presence at trial, and cross-examination.<sup>26</sup>

There are numerous exceptions to the rule against hearsay. Each exception is founded on some circumstantial assurance of trustworthiness.<sup>27</sup> The theory underlying the business records exception is similar to the theory underlying other exceptions—unusual reliability, which is inferred from the belief that regularly kept records have a high degree of accuracy.<sup>28</sup> Their very regularity and continuity are presumed to train the recordkeeper in habits of precision. Moreover, financial records periodically are balanced and audited. Finally, "the entire business of the nation and many other activities function in reliance upon records of this kind."<sup>29</sup> In short, not only do courts see the practice and environment as encouraging the making of accurate records, but they also rely upon business reliance.<sup>30</sup> The courts' reliance on business reliance has supported liberalized admissibility and has decreased formal demands for assurances of trustworthiness.<sup>31</sup> The traditional com-

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24. The exceptions under the Federal Rules of Evidence do not allow admission, but rather negate exclusion. See FED. R. EVID. 803.

25. MCCORMICK, *supra* note 12, § 245, at 726.

26. *Id.* At least in criminal law cases, there is also the constitutional issue of confrontation. See, e.g., *Pointer v. Texas*, 380 U.S. 400 (1965). See generally 5 J. WIGMORE, *supra* note 12, at §§ 1395-1400.

27. See, e.g., FED. R. EVID. 803(b) advisory committee's note; HOUSE COMM. ON THE JUDICIARY, FEDERAL RULES OF EVIDENCE, H.R. REP. NO. 650, 93d Cong., 1st Sess. 14 (1973); MCCORMICK, *supra* note 12, at § 306.

28. MCCORMICK, *supra* note 12, § 306, at 872.

29. *Id.*

30. *Id.* § 810, at 879.

31. According to *McCormick*, the rule against hearsay was a late development of the British common law. *Id.* § 244, at 726. Nonetheless, the last sixty years in the United States has been a time of evidence law codification. The Commonwealth Fund Act, see E.M. MORGAN, Z. CHAFEE, JR., R.W. GIFFORD, E.W. HINTON, C.M. HOUGH, W.A. JOHNSTON, E.R. SUNDERLAND & J.H. HIGMORE, *THE LAW OF EVIDENCE, SOME PROPOSALS FOR ITS REFORM* 63 (1927); the Uniform Business Records as Evidence Act, 9A U.L.A. 506 (1965); and the 1953 Uniform Rules of Evidence, 9A U.L.A. 637 (1965), liberalized the foundation requirements for qualifying a document as a business record; cf. J. WEINSTEIN, J. MANSFIELD, N. ABRAMS & M. BERGER, *EVIDENCE CASES AND MATERIALS* 779-81 (7th ed. 1982). The Commonwealth Fund Act was adopted by Congress as the Act of June 20, 1936, 28 U.S.C. § 1732 (1964), and repealed in part upon adoption of the Federal Rules of

mon-law foundation for qualifying a document as a business record has included testimonial proof of four elements: (1) The record is an original entry made in the routine course of business; (2) the entries were made upon the personal knowledge of the recorder or someone reporting to him; (3) the entries were made at or near the time of the transaction; and (4) the recorder and his informant are unavailable.<sup>32</sup> When these conditions are met, courts are willing to forgo the requirements attendant to live testimony.

In recent years, however, courts have relaxed these substitute conditions of circumstantial trustworthiness for business records in deference to the exigencies of modern business practices and the desire for an efficient trial process.<sup>33</sup> For example, the size and complexity of economic and political institutions has attenuated the requirement that each and every employee representing a link in the chain from transaction to offered evidence appear and testify unless unavailable.<sup>34</sup> Even if all the employees are available, it makes sense to avoid parading them to the witness stand in order to minimize the expense and disruption to the institution as well as the lengthy process of so qualifying every business record.

Should computer records be treated differently from manually or mechanically maintained business records? Before computerization had become so widespread, a number of influential writers expressed concern over the interaction between computerization and traditional evidence doctrine. The following excerpt from an article by Judge Brown captures the dilemma:

For a machine now capable of making 240,000 additions per second, reading magnetic tape containing four million digits of information on a single reel at a breath-taking speed, to speak of the shop book rule is,

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Evidence in 1975. (Section (b) of the Commonwealth Fund Act remains as § 1732, a best-evidence alternative to Rule 1003.) The Uniform Act was adopted by numerous states, listed in 9A U.L.A. 506 (1965). Texas adopted a hybrid of the Commonwealth and Uniform Acts. See TEX. REV. CIV. STAT. ANN. art. 3737e (Vernon 1968). For a legislative history of the changes in the Federal Rules version of the business records exception, compare FED. R. EVID. 803(b) advisory committee's note with CONF. COMM., FEDERAL RULES OF EVIDENCE, H.R. REP. NO. 1597, 93d Cong., 2d Sess. 11 (1974) [hereinafter H.R. REP. NO. 1597]; SENATE COMM. ON THE JUDICIARY, FEDERAL RULES OF EVIDENCE, S. REP. NO. 1277, 93d Cong., 2d Sess. 16 (1974); HOUSE COMM. ON THE JUDICIARY, FEDERAL RULES OF EVIDENCE, H.R. REP. NO. 650, 93d Cong., 1st Sess. 14 (1973) [hereinafter H.R. REP. NO. 650].

For an alternative statute that addresses the computerized evidence problem in great detail, see The South Australia Evidence Act Part VI A, § 59a-59c, as amended through 1975, reproduced in *COMPUTER LAW SERVICE*, at app. 5-4.1a (R. Bigelow ed. 1977).

32. MCCORMICK, *supra* note 12, at § 306 n.2 (citing Laughlin, *Business Entries and the Like*, 46 IOWA L. REV. 276, 282 (1961)).

33. See FED. R. EVID. 803(6) advisory committee's note.

34. MCCORMICK, *supra* note 12, § 311, at 880.

indeed, an anachronism. But we operate more comfortably with familiar concepts. Just as that rule dispensed with the necessity of producing the person who made the entry, the law must find a means of giving judicial currency to that which is reliable and acceptable in the market place.<sup>35</sup>

Judge Brown juxtaposes doctrinal anachronism and practical necessity. On the one hand, the business records exception does not seem to fit the complexity of electronic recordkeeping. On the other hand, doctrine that calls for evidence of circumstantial trustworthiness ought to take into account everyday business reliance upon such records.<sup>36</sup> The danger attendant to applying familiar legal concepts like the shop-book rule to new situations is that traditional concepts might predispose judges to treat new situations as if they were not new at all. Important differences would elude consideration. While most writers have concerned themselves only with guiding beginning practitioners safely through the most stringent foundation requirements,<sup>37</sup> a few have questioned the wisdom of applying traditional evidence doctrine to new recordkeeping technology.<sup>38</sup>

In an article well known among those concerned with computer-ev-

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35. Brown, *Electronic Brains and the Legal Mind: Computing the Data Computer's Collision with Law*, 71 YALE L.J. 239, 248 (1961). Judge John R. Brown was the Chief Judge of the United States Court of Appeals for the Fifth Circuit.

36. See also 5 J. WIGMORE, *supra* note 12, at § 1530.

37. McCORMICK, *supra* note 12, at § 314, states, quite accurately, that the only real uncertainty regarding admissibility of computer records is the scope of the foundation required. For an excellent introduction to the area, see Tapper, *Evidence from Computers*, 8 GA. L. REV. 562 (1974). Perhaps the best of the practitioner-education articles are Freed, *Computer Printouts as Evidence*, in 16 AM. JUR. PROOF OF FACTS 273 (1965) (outlining the questions and testimony to be elicited); Freed, Fenwick & McGoniga, *Mock Trial: Admissibility of the Computerized Business Records Problem*, 15 JURIMETRICS J. 206 (1975); Roberts, *A Practitioner's Primer on Computer-Generated Evidence*, 41 U. CHI. L. REV. 254 (1974) (while offering an excellent introduction for litigators, Roberts worries about both too easy and too difficult admissibility, with little analysis); see also *Computer-Related Evidence Law*, 1 COMPUTER L.J. 667 (1979). For a selective bibliography, see USE OF COMPUTERS IN LITIGATION 379-80 (J.H. Young, M.E. Kris & H.C. Trainor eds. 1979).

38. Compare Freed, *supra* note 37, at 276 & 102, 109 (Supp. 1984) (outlining additional testimony needed for admission of accounting record print-outs) with Freed, *A Lawyer's Guide Through the Computer Maze*, 6 PRAC. LAW. 15, 28 (1960) (computer bookkeeping or computation reliability should be treated no differently than manual procedures); see also Singer, *Proposed Changes to the Federal Rules of Evidence as Applied to Computer-Generated Evidence*, 7 RUTGERS J. COMPUTERS TECH. & L. 157, 159 (1979) (calling for a new rule to accommodate new technology). It is my position that, although a more comprehensive foundation is called for, new rules are neither likely nor needed. See *infra* text accompanying notes 112-24 & 167-202 for a discussion of rationales for reading the current rules as requiring a more comprehensive foundation.

Two excellent articles describe the differences between computerized records and traditional business records in detail, but do not deal in any depth with legal doctrine in general or the Federal Rules of Evidence in particular. See Dehetre, *Data Processing Evi-*

idence problems, Colin Tapper compared common-law and statutory evidence principles with statutes drafted to deal specifically with evidence generated by computers.<sup>39</sup> While observing that computer recordkeeping differs significantly from conventional practices,<sup>40</sup> Tapper suggests that special legislation is undesirable.<sup>41</sup> His rationale reflects Judge Brown's observation regarding our preference for familiar concepts, as well as his own confidence in judicial development of proper legal doctrine.<sup>42</sup> Nonetheless, Tapper's brief evaluation of the (then still proposed) Rules calls into question the business record exception's applicability to printouts:<sup>43</sup> it "would involve an expansive reading of the term 'data compilation' to encompass the entire process of computer system from the reception of data, through the key-punching, encoding and computer calculation, to the final printing-out of the information."<sup>44</sup>

In contrast to Tapper's apprehension that the business records exception under the Rules could be read to exclude printouts of computerized business records, current writers harbor no such fears.<sup>45</sup> While noting the special character of computer recordkeeping, McCormick states that courts have dealt competently with the admissibility of computer-generated evidence under the Rules.<sup>46</sup> Indeed, Tapper himself notes that, in principle, the foundation for computer records "would not seem to differ from the foundation required for . . . conventional business records."<sup>47</sup> Still, Tapper feels compelled to caution courts about

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*dence—Is It Different?*, 52 CHI.-KENT L. REV. 567 (1976); Sprowl, *Evaluating the Credibility of Computer-Generated Evidence*, 52 CHI.-KENT L. REV. 547 (1976).

The clearest exception to the typical commentary is Singer's article, which offers an amendment to accommodate evidence from computers. The Singer amendment should be compared with the South Australia Evidence Act, *supra* note 31.

39. Tapper, *supra* note 37, at 562.

40. *Id.* at 565. Tapper notes that computer recordkeeping differs significantly from conventional practices not only because many intermediate steps are bypassed, but also because of decreasing contact between human beings and the information needed to conduct a business. *Id.*

41. *Id.* at 613.

42. *See id.* Perhaps Professor Tapper's education and teaching experience in the British common-law tradition illuminates his confidence in the judiciary.

43. *Id.* at 603-04. The wording of Rule 803(6) vacillates between "regularly kept" and "business" records. For a legislative history of that movement, see sources cited *supra* note 31.

44. Tapper, *supra* note 37, at 604. Tapper does not question the prudence of the particular rules, although he prefers general statutes like the Federal Rules of Evidence. Instead, he focuses on the proponent's task of successfully qualifying computerized data as business records.

45. *See, e.g.*, MCCORMICK, *supra* note 12, § 314, at 885; Johnston, *A Guide for the Proponent and Opponent of Computer-Based Evidence*, 1 COMPUTER L.J. 667 (1979);

46. MCCORMICK, *supra* note 12, § 314, at 886.

47. Tapper, *supra* note 37, at 595.

"the complex nature of computers and lay unfamiliarity with their processes."<sup>48</sup>

Although commentators disagree over the proper response,<sup>49</sup> it is important to note that they all agree that computer data raise new questions regarding reliability within the traditional bounds of the business records exception.

### III. Federal Courts and the Business Records Exception

This section first analyzes court treatment of computer data under the traditional shop-book rule, then explicates court interpretation of the Federal Rules of Evidence, and finally presents the approach recommended in the *Manual for Complex Litigation* for dealing with technologically produced hearsay evidence—computerized business records.

#### A. THE TRADITIONAL SHOP-BOOK RULE: A DOCTRINAL SPLIT

Federal court treatment of computerized business records prior to the enactment of the Rules in 1975 substantiates the commentators' dilemma. Two opposing lines of opinion regarding proper qualification of computerized business records emerged under the Federal Business Records Act.<sup>50</sup> One line of opinion simply pointed to the practical necessity for computerized business records as the rationale for adopting the traditional foundation for the business records exception: if computerized records are good enough for businesses, they are good enough for the courts.<sup>51</sup> Any absence of testimony regarding accuracy of offered printouts of business records could be shown to affect their weight, but not their admissibility.<sup>52</sup> Indeed, one court stated that printouts "produced in the ordinary course of business . . . at least have

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48. *Id.* For a typical range of writing on the subject, see, e.g., Roberts, *supra* note 37 (declaring that difficulties with qualification of computerized records are part of a litigator's responsibility); Singer, *supra* note 38 (proposing that the legislature amend Rule 901 to deal explicitly with computerized records); Essay, *A Reconsideration of the Admissibility of Computer-Generated Evidence*, 126 U. PA. L. REV. 425 (1977) (suggesting that federal courts require showing that data processing systems have satisfactory controls).

To the extent that any special treatment is permitted, courts might allow the objecting party to attack the computerized document's probative value. See *infra* text accompanying notes 73-83.

49. See *supra* note 38 and references cited therein.

50. 28 U.S.C. § 1732(a) (1970) (repealed in part in 1984).

51. See, e.g., *United States v. DeGeorgia*, 420 F.2d 889 (9th Cir. 1969); *Louisville & N. R.R. v. Knox Homes Corp.*, 343 F.2d 887 (5th Cir. 1965) (Brown, J.).

52. See, e.g., *D & H Auto Parts v. Ford Mktg. Corp.*, 57 F.R.D. 548, 551 (E.D.N.Y. 1973). One commentator first concedes admissibility and then exhorts opponents to continue the fight by attacking probative value. See Bender, *Computer Evidence Law: Scope and Structure*, 1 COMPUTER L.J. 699, 707-09 (1979).

a prima facie aura of reliability."<sup>53</sup>

The contrasting line of opinion did not presume that electronic data processing is reliable. It imposed an additional burden on those who had computerized their regular recordkeeping and wished to offer their records as evidence. Perhaps the most frequently cited example of a careful foundation appears in *United States v. Russo*.<sup>54</sup> The trial court in *Russo* had heard detailed and extensive testimony from expert witnesses familiar with the particular computer system that produced the printout offered as evidence. Those witnesses gave testimony regarding (1) the mechanics of data input control designed to ensure accuracy; (2) the nature of the information constituting the input; and (3) the business' reliance on the printout in the ordinary course of its activities.<sup>55</sup> In addition to affirming the trial court's standard for qualifying the printout, the appellate court held that the underlying data, computer programs, and other relevant discovery documents had to be made available to the opposing party far in advance of trial.<sup>56</sup> Yet the court did not require affirmative proof of computer system reliability, even though the opinion cited with approval the two leading state court opinions that call for such proof.<sup>57</sup>

Still, *Russo* stands for the proposition that computerized business records merit special qualification requirements. The concurring opinion in a case four years earlier, *United States v. DeGeorgia*,<sup>58</sup> went even further in imposing an additional burden on the proponent of such evidence. Judge Ely wrote that qualifying a computer printout under the business records exception should not shift the burden of demonstrating the accuracy of computer records to the opponent.<sup>59</sup> The business record's proponent must make a prima facie case of computer system reliability. Judge Ely's position is in sharp contrast to the majority's holding

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53. *Olympic Ins. Co. v. H.D. Harrison, Inc.*, 418 F.2d 669, 670 (5th Cir. 1969); see also *Perma Research & Dev. v. Singer Co.*, 542 F.2d 111, 115 (2d Cir.), cert. denied, 429 U.S. 987 (1976).

54. 480 F.2d 1228 (6th Cir. 1973), cert. denied, 414 U.S. 1157 (1974) (admitting annual statistical run of insurance company, which was offered to show that allegedly stolen vehicle was not rented while in defendant's possession).

55. *Russo*, 480 F.2d at 1240-41.

56. *Id.* at 1242 (citing MANUAL FOR COMPLEX AND MULTIDISTRICT LITIGATION § 2.716, at 88 (predecessor to MANUAL, *supra* note 14)). The lower court's standard for qualifying the printout of the annual statistical run did not include an inquiry into the system hardware's reliability. Because there was no evidence taken on that point, the appellate court apparently was satisfied to assume such reliability. *Id.* at 1240-41.

57. The opinion cited *King v. State ex rel. Murdock Acceptance Corp.*, 222 So. 2d 393 (Miss. 1969), and *Transportation Indem. Co. v. Seib*, 178 Neb. 253, 132 N.W.2d 871 (1965). Both opinions are cited in the Advisory Committee's Note to Rule 901(b)(9). See *infra* notes 125-62 and accompanying text for a discussion of the Note and the Rule.

58. 420 F.2d 889 (9th Cir. 1969).

59. *Id.* at 895-96.

that company reliance on computerized business records represents an adequate foundation for admissibility.<sup>60</sup> His opinion differed from the majority's opinion over the inference of reliability from the fact of reliance. It also differed over the merger of circumstantial trustworthiness and systemic reliability. Such disagreement over the proper relationship between the ideas of trustworthiness and reliability has diminished in significance under the business records exception of the Federal Rules of Evidence.

#### B. THE FEDERAL RULES OF EVIDENCE: PROCEEDINGS JUSTLY DETERMINED

Current treatment of computerized business records under Rule 803(6) plots a course parallel to the liberal-admissibility line of earlier cases. Courts today demand no special foundation for qualifying computer printouts and their underlying data as business records.<sup>61</sup> Does that course follow from a reading of the Rule? At first blush, it does appear to follow. The rule states in relevant part that

[t]he following are not excluded by the hearsay rule, even though the declarant is available as a witness: . . . (6) *Records of Regularly Conducted Activity*. A memorandum, report, record, or data compilation, in any form, . . . if kept in the course of a regularly conducted business activity . . . unless the source of information or method or circumstances of preparation indicate lack of trustworthiness.<sup>62</sup>

Two points are certain: First, "data compilation" includes information maintained in computer databases,<sup>63</sup> and second, the hearsay rule does not exclude data compilations, in any form, kept in the ordinary course of business.<sup>64</sup> Tapper's uneasiness about the scope of "data compilation" aside,<sup>65</sup> Rule 803(6) does propound an explicit "unless" caveat that calls upon courts to take into account lack of trustworthiness. This

60. *Id.* at 893 n.11 (immaterial that records were kept on computer).

61. *But see* *Capital Marine Supply, Inc. v. M/V Roland Thomas, II*, 719 F.2d 104 (5th Cir. 1983). *Capital Marine Supply* seems to be an exception because the opinion describes rather extensive authentication testimony, including daily verification of information against daily manual ledger cards and collection registers. *Id.* at 105-06. The court, however, judged the testimony against a general foundation standard that took into account neither the special problems of computer system reliability nor the traditional doctrine of authentication. *Id.* at 106. For further discussion of the Fifth Circuit's position, see *infra* text accompanying notes 75-83. For a discussion of the general foundation for qualifying business records, see *supra* notes 25-34 and accompanying text.

62. FED. R. EVID. 803(6) (emphasis added).

63. *See* FED. R. EVID. 803(6) advisory committee's note.

64. The definition of "business" is broad. *Compare* FED. R. EVID. 803(6) advisory committee's note with H.R. NO. 1597, *supra* note 31, at 3.

65. *See supra* notes 39-44 and accompanying text; *see also* MCCORMICK, *supra* note 12, at § 314 n.6 (expressing similar uneasiness).

section demonstrates that courts need not and, further, should not qualify computerized business records as if they were no different from other business records, and that the Rule's caveat instructs judges to inquire into a computerized recordkeeping system's trustworthiness.<sup>66</sup> Part 1 sets the foundation question and the caveat's instruction within the overall structure of the Rules. Part 2 then reviews current court treatment of computerized business records and criticizes it as both mechanical and outside the Rules' purport.

1. *Rule 803(6)'s Caveat and the Trial Court's Responsibility.*—Rule 803(6) does not require a judge to exclude a data compilation qualified as a business record unless lack of trustworthiness is indicated. A business record, of course, is not automatically admitted upon qualification. It must, for example, meet relevancy, best-evidence, and other requirements.<sup>67</sup> Once untrustworthiness is indicated, however, the judge must exclude the offered business record.<sup>68</sup> But how is it that the source of information or the method or circumstances of preparation are deemed untrustworthy? Is it part of the proponent's burden of qualification? Or does the opponent have a burden of coming forward with evidence, or even a burden of persuading the judge?

The issue of (un)trustworthiness falls under the Rule 104(a) heading of preliminary questions of fact.<sup>69</sup> While the Rules are silent about allocating burdens of proving these questions, there does seem to be a settled practice:<sup>70</sup> When a judge hears evidence to determine preliminary questions of fact, the proponent generally has the burden of establishing those facts by a preponderance of the evidence.<sup>71</sup> The opponent has the burden of producing evidence to show the existence of grounds for objection.<sup>72</sup>

Does Rule 803(6)'s caveat require that the proponent offer evidence of trustworthiness? Or does it fall outside the general rule regarding the burden of proof for preliminary facts? Is it the opponent who must

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66. For an analysis demonstrating that Rule 901(b)(9) provides the appropriate standard for admission of computerized records, see *infra* text accompanying notes 125-62.

67. For a discussion concerning the relevance of the distinction between "not excluded" and "admitted" to the authentication problem, see *infra* notes 108-11 & 152-54 and accompanying text.

68. See FED. R. EVID. 104, 803(6), 1101(d)(1) advisory committee's note.

69. FED. R. EVID. 104(a).

70. FED. R. EVID. 104 advisory committee's note; see MCCORMICK, *supra* note 12, at § 53; P.F. ROTHSTEIN, FEDERAL RULES OF EVIDENCE 20-22 (student ed. 1979).

71. See, e.g., *United States v. Enright*, 579 F.2d 980 (6th Cir. 1978); C.A. WRIGHT & K.W. GRAHAM, FEDERAL PRACTICE AND PROCEDURE § 5053 (1984) [hereinafter WRIGHT & GRAHAM]. For a discussion regarding the current court practice, see *infra* notes 73-83 and accompanying text.

72. MCCORMICK, *supra* note 12, at § 53; WRIGHT & GRAHAM, *supra* note 71, at § 5053.



produce evidence of untrustworthiness as grounds for objection? The procedure is in doubt because the language of the Rule seems to conflict with the general practice of requiring the proponent to prove preliminary questions of fact: the caveat calls for exclusion of a business record upon some indication of *lack of* trustworthiness—certainly a bizarre burden for a proponent. Nonetheless, the phraseology still allows for two conflicting interpretations. On the one hand, it might make sense to hold that unless the proponent produces evidence indicating trustworthiness, a presumption of lack of trustworthiness prevails. This interpretation is consistent with the hearsay rule's general presumption of untrustworthiness and with the general practice of placing the burden on the proponent. On the other hand, it also seems reasonable that unless the opponent produces evidence tending to show a lack of trustworthiness, the record qualifies. This view accords with the presumed trustworthiness of writings once qualified as business records and with the caveat's instruction to exclude an otherwise-qualified business record on some indication of "lack of trustworthiness." Both interpretations of Rule 803(6) and its caveat regarding trustworthiness seem to make good sense.

2. *The Courts: Splitting the Difference.*—Which presumption takes precedence and which party must carry the burden of proving the preliminary question of fact regarding (lack of) trustworthiness? This quandry replays the dilemma between trustworthiness and reliability suggested in the excerpt from Judge Brown's early article and in the pre-Rules case law.<sup>73</sup>

This section quickly reviews the current court practice of presuming the trustworthiness of computer output that has been qualified as business records, and the practice of permitting the opponent to attack trustworthiness, if at all, only with regard to probative value—that is, only after the printout already has been admitted into evidence. This section concludes that while the courts' presumption of trustworthiness is plausible, it ultimately is undesirable, because such treatment of the burden-of-proof issue is unfair to the objecting party.<sup>74</sup>

An extreme example of the presumption of trustworthiness of computerized records is a recent Fifth Circuit opinion, *United States v. Vela*,<sup>75</sup> which involved the government's use of telephone company bills to prove its case. The district court admitted copies of microfiche records of telephone company bills revealing aspects of Vela's telephone usage. Typically, computer systems record the initial dialing of calls,

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73. See *supra* notes 35-38 & 50-60 and accompanying text.

74. For an interpretivist argument based on a close reading of the Rules, see *infra* notes 101-75 and accompanying text.

75. 673 F.2d 86 (5th Cir. 1982).

compute charges, and prepare bills. The government offered no testimony regarding the telephone company's computer system other than statements about the general reliability of the process, perhaps as a consequence of the district court judge's great faith in electronic data processing systems and his lesser regard for their human overseers. The judge considered computerized records even more reliable than the "average business records" because they were "not even touched by the hand of man."<sup>76</sup>

The Fifth Circuit affirmed the lower court decision as being within the trial judge's discretion. In the course of its opinion, the appellate panel observed that the federal courts were (and still are) split on the question of admissibility of computerized business records,<sup>77</sup> but chose to maintain its prior position, articulated in *Rosenberg v. Collins*,<sup>78</sup> that computer data should be treated like any other record of a regularly conducted activity. The court acknowledged and rejected the Eighth Circuit's view, announced in *United States v. Scholle*,<sup>79</sup> that a unique foundation is necessary for computerized business records.

Although the *Scholle* opinion does refer to a need for special qualification, the split between the circuits turns out to be more rhetorical than substantial. First, the court in *Scholle* was willing to assume that properly functioning computer equipment was used.<sup>80</sup> Second, its apparent demand for a more comprehensive foundation should not be confused with the pre-Rules opinions that required a higher standard for admissibility. The court in *Scholle* considered any evidentiary shortcoming in developing the foundation for admission of printouts from a computer retrieval system to go to the weight to be given the evidence rather than to its admissibility.<sup>81</sup>

The breadth of agreement between the circuits is much wider than the split. First, both circuits agree, despite Rule 104(a), that the question of trustworthiness should not be treated as a preliminary question

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76. *Vela*, 673 F.2d at 90.

77. *Id.* at 88.

78. 624 F.2d 659, 665 (5th Cir. 1980). Although a more recent opinion, *Capital Marine Supply, Inc. v. M/V Roland Thomas II*, 719 F.2d 104 (5th Cir. 1983), affirmed a lower court's qualification of computerized business records on a more comprehensive foundation, it redefined the *Rosenberg* standard.

*Rosenberg* is also cited by *State Office Sys., Inc. v. Olievetti Corp.*, 762 F.2d 843, 845 (10th Cir. 1985); *United States v. Croft*, 750 F.2d 1354, 1364 (7th Cir. 1984); and *Pacific Serv. Stations Co. v. Mobil Oil Corp.*, 689 F.2d 1055, 1061 (Temp. Emer. Ct. App. 1982). All three opinions refer to *Rosenberg* as authority for the proposition that computerized records are treated under Rule 803(6) just like manually kept records and that admissibility is ultimately within the trial court's discretion.

79. 553 F.2d 1109, 1125 (8th Cir.), *cert. denied*, 434 U.S. 940 (1977).

80. *Scholle*, 553 F.2d at 1125.

81. *Id.*

of fact to be determined by the judge,<sup>82</sup> but instead should be treated as a component of probative value to be weighed by the jury. Second, they agree that for purposes of Rule 803(6), computer printouts qualify on the same basis as any other business record.<sup>83</sup>

The area of disagreement, if any, has shifted to the domain of probative value. Given the broad power of federal judges to comment on the evidence, a proponent in the Eighth Circuit who offers no more than the standard business record foundation takes the risk that a judge might comment unfavorably to a jury. In a nonjury trial, the risk changes, since a judge might discount substantially the probative value of a computerized business record. Still, the computer printout's appearance and its aura of reliability remain a powerful counterweight for the proponent; potential sources of error are not immediately apparent to a trier of fact or to an objecting party. Further, with no burden of proving reliability, the offering party need not present any witness to cross-examine or any evidence to rebut. Finally, the objecting party often faces great difficulty and expense in discovery and in hiring experts to investigate the system's reliability. The balance tips even more to the proponent's favor in the common context of an individual defendant's confronting a large firm or government agency—or both, as in the *Vela* prosecution.

The shift of the disagreement between the circuits to the domain of probative value can be described as a pragmatic movement to resolve the dilemma raised by the doctrinal confrontation of necessity and reliability—as a reconciliation between the two pre-Rules lines of cases that reflect that dilemma. In particular, the need for computerized business records is served by their easy admissibility, while the issue of system reliability can be joined before the jury under the rubric of probative value. Certainly the trial process calls for pragmatic solutions. Has this one worked?

First, the courts' mechanical application of the business records exception to computer data shifts the burden of raising and proving systemic unreliability to the opponent, despite the proponent's superior ability to offer evidence. Second, the issue of reliability (that is, lack of trustworthiness) does not affect admissibility, but only probative value, although Rule 803(6)'s caveat suggests that it should. Although the weight of the evidence is certainly a significant concern, the objecting

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82. The trial judge has discretion in letting the jury hear evidence on preliminary questions of fact. See, e.g., *MCCORMICK*, *supra* note 12, at § 53; see FED. R. EVID. 104(c) & advisory committee's note.

83. For a comparison of different approaches to qualifying computer printouts specially prepared for trial, see the majority and dissenting opinions in *Perma Research & Dev. v. Singer*, 542 F.2d 111 (2d Cir.), *cert. denied*, 429 U.S. 987 (1976). Courts turn to FED. R. EVID. 901(b)(9) only for special reports or analysis underlying expert testimony.

party faces an extremely difficult and expensive task, especially in light of judges' views of computer systems as particularly reliable, their broad discretion in evidentiary matters, and the proponent's disincentive to call witnesses open to cross-examination and to offer evidence susceptible to rebuttal. A comparison of practices sanctioned by the courts and those recommended in the authoritative *Manual for Complex Litigation (Manual)* corroborates the view that current court interpretation of the Rules has generated unfair process and undesirable consequences.

### C. Manual for Complex Litigation: *An Alternative Practice*

Produced under the auspices of the statutorily created Federal Judicial Center, the *Manual* offers analysis and recommendations to foster "fair, firm, and efficient judicial control of litigation."<sup>84</sup> Although originally intended for multidistrict litigation, the *Manual* suggests procedures to accomplish the "speedy" and "just disposition" of complex litigation.<sup>85</sup>

In a section entitled "Proof of Facts in Complex Cases," the *Manual* makes six recommendations to bridge the growing "gap between the competence of the juror, the bench, and the bar, on the one hand, and the competence of the persons and machines employed by business and science to ascertain facts and draw conclusions, on the other."<sup>86</sup>

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84. MANUAL, *supra* note 14, at iv.

85. *Id.* at vii.

86. *Id.* § 2.71, at 110; *see also id.* § 3.50 (similar recommendation regarding admission of computer runs for later point in the pretrial process).

The *Manual's* six recommendations are as follows:

2.711 First Recommendation. Voluminous or complicated data of an admissible character should, whenever possible, be presented through written or oral summaries, tabulations, charts, graphs, or extracts. The underlying data, together with the proposed exhibits or summary testimony, should be made available to opposing counsel well in advance of the time they are to be offered, to permit all objections to be raised and if possible resolved prior to the offer. Underlying data should be placed in evidence in the ordinary case.

2.712 Second Recommendation. Scientifically designed samples and polls, meeting the tests of necessity and trustworthiness, are useful adjuncts to conventional methods of proof and may contribute materially to shortening the trial of the complex case.

2.713 Third Recommendation. The underlying data, method of interpretation employed, and conclusions reached in polls and samples should be made available to the opposing party far in advance of trial, and, if possible, prior to the taking of the poll or sample.

2.714 Fourth Recommendation. When computer-maintained records and computer analyses of raw data are valuable sources of evidence, their use and admissibility should be promoted and facilitated. Computer inputs and outputs, the underlying data, and the program method employed should be made available to the opposing party in advance of trial as a condition of admissibility.

2.715 Fifth Recommendation. Discovery requests relating to the computer

The fundamental concerns motivating these recommendations are fairness to the party opposing computerized evidence and encouragement of the introduction of admissible computer evidence.<sup>87</sup>

The *Manual's* interpretation of Rule 803(6) follows its sixth recommendation:

Federal Rule of Evidence 803(6), the business records exception to the hearsay rule, treats computer data on the same basis as other business records. However, the Rule *allows* the court to consider the special characteristics of computer records in determining whether to admit them. This recommendation is therefore intended to provide specific guidance for the court's application of Rule 803(6).<sup>88</sup>

Thus, the *Manual* stakes out a middle ground between the current court position that all business records should simply be qualified on the same foundation and the Rule 104(a)-inspired position that the judge must consider the special characteristics of computer records.<sup>89</sup> The *Manual's* recommendation is offered to guide the court in the proper exercise of its *discretionary* power to determine trustworthiness.

and its programs, inputs, and outputs should be processed using methods consistent with the approach used in discovery of other types of information.

2.716 Sixth Recommendation. Computer-maintained records kept in the regular course of business and printouts prepared especially for litigation should be admitted if the courts finds that reliable computer equipment and techniques have been used and that the material is of probative value. The court should therefore require, well in advance of trial, that (a) the offering party demonstrate that the input procedures conform to the standard practice of persons engaged in the business or profession of the party or person from whom the printout is obtained; (b) in the case of a printout prepared especially for trial, the offering party demonstrate that the person from whom the printout is obtained relied on the data base in making a business or professional judgment within a reasonably short period of time before producing the printout sought to be introduced; (c) the offering party provide expert testimony that the processing program reliably and accurately processes the data in the data base; and (d) the opposing party be given the opportunity to depose the offeror's witness and to engage a witness of its own to evaluate the processing procedure.

*Id.* §§ 2.711-716.

The *Manual*, *Second* discussed the issues addressed by the six recommendations and the pertinent commentary in two paragraphs and two textual notes. MANUAL, SECOND, *supra* note 15, § 21.446, at 60-62 & nn. 80-81; see *infra* notes 88 & 90.

87. See, e.g., MANUAL, *supra* note 14, at § 2.714.

88. *Id.* § 2.716, at 122 (footnote omitted) (emphasis added); see MANUAL, SECOND, *supra* note 15, § 21.446, at 61 n.80. Immediately following footnote 80's reference to Rule 803(6) and discussion of the business record exception's application to computer data, footnote 81 makes an explicit reference to Rule 901(b)(9) and the authentication requirement. *Id.* at 61 n.81. See *infra* notes 112-24 and accompanying text for discussion of the authentication requirement.

89. It is not surprising that the *Manual* describes the judge's power as discretionary because, after all, its authors are judges. Still, the *Manual's* middle position makes better sense than the court's inattention to the distinctions between computerized business records and traditional leatherbound shop books.

What does the *Manual* envision as the proper practice of establishing the trustworthiness of a computerized business record? It proposes a four-step process.<sup>90</sup> The proponent should offer proof that (1) the document is a business record;<sup>91</sup> (2) the document has probative value; (3) the computer equipment used is reliable; and (4) reliable data processing techniques were applied. Clearly, this recommendation is at odds with the decisions of the Fifth and the Eighth Circuits. The Fifth Circuit requires no proof of the third and fourth criteria,<sup>92</sup> while the Eighth Circuit's demand for comprehensive proof has no teeth—a proponent's failure to comply with its demand is not adequate grounds for reversing the trial court's acceptance of the records.<sup>93</sup>

In addition to recommending a more comprehensive foundation, the *Manual* encourages the judge to take a strong position regarding pretrial discovery of computerized documents.<sup>94</sup> The fourth recommendation warns that “[c]omputer inputs and outputs, the underlying data, and the program method employed should be made available to the opposing party in advance of trial as a *condition of admissibility*.”<sup>95</sup> Further, the offering party should provide expert testimony that the processing programs reliably and accurately process the information in the business record database.<sup>96</sup> To emphasize that it remains the proponent's task to qualify computerized business records, the *Manual* maintains that “no procedure should be adopted if it would in effect place the burden of disproving admissibility on the opposing party.”<sup>97</sup>

The *Manual*'s purpose is to guide judges in requiring proponents to offer evidence of computer system reliability. In sharp contrast to the courts' interpretation of Rule 803(6) as calling for an inference of reliability from day-to-day business reliance, the *Manual* considers inadequate the circumstantial trustworthiness derived from computer data's status as business records. Moreover, the *Manual*'s mandate for open discovery of computer-related documents does not imply a shift of the proponent's burden of proof; rather, it provides the objecting party with further assurance of a fair opportunity to rebut the comprehensive

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90. MANUAL, *supra* note 14, at § 2.716; *see infra* note 99. The four-step process combines the business-records and authentication requirements.

91. For a description of this step, *see supra* text accompanying note 32.

92. *See supra* text accompanying notes 75-83.

93. *See supra* notes 79-81 and accompanying text. The *Manual* mistakenly cites *Scholle* as authority for a more stringent standard of qualification. *See* MANUAL, *supra* note 14, § 2.716, at 121 n.302.

94. MANUAL, *supra* note 14, at § 2.71 (first, third, fourth, fifth, and sixth recommendations); *see* MANUAL, SECOND, *supra* note 15, § 21.446, at 59.

95. MANUAL, *supra* note 14, § 2.714, at 117 (emphasis added).

96. *Id.* § 2.716, at 121 (sixth recommendation, part (c)).

97. *Id.* § 2.713, at 117 (commentary after third recommendation).

foundation required of the proponent.<sup>98</sup>

#### IV. Two Arguments for Adopting the *MANUAL'S* PRACTICE IN ALL CASES

The courts' current interpretation of Rule 803(6) is open to serious question, not only because of the unfair burden it imposes on opposing parties, but also because it is less plausible than an alternative reading of the Rule that supports the *Manual's* recommendations.<sup>99</sup> The alternative reading's connection between Rule 803(b) and Rule 901(b)(9) makes good sense because treating the Rule 803(6) caveat about trustworthiness as a preliminary question of fact both diminishes unfairness to the objecting party and increases the quantity and quality of admitted evidence. Accordingly, the better practice (that is, the one in tune with our fundamental commitment to trial on the merits) requires the proponent to offer evidence of the computer system's reliability in order to qualify a computerized business record.

The next two sections develop two different rationales in support of a more comprehensive foundation for computerized business records. The first section examines the legislative history of the Rules and clarifies the relationship between the business records exception and the Rules dealing with authentication of documentary evidence.<sup>100</sup> The second section investigates computer system reliability. Both sections conclude that requiring a comprehensive foundation, as suggested by the *Manual*, makes sense—sense that is founded in statutory interpretation and in the practical limitations of complex technology.

##### A. AN INTERPRETIVIST ARGUMENT: THE PROPER READING OF THE RULES

1. *An Alternative Reading of Rule 803(6).*—The Rules separate hearsay exceptions into two categories. Under Rule 804, certain out-of-court statements are not excluded as hearsay if the declarant is unavailable as a witness.<sup>101</sup> On the other hand, business records, public records, and other out-of-court statements enumerated in Rule 803 are not excluded as hearsay, regardless of the declarant's availability.<sup>102</sup> The generally accepted interpretation of this categorization holds that

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98. Ideally, much of this can be handled prior to trial. See generally *id.* §§ 2.71-716.

99. The *Manual* does not mention any sort of close reading of the Rules. This alternative reading already has been suggested in the earlier explication of Rule 803(6)'s "unless" caveat and its relationship to Rule 104(a) preliminary questions of fact. See *supra* notes 62-72 and accompanying text.

100. See FED. R. EVID. 803(6), 901, 902; see also FED. R. CIV. P. 44.

101. FED. R. EVID. 804(b).

102. FED. R. EVID. 803.

Rule 803 documents—business records, for example—are imbued with so much circumstantial trustworthiness that cross-examination of the declarant would be superfluous. Given the courts' unflinching reliance upon business reliance on records, it is not surprising that they admit relevant business records into evidence rather routinely.

The Advisory Committee's Note to Rule 803 describes the traditional policy underlying admission of hearsay: "[U]nder appropriate circumstances a hearsay statement may possess circumstantial guarantees of trustworthiness sufficient to justify non-production of the declarant in person at the trial, even though he may be available."<sup>103</sup>

Circumstances must guarantee a high degree of trustworthiness to justify nonproduction of a declarant, given our trust in the institution of cross-examination. Other legislative history supports the courts' view that business records represent an "appropriate circumstance" that meets that high standard of trustworthiness. The Advisory Committee makes specific reference to the unusual reliability of business records.<sup>104</sup> Furthermore, the House Committee Report describes insertion of the word "business" into the Rule 803(6) language of "regularly conducted activity" as motivated by the Committee's desire to assure a high standard of circumstantial trustworthiness.<sup>105</sup> In short, the equation of business records and circumstantial trustworthiness is corroborated by the legislative history.<sup>106</sup>

But another interpretation of the legislative history makes good sense as well. Both the Rule and the commentary can also be read as *demanding* strong evidence of reliability to justify nonproduction of the declarant and thus to qualify a computerized business record, rather than as *categorically presuming* circumstantial trustworthiness. We already have seen that the Rule's caveat about lack of trustworthiness raises the issue of proving reliability.<sup>107</sup> Moreover, the Advisory Committee's excerpted statement that "appropriate" circumstances "may"

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103. FED. R. EVID. 803 advisory committee's note. The first proposed Rule 8-03 provided as follows: "A statement is not excluded by the hearsay rule if its nature and the special circumstances under which it was made offer assurances of accuracy not likely to be enhanced by calling the declarant as witness, even though he is available." *Proposed Rules of Evidence for the United States District Courts and Magistrates, Rule 8-03*, 46 F.R.D. 161, 345 (1969).

104. FED. R. EVID. 803(b) advisory committee's note.

105. H.R. NO. 650, *supra* note 31, at 14. Did the Joint Committee's broad definition of "business" essentially cancel the anticipated increase in trustworthiness? Cf. H.R. No. 1597, *supra* note 31, at 3. It appears that the net change, if any, is the House Report's statement of concern and its possible effect on interpretation of the Rule.

106. For an interesting jurisprudential analysis of legislative intent as the problematic control mechanism for interpretivism, see Tushnet, *Following the Rules Laid Down: A Critique of Interpretivism and Neutral Principles*, 96 HARV. L. REV. 781 (1983).

107. See *supra* text accompanying notes 62-72.



justify nonproduction of the declarant raises the issue whether *all* business records present equally appropriate circumstances.

Apparently, the Advisory Committee views the qualification process as a flexible one. No hearsay is conclusively trustworthy; under appropriate circumstances, any hearsay may be trustworthy. Yet the Rule states explicitly that business records "are not" excluded as hearsay and that any form of data compilations can constitute a business record.<sup>108</sup> Nonetheless, the degree of circumstantial trustworthiness must be great enough to deny the trier of fact its litmus test of credibility—the chemistry between witness and opposing counsel that separates truth from falsehood, certainty from surmise—whether or not the declarant is available. Given the high degree of trustworthiness demanded, the flexibility recommended, and the differences in familiarity and complexity between leatherbound shop books and computerized data processing, serious questions are raised regarding the appropriateness of presuming circumstantial trustworthiness of computerized records. Perhaps the *Manual's* recommendations concerning proof of computer system reliability should apply in all cases, whether or not considered complex. Extending the *Manual's* recommended practice makes good sense, not only because of the high standard of circumstantial trustworthiness needed to measure up to a declarant's testimony about system reliability and subsequent subjection to cross-examination, but also because such circumstances, even if proved, are not intended as a mechanical guarantee of qualification. Rather, the Advisory Committee states that they "may" (or may not) be adequate to replace live testimony. This reading of legislative intent, again in conjunction with the Rule's caveat regarding lack of trustworthiness, calls upon the court to require proof of computer system reliability. Furthermore, the trial court's responsibility to make an independent judgment is consistent with the overarching philosophy of flexibility intended to guide interpretation of the Rules' hearsay exceptions. Just as the Rules call upon the court to admit hearsay evidence that is trustworthy, though not within the contours of an enumerated exception,<sup>109</sup> so too do they reject a mechanical jurisprudence that would admit any evidence meeting the formal criteria of an enumerated exception.<sup>110</sup>

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108. FED. R. EVID. 803 ("The following are not excluded by the hearsay rule, even though the declarant is available as a witness: . . . (6) Records of a Regularly Conducted Activity . . .").

109. FED. R. EVID. 803(24).

110. See *United States v. American Cyanamid Co.*, 427 F. Supp. 859 (S.D.N.Y. 1977) (holding that Rule 102 allows court to expand Rule 803(24) beyond exceptional cases); FED. R. EVID. 102. The trend of relaxing requirements is intended to decrease the need for producing witnesses, not to diminish the contours of an adequate foundation. FED. R. EVID. 803(6) advisory committee's note. *McCormick* comments on "the failure to adjust

The purpose of the foregoing analysis is not to prove in some rigorous sense (even if that were possible) that this alternative reading of Rule 803(6) is the only reasonable one, but rather to demonstrate that a more comprehensive foundation requirement like the practice recommended in the *Manual* is a permissible inference from the Rules and their legislative history. On those grounds, the following sections develop further support for this reading by reviving the doctrine of authentication and by closely reading of Rules 901 and 902. Notwithstanding the courts' current limitation of the technical doctrine of authentication to computer-generated documents specially prepared for trial, Rule 901(b)(9) and its legislative history offer convincing support for the *Manual's* more demanding interpretation of the proponent's burden of qualifying computerized business records.<sup>111</sup>

2. *The Doctrine of Authentication.*—The traditional purpose of document authentication is to establish that the document is what it purports to be, in order to prove a relationship between the document and an individual—often the opponent to admission.<sup>112</sup> One common example of authentication is proving the relationship between a promissory note and the debtor by authenticating the debtor's signature. Another example is establishing the relationship between a computer-generated monthly summary of account activity and the customer summarized.<sup>113</sup> Still another example is establishing the relationship between a state government's computer-generated listing of a taxpayer's liability and the taxpayer.<sup>114</sup> The relevancy of a writing to an issue raised in litigation often will be logically dependent on the existence of some such relationship.<sup>115</sup> For example, if the signature on a promissory note is forged, then the note is not authentic and, as a consequence, not relevant to the issue of a promise to pay a sum certain. This atti-

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the rules of admissibility more flexibly and realistically to these variations in the reliability of hearsay." MCCORMICK, *supra* note 12, § 245, at 728-29. For a discussion of the need for flexibility, see Loevinger, *Facts, Evidence and Legal Proof*, 9 W. RES. L. REV. 154, 165 (1958) ("[T]here can be little utility in a class which is so broad as to include the prattling of a child and the mouthings of a drunk, the encyclical of a pope, a learned treatise, an encyclopedia article, a newspaper report, an unverified rumor from anonymous sources, an affidavit by a responsible citizen, a street corner remark, the judgment of a court."), cited in MCCORMICK, *supra* note 12, § 245, at 729 n.22. On the subject of mechanical jurisprudence, see Cohen, *Transcendental Nonsense and the Functional Approach*, 35 COLUM. L. REV. 809 (1935); Pound, *Mechanical Jurisprudence*, 8 COLUM. L. REV. 605 (1908).

111. The *MANUAL*, *supra* note 14, makes no reference to Rule 901. *But see* *MANUAL*, *SECOND*, *supra* note 15, § 21.446, at 61 n.81.

112. *See* MCCORMICK, *supra* note 12, § 218, at 684-86.

113. *See, e.g.*, *Ford Motor Credit Co. v. Swarens*, 447 S.W.2d 53 (Ky. 1969).

114. *See, e.g.*, *Ed Guth Realty, Inc. v. Gingold*, 34 N.Y.2d 440, 315 N.E.2d 441, 358 N.Y.S.2d 367 (1974) (admitting state tax records under business records statute).

115. MCCORMICK, *supra* note 12, § 218, at 686; *cf.* FED. R. EVID. 401 (relevancy).

tude of judicial agnosticism toward authorship has been justified as a check on the perpetration of fraud.<sup>116</sup>

Most commentators, however, see the requirement of authentication as time-consuming, expensive, and ineffective.<sup>117</sup> They offer two reasons for asserting that authentication should not be required.<sup>118</sup> First, the overwhelming majority of writings are genuine. Second, the opponent to admission is in the best position to demonstrate that the purported connection of a writing to her is attributable to fraud or mistake.<sup>119</sup> Given these conditions, it is reasonable to require the opponent to carry the burden of proving inauthenticity. But do these rationales apply as well to computerized business records as they do to promissory notes? First, most purported business records probably are business records. But computer printouts and the information constituting business records are chronologically, physically, and computationally distant from one another. There is no genuine business record in the sense that there is a genuine note or contract. Thus, the judge, jury, and counsel face a different and unfamiliar task in assessing the authenticity of a computer printout. Second, with computerized data, the opponent to admission is not in the best position to demonstrate very much about the proponent's system, especially the production of inauthentic documents. The traditional rationales for eliminating authentication do not make good sense with unsigned and unscrivened documents such as computer printouts of business records.

With respect to business records in general, *McCormick* states that a witness whose testimony is offered as foundation for authentication need testify only that "the offered writing is actually part of the records of the business."<sup>120</sup> But if the offered document is a computer printout, *McCormick* takes an intermediate position: the proponent should be required to prove that the printout accurately reflects what is in the computer.<sup>121</sup> Although this intermediate position is a step in the right direction because it recognizes the complexity and time lag inherent in producing the printout,<sup>122</sup> that very recognition belies this treatment. In short, how can we presume that "what is in the computer" is itself reliable? The procedure for getting the information into the computer

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116. MCCORMICK, *supra* note 12, § 218, at 687. *But see* articles by Sprowl and Dehetre, *supra* note 38 (limits of computer audits).

117. *See, e.g.*, MCCORMICK, *supra* note 12, § 218, at 687, § 228, at 701 n.10 (citing Broun, *Authentication and Contents of Writings*, 1969 LAW & SOC. ORDER 611; Strong, *Liberalizing the Authentication of Private Writings*, 52 CORNELL L.Q. 284 (1967)).

118. *See, e.g.*, MCCORMICK, *supra* note 12, § 228, at 701.

119. Strong, *supra* note 117, at 291.

120. MCCORMICK, *supra* note 12, § 214, at 688.

121. *Id.* § 314, at 885 n.6 (interpreting Rule 901(b)(9)).

122. For example, the printout may have been produced years after the original transaction.

in order to create a printout is open to the same sort of questions. Inputting, processing, storing, shifting, copying, re-storing, and recalling the original business record information<sup>123</sup> from, to, and among various magnetic tape and disc media, and during numerous trips through the central processing unit and main memory registers dramatically increase the probability of error. If the risk of information change, whether the result of fraud or the consequence of error, is great enough during the production of a printout to merit authentication, then the greater risks attendant to the complex and prolonged process of constructing "what is in the computer" call even more convincingly for document authentication.<sup>124</sup>

3. *Court Interpretation of Rules 901 and 902.*—Despite significant questions regarding the reliability of any computer printout of business record information, courts have trivialized the authentication requirement under Rule 901. Courts have required proponents only to offer testimony that the offered printouts are business records,<sup>125</sup> unless the printout reflects a compilation or analysis specially prepared for trial, in which case the proponent is required to prove that the system or process has produced an accurate result.<sup>126</sup> The general consequence of this distinction is that computer-generated (specialized) reports<sup>127</sup> or studies are more difficult to qualify than computer-stored business records.<sup>128</sup>

It is not clear, however, that the basic distinction between special and habitual production of reports has much to say about reliability. Although regularly kept records may be trustworthy because of the habitual nature of the recordkeeping and reliance, specially prepared reports probably get special attention from those personnel considered the most reliable and knowledgeable.<sup>129</sup> Further, as the *Manual* points out, computer processing frequently is not an electronic version of double-entry bookkeeping. Rather, many computer systems do not re-

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123. The presumption is that the procedure for recording information before the inputting stage meets the formal criteria of the business records exception.

124. See *MANUAL*, *supra* note 14, at § 2.716.

125. See, e.g., *United States v. Vela*, 673 F.2d 86 (5th Cir. 1982).

126. See *Perma Research & Dev. v. Singer Co.*, 542 F.2d 111, 125 (2d Cir.) (Van Graafeiland, J., dissenting), *cert. denied*, 429 U.S. 987 (1976).

127. Regarding the foundation for summaries, see *FED. R. EVID.* 1006.

128. Cf. Bronstein & Engleberg, *A Preliminary Assessment of the Reception of Computer Evidence: Report of the Computer Evidence Survey Project*, 21 *JURIMETRICS J.* 329 (1981). But the information in all printouts is both computer-generated and -stored.

129. Opinion does differ over the question whether specialized reports are more (or less) prone to error. Compare *Perma Research & Dev. v. Singer Co.*, 542 F.2d 111, 125 (2d Cir.) (Graafeiland, J., dissenting) (more likely), *cert. denied*, 429 U.S. 987 (1976) with *MANUAL*, *supra* note 14, at § 2.716 (4th ed. 1977) (less likely).

quire an entry for each individual transaction in a chain of transactions. They maintain only the current balance of an account, and they eliminate any trace of the intermediate transactions that led to the current balance.<sup>130</sup> Moreover, by increasing the quantity and changing the character of data, computerized processing raises special concerns regarding care in collection and recordation not associated with the more limited records traditionally kept by businesses.<sup>131</sup> The most recent prior edition of the *Manual* articulated its skepticism even more forcefully: while computerized business records might be less acceptable in particular ways than handwritten books of account,<sup>132</sup> computerization of statistical analysis, summarization, and other data manipulation can enhance the probative value of the evidence, due to the computer's superior ability to handle large quantities of data and to perform errorless mathematical computations, once the programs are properly tested.<sup>133</sup> The *Manual's* position is at odds with the courts' presumptive confidence in business records and presumptive skepticism regarding specialized reports. Instead, the *Manual* counsels faith in programs that are properly tested, whether the records produced are general or special purpose.

Even if it is conceded that the Rules call for some distinction between special and habitual reports, the courts seem to be making the wrong one. Rule 902 states that extrinsic evidence of authenticity as a condition precedent to admissibility is not required only with respect to ten enumerated categories of documents, including, for example, certified copies of public records and acknowledged documents like wills.<sup>134</sup> This itemization does not include computerized business records.<sup>135</sup> Nonetheless, courts seem to treat computerized records as if they were self-authenticating documents.<sup>136</sup>

Rule 901 deals with authentication as a condition precedent to admissibility. Since business records are not self-authenticating under

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130. MANUAL, *supra* note 14, at § 2.716.

131. *Id.*

132. *Id.* § 2.716 (4th ed. 1977).

133. *Id.* § 2.717. The change in the *Manual's* language between the third and fourth editions may be a step toward the current court practice of liberal admissibility of computerized business records. On the other hand, it simply may reflect experience with the uneven quality of data analysis done specially for trial.

134. FED. R. EVID. 902(4), 902(8); *cf.* FED. R. CIV. P. 44.

135. FED. R. EVID. 902 states that "[e]xtrinsic evidence of authenticity as a condition precedent to admissibility is not required with respect to the following . . . ." An itemized list of ten categories follows. *See id.* The argument of exclusivity is based on the hoary interpretational canon of *expressio unius* and seems to make sense here.

136. *See, e.g.,* United States v. Vela, 673 F.2d 86 (5th Cir. 1982). McCormick states that authentication "merely duplicates Rule 803(6)." MCCORMICK, *supra* note 12, § 314, at 885 n.6.

Rule 902, a proponent of business records should be required to produce evidence sufficient to support a finding that the records are what the proponent claims.<sup>137</sup> In other words, a *prima facie* case must be made that the offered document reflects business record information accurately entered, stored, processed, and retrieved from the proponent's computer system. Rule 901 presents ten examples to illustrate its authentication requirement. One of the examples of authentication is "[e]vidence describing a process or system used to produce a result and showing that the process or system produces an accurate result."<sup>138</sup> It is this illustration, under Rule 901(b)(9), that the courts apply to printouts which represent the results of opinion polls,<sup>139</sup> models and simulations, and other types of special reports.<sup>140</sup>

In contrast to this treatment of special reports, courts require the proponent of computerized business records simply to identify the printout as (a copy of) business records.<sup>141</sup> This practice, if not viewed as a questionable extension of Rule 902 and self-authentication, might be described as authentication under either the Rule 901(b)(1) example of testimony of a witness with knowledge or the Rule 901(b)(9) example, whose commentary states that a court may take judicial notice of the accuracy of a system or process.<sup>142</sup> Both approaches to authenticating computerized business records are founded in questionable readings of Rule 901, which provide only a weak basis for the courts' current shorthand treatment of authentication.

First, the kind of testimony contemplated under Rule 901(b)(1) makes no sense with regard to computer system functions, because a human being can offer, at best, only circumstantial evidence of a computer's proper processing of any piece of information. This example anticipates *eyewitness* testimony of, for example, a document signing or

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137. FED. R. EVID. 901(a).

138. FED. R. EVID. 901(b)(9).

139. *See, e.g.,* Zippo Mfg. Co. v. Rogers Imports, Inc., 216 F. Supp. 670, 680-86 (S.D.N.Y. 1963).

140. The doctrine of authentication applies regardless whether the process or system involves computerization. *See also* FED. R. EVID. 703 (proper basis for expert testimony); *cf.* MANUAL, *supra* note 14, at §§ 2.711-716.

141. MCCORMICK, *supra* note 12, § 314, at 885 & n.6. This is a mistaken conflation of the authentication and best-evidence requirements. *See also* ROTHSTEIN, *supra* note 70, at 450 (Aug. 1983 release). Rothstein directs the student from his Rule 901(b)(9) Practice Comment (authentication of computer records) to his Rule 1001 Practice Comment (best-evidence issue regarding summaries), and from there on to Rule 703 (which allows expert opinion on sources not admitted into evidence, if normally relied upon by such experts). Rothstein conflates the first two rules and then, as he says, end-runs them—by satisfying them through the expert's testimony. *See id.* This practice is unlikely to succeed if the court or opposing counsel is adequately informed.

142. I say "might be" because the courts have not cited specific paragraphs. *See, e.g.,* United States v. Vela, 673 F.2d 86 (5th Cir. 1982).

narcotics chain of custody.<sup>143</sup> But no person can offer firsthand knowledge of computer data processing. Perhaps a system operator can testify that the computer log indicates that a given program ran at a particular time without any error messages. But the log itself is hearsay and raises serious questions regarding trustworthiness. The log could have been altered without any external indication; or data could have been altered without a log entry; or a program could have been changed or even run without a log entry. Indeed, any of these events could have happened without the operator's suspicion of any extraordinary occurrence. At best, testimony reiterating a computer log simply offers a new form of circumstantial evidence of facts not susceptible to observation—technologically produced hearsay.<sup>144</sup> In sum, if testimony is taken under Rule 901(b)(1), it should not be confused with traditional eyewitness authentication of a signature or chain of custody.

Under Rule 901(b)(9), a court may take judicial notice of the accuracy of a system or process.<sup>145</sup> But taking notice of a process' accuracy does not mean taking notice of a particular result as accurate. In other words, courts may take judicial notice only of the scientific principles that justify the evidentiary use of scientifically accepted processes like computers, radar, and handwriting identification.<sup>146</sup> For example, although notice routinely is taken of the general reliability of radar to establish automobile speed, the prosecution still must prove the accuracy of any given reading.<sup>147</sup> In similar fashion, although a court properly takes notice of the scientific and engineering principles underlying computerized data processing, a particular result generated by a given data processing system is not a proper subject for judicial notice. Any particular printout offered as evidence must be authenticated as the accurate result of a system or process.<sup>148</sup>

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143. FED. R. EVID. 901(b)(1) advisory committee's note.

144. See also FED. R. EVID. 602 (requiring personal knowledge); FED. R. EVID. 703 (basis for expert opinion).

145. FED. R. EVID. 901(b)(9) advisory committee's note.

146. See FED. R. EVID. 201; MCCORMICK, *supra* note 12, at § 330. Judicial notice generally requires the introduction of evidence through testimony. See, e.g., ROTHSTEIN, *supra* note 70, at 37 (Aug. 1985 release).

147. The proof ordinarily includes the operator's training, as well as the device's maintenance and testing record. See, e.g., MCCORMICK, *supra* note 12, § 330, at 925 n.15.

148. An offer of a particular printout also raises issues under the best evidence rule. The best evidence rule is a rule of preference. With respect to documentary evidence, it calls for the best evidence available. If the original is available, then it must be produced. FED. R. EVID. 1002. If not, then its unavailability must be explained and an accurate copy is admissible. See FED. R. EVID. 1003. If records are voluminous, then a summary is admissible, as long as the underlying data are made available to the opposing party. FED. R. EVID. 1006. A printout is never an original record in the sense that a cash register receipt or ledger entry is original. It is a copy produced some time—days or years—after the transaction occurred. Given the observation that computerized systems of business re-

Current court treatment of computerized business records does not accord with the purport of Rules 901 and 902. Neither self-authentication, eyewitness testimony, nor judicial notice represents an appropriate way of establishing system reliability. Rather, systemic accuracy should be authenticated under Rule 901(b)(9).

4. *The Proper Relationship Between Rules 803(6) and 901(b)(9).*—Perhaps the courts' current trivialization of the authentication requirement can be seen as making sense under a rationale that the Rules allow courts to infer reliability from reliance—that qualifying a record under the business records exception is intended to obviate the need to prove the accuracy of the system or process that produced the record. In considering whether that rationale describes the proper relationship between Rules 803(6) and 901(b)(9), at least four relationships are possible in the abstract. One pair of possibilities is based on the interpretational assumption that complying with both rules would, in effect, be proving the same issue twice. In particular, meeting the qualification requirements of either rule automatically meets the requirements of the other rule as well. The second pair of possibilities is based on the interpretational assumption that the two rules are independent of one another: that is, either both rules apply to computerized business records and both their requirements must be met, or only the hearsay exception applies and authentication is therefore immaterial.

The courts' current practice of inferring reliability from reliance appears to be consistent with the premise behind the first pair of possible relationships. Indeed, several cases assert that comprehensive authentication of a computer system's printouts of business records would be redundant because it would force the proponent to prove trustworthiness twice.<sup>149</sup> These opinions maintain that making a *prima facie* case under Rule 803(6) satisfies Rule 901 as well.<sup>150</sup> In contrast, Colin Tapper in his article on computer evidence infers precisely the converse relationship from the same premise. He suggests that because the proponent's burden might be lighter under Rule 901(b)(9) than under Rule 803(6), it makes sense to allow the proponent to establish computerized

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cordkeeping do not save original records and given the belief that current copying technology—whether photocopying or computer magnetic storage media—is accurate, the Federal Rules treat printouts as originals, though they inexplicably treat magnetic tape or disc copies as copies. See FED. R. EVD. 1001(3), (4). This makes little sense, because any printout is usually created from data stored on magnetic tapes or discs. See generally FED. R. EVID. 1001-1008.

149. See, e.g., *United States v. Vela*, 673 F.2d 86, 90 (5th Cir. 1982); *Perma Research & Dev. v. Singer Co.*, 542 F.2d 111, 125 (2d Cir.) (Van Graafeiland, J., dissenting), *cert. denied*, 429 U.S. 987 (1976). See generally MCCORMICK, *supra* note 12, at 885 n.6.

150. See, e.g., *United States v. Vela*, 673 F.2d 86, 90 (5th Cir. 1982).



business records' trustworthiness under the lighter proof standard.<sup>151</sup> Tapper bases his strategy on the premise that both rules share the same purport—that authentication and business record status represent parallel paths to establishing trustworthiness. Tapper believes that offering evidence of system reliability satisfies the hearsay rule's concern for circumstantial trustworthiness.

Although both the courts' and Tapper's versions of rule commutation are equally reasonable, neither version responds to the questions and concerns about fairness and proper rule construction posed in earlier sections.<sup>152</sup> In particular, neither version takes adequate account of the power of the aura of admissibility granted computerized business records, the extreme difficulty and expense of an opponent's burden of simply investigating a computer system's reliability, the Rule 104(a) imposition of a burden on the proponent regarding preliminary questions of fact, or the Rule 803(6) proviso regarding trustworthiness. Moreover, Rule 803 and its Advisory Committee's Notes explicitly call for independent foundation requirements. Rule 803 states that enumerated categories of hearsay are "not excluded"; it does not state that they are "admitted" into evidence. The Notes clarify this semantic distinction by explaining that the exceptions listed in Rule 803(b) "are phrased in terms of nonapplication of the hearsay rule, rather than in positive terms of admissibility."<sup>153</sup> For example, if the document is a copy, then the rules regarding copies and the best-evidence requirement are not automatically satisfied by establishing that the document is a business record.<sup>154</sup> But the uncertainty is not easily resolved: although Rule 803(6) and the Advisory Committee's Notes would seem to favor treating Rules 803 and 901 as independent hurdles, there remains an alternative construction of the rules that might justify the courts' position.

Current court practice also can be described as falling under the second interpretational assumption—the proposition that qualifying a document under Rule 803(6) does not absolve the proponent from meeting other admissibility requirements. The argument is simply stated: Not all rules apply to all evidence. For example, not all computer printouts are summaries; if a printout is not a summary, it need not meet the foundation elements enunciated in Rule 1006. In similar fashion, the courts' current practice is consistent with the notion that although the rules have independent requirements, Rule 901(b)(9) does not apply to all computer printouts offered as evidence. A court might assert that Rule 901(b)(9) is intended to apply only to those documents

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151. Tapper, *supra* note 37, at 579.

152. See *supra* text accompanying notes 16-21 & 67-72.

153. FED. R. EVID. 803 advisory committee's note.

154. See FED. R. EVID. 1001-1006 (rules governing best evidence and summaries); see also 28 U.S.C. § 1732 (Supp. 1984) (alternative best evidence rule for business records).

that require proof of accuracy. Printouts of business records, whose reliability already is presumed from business reliance, simply do not fit under this rule, just as they do not fit under the rule regarding summaries. Only special reports of polls, econometric studies, or other kinds of analysis that are not regularly performed and relied upon merit the time, expense, and detailed scrutiny contemplated by Rule 901(b)(9). Does this construction of the Rules, carved out of the general structure of rule independence, make better sense than the construction based on rule commutation?

The construction founded in rule commutation is, as has already been suggested, inconsistent with the explicit language of Rule 803(6) and its Advisory Committee's Note.<sup>155</sup> It turns out that the construction intended to avoid the general mandate for rule independence also fails. If based on the premise that Rule 901(b)(9) represents an exception to the general mandate, the courts' practice of not requiring proponents of computerized business records to comply with the Rule stems from a misguided interpretation that overlooks two prominent signposts pointing to the proper reading. First, the Advisory Committee's Note strongly suggests that Rule 901(b)(9) was intended to apply to business records. The Advisory Committee's Note refers to three cases, all of which resolved admissibility questions about computerized business records. No other cases are cited.<sup>156</sup> Second, giving both Rule 803(6) and Rule 901(b)(9) substantive content comports more closely with the treatment of other complex hearsay problems in the Rules—particularly the rule regarding hearsay within hearsay.<sup>157</sup> Both of these signposts point toward a reading of the Rules that would require a more comprehensive foundation for computerized business records, similar to the *Manual's* recommended practice.

The Advisory Committee's Note includes citations to three state court opinions that outline proper practices for qualifying computer data as business records.<sup>158</sup> One of the opinions, *Transport Indemnity Co. v. Seib*,<sup>159</sup> approvingly refers to the 141 pages of trial transcript de-

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155. See *supra* notes 101-11 and accompanying text.

156. See FED. R. EVID. 901(b)(9) advisory committee's note. Can it be argued, on the basis of the cases cited in the Advisory Committee's Note, that Rule 901(b)(9) applies only to business record cases? That reading would disregard the Advisory Committee's Note citation to several articles that deal with a wider range of issues than just computerized business records. See *id.*

157. See FED. R. EVID. 805.

158. FED. R. EVID. 901(b)(9) advisory committee's note. It is curious that the *Manual*, written by federal judges for federal judges, refers only to state court cases. No pre-Rules federal court opinions are cited. Perhaps that silence marks the depth of the split between those two lines of federal court opinions.

159. 178 Neb. 253, 132 N.W.2d 871 (1965).

voted to proving computer system reliability.<sup>160</sup> *Seib* is juxtaposed with two brief opinions, both of which rely simply on the circumstantial trustworthiness of business records.<sup>161</sup> This trio of opinions recalls the pre-Rules split among both state and federal judges and reflects the dilemma between need and reliability<sup>162</sup> that animated those two lines of cases. The fact that all three opinions cited deal with computerized business records suggests that the Advisory Committee intended Rule 901(b)(9) to apply to such offers of evidence.

Although the Advisory Committee's Notes do not offer a resolution of the cases' disparate treatment of computer records—either 141 pages or no pages of trial transcript testimony—they nonetheless call for the Rule's application to computerized business records. Furthermore, the treatment of other complex hearsay problems under the Rules—particularly hearsay within hearsay—suggests that independent proof of systemic reliability reflects the proper construction of Rule 901(b)(9). In short, the business records exception in combination with system authentication should comprise the two components of a comprehensive foundation for computerized business records.

The analogy of computerized business records to hearsay within hearsay is worth examining at some length. Rule 805 states that “[h]earsay included within hearsay is not excluded under the hearsay rule if each part of the combined statements conforms with an exception to the hearsay rule provided in these rules.”<sup>163</sup> In other words, both the inclusive and the included statements must conform with some hearsay exception. Generally, the process involves a two-stage inquiry. First, does the inclusive statement qualify under some hearsay exception? If it does, then the court proceeds to the next stage. If the included statement is offered to prove the truth of the matter stated, then the included statement must also qualify under a hearsay exception.<sup>164</sup> A familiar example of hearsay within hearsay is the police officer who testifies that *X* informed him that *Y* confessed to *X* that *Y* committed the crime for which *Y* is being tried. Since both the statements by *X* and *Y* are hearsay, both statements must qualify under some exception to the hearsay rule. While the confession of *Y* qualifies as an admission

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160. *Id.* at 257, 132 N.W.2d at 874.

161. *Merrick v. United States Rubber Co.*, 7 Ariz. App. 433, 435-36, 440 P.2d 314, 316-17 (1968); *State v. Veres*, 7 Ariz. App. 117, 125-26, 436 P.2d 629, 637-38 (1968), *cert. denied*, 393 U.S. 1014 (1969).

162. *See supra* text accompanying notes 35-38.

163. FED. R. EVID. 805.

164. FED. R. EVID. 805 advisory committee's note; *see MCCORMICK, supra* note 12, § 324.3, at 911.

by a party-opponent,<sup>165</sup> the informant's statement does not fall under any exception.<sup>166</sup> Thus, the officer is not permitted to testify about either statement.

A printout offered into evidence can be described in similar terms. The data processing director *D* testifies that program *X* was written to read the business records<sup>167</sup> in files *Y*<sub>1</sub> through *Y*<sub>10</sub>, to perform some specified analysis, and then to write the result to file *Z*<sub>1</sub>; program *A* was written to read file *Z*<sub>1</sub> and certain other files (*Z*<sub>2</sub>, *Z*<sub>3</sub>, and sometimes *Z*<sub>n</sub>), to rearrange the information, and then to pass some of it on to other programs that perform other functions, including program *P*, which prints out selected items of information on printout *E*. Some of these programs were run over a period of several weeks after the transactions in question, while others were run the day before the witness' testimony, which is some years after the transaction. Clearly, questions are raised about program and equipment changes and testing, data and program security, system maintenance and reliability, and personnel training and turnover. In short, should we trust the statements passed between files and programs (created and run by data processing personnel *X* and *Y*) over a period of years simply because, somewhere along the line, some version of the information was a business record? Does *D*'s testimony addressing only the business records exception seem adequate here? Clearly not. Like the hearsay within hearsay question, computerized processing adds another level of questionable trustworthiness to already questionable hearsay—business records. Accordingly, separate attention to systemic reliability is called for. Rule 901(b)(9) offers an appropriate framework for that separate treatment.

*Zippo Manufacturing Co. v. Rogers Import, Inc.*,<sup>168</sup> an unfair-competition case, presents an example of qualifying hearsay within hearsay that is even closer to the question of authenticating computerized business records. *Zippo* involved a consumer survey that was intended to show product confusion. The survey report was qualified as a business record; the included hearsay—the interviewees' answers—was qualified under the state of mind exception.<sup>169</sup> Despite meeting the court's formal requirements, however, the report's status as a business record was problematic, since such polls often are undertaken in contemplation of litigation. Nonetheless, an interesting and enduring insight emerges from Judge Feinberg's elegant admissibility analysis, which was con-

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165. See FED. R. EVID. 801(d) (admission by party-opponent excluded from the traditional category of hearsay).

166. MCCORMICK, *supra* note 12, at § 324.3.

167. The hypothetical makes the simplifying assumption that the initial documents qualify as business records.

168. 216 F. Supp. 670 (S.D.N.Y. 1963).

169. *Id.* at 682-83. The state of mind exception is now codified as FED. R. EVID. 803(3).

cerned more with the techniques employed in the survey than with the business record status of the report. Indeed, the Advisory Committee's Notes approvingly reflect Judge Feinberg's analysis: "Attention is directed to the validity of the techniques employed rather than to relatively fruitless inquiries whether hearsay is involved."<sup>170</sup>

As with the previous discussion of two-tiered hearsay, Judge Feinberg's analysis suggests that computerized business records call for scrutiny beyond a simplistic business records analysis. The formal category of "business record" ultimately presents a picture that is both too partial and too vague, a picture that forces inquiry into an unfamiliar and complex process whose unavoidable potential for failure properly calls for proof of system reliability.<sup>171</sup> Moreover, the court may not properly notice unproved particulars, even if the institutional resources were available. Judicial notice is intended to apply only to general scientific and engineering principles underlying computer technology or to generally accepted principles of statistical analysis, but not to specified output from particular systems or particular polls.<sup>172</sup>

Finally, when courts have entertained the possibility of admitting hearsay that does not seem to fit under an enumerated exception, they have taken a number of factors into consideration, including the time lapse between the event and the hearsay statement offered.<sup>173</sup> With a printout of computerized business records, the typical time period between the recording of the transaction, subsequent computations and changes, storage and copying, and retrieval and printing is several years.<sup>174</sup> In short, both the complexity of modern data processing and the significant time lapses between the transaction and subsequent processing mean that computerized business records present complex hearsay problems that, like the multiple levels of hearsay within hearsay, call for independent and substantial Rule 901(b)(9) authentication.

To summarize, a proper reading of the Rules demands the kind of comprehensive foundation recommended by the *Manual*. Two aspects of computerization should be recognized as affecting the circumstantial trustworthiness of business records: not only the technological and procedural complexity, but also the extended time lapses between the original transaction, subsequent processing, and ultimate printout create significant risks of error.<sup>175</sup> Accordingly, the current practice of simply

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170. FED. R. EVID. 703 advisory committee's note.

171. See *infra* text accompanying notes 176-213.

172. See *supra* text accompanying note 148.

173. See FED. R. EVID. 803(24); see also MCCORMICK, *supra* note 12, § 324.1, at 908 n.11 and cases therein.

174. The relative reliability of the system is also open to question. See *supra* text accompanying notes 129-33.

175. For a discussion of such risks of error, see *infra* text accompanying notes 176-213.

qualifying a printout of computer-maintained business data under the business records exception does not attain the high degree of trustworthiness contemplated under the Rules. In light of this demand for trustworthiness, the courts' current trivialization of authentication appears mistaken.

Current judicial practice proves even more problematic when assessed under Rules 901 and 902, because self-authentication, eyewitness testimony, and judicial notice are all inappropriate. Moreover, because the Rules explicitly maintain that each rule's particular qualification requirements are independent of all others, meeting the business record standard under Rule 803(6) does not absolve the proponent from authenticating the system under Rule 901(b)(9). The propriety of that practice is corroborated not only by the Advisory Committee's Note for Rule 901(b)(9), which refers only to opinions dealing with computerized business records, but also by treatment of other complex hearsay problems, particularly Rule 805 qualification of hearsay within hearsay.

#### B. AN ASSESSMENT OF EXPERIENCE: THE LIMITS OF COMPUTER RELIABILITY

Another kind of analysis, an assessment of experience, also calls upon the courts to scrutinize computerized business records more closely. Trial judges should require a more comprehensive foundation, not only because the current practice is both unfair to the party opposing admission and inconsistent with a proper reading of the Rules, but also because it takes inadequate account of the practical limitations of complex technology. This section focuses on four limits of computer system reliability: System security, user expertise, industry marketing practices, and the process of conversion.<sup>176</sup> Although all four subjects (and others) can limit the reliability of any computer system, system security and user expertise are discussed within the context of small systems—personal computers—while marketing practices and conversion problems are analyzed within the context of large systems. The categorization scheme not only allows these problems to be discussed in their most commonly occurring environment, but also permits analysis of two major forms of data processing technology.<sup>177</sup>

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176. By conversion, I mean changing (that is, converting) programs and data to render them functional in another hardware or software environment.

177. Although a number of commentators use schemes like hardware/software or human/machine error to identify errors, these distinctions are not very useful because of the overlap between hardware and software, and because programming, operation, manufacture, and design are all ultimately done by humans or according to models designed by humans.

1. *Small Computers: System Security and User Expertise.*—When I worked as a systems engineer for RCA some fifteen years ago, my responsibilities included supervision of a customer's computer, then considered medium-sized, which filled a 1400-square foot, air-conditioned room in the basement of a high-rise office building. For a monthly rental charge of approximately \$7500, the customer had unlimited use of a central processing unit with 256K of main memory, four tape drives, four disc drives, two printers, DOS software, and me. Today, a more powerful system can fit on a desktop and can be purchased for significantly less than the \$7,500 RCA charged for one month's rent. The substantial decreases in computer system size and price, particularly within the last five years, have created new system security problems and have expanded the customer population to include smaller and less knowledgeable users.<sup>178</sup> As a result, today's newer technology raises questions of reliability different from those of its predecessors.

With physically large computer systems, thousands of square feet must be specially prepared,<sup>179</sup> environmentally controlled,<sup>180</sup> and dedicated to housing computer hardware and supplies. In addition, offices, conference rooms, and common work areas for operations, programming, and systems support personnel typically are nearby.<sup>181</sup> Magnetic tape archives house years of historical information. Simply the size of such data processing operations, still common but no longer universal today, requires a firm to organize and control access to system components and workspace areas.

Although such environments continue to suffer security problems despite the availability of inexpensive safeguards and the passage of federal criminal legislation,<sup>182</sup> personal computers (PCs) present even

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178. I do not talk about the middle category—minicomputers. In many respects, they combine both the strengths and weaknesses of mainframes and personal computers (PCs). In 1977, a minicomputer was defined as a complete, general-purpose computing system whose processing unit and main memory (ROM) cost no more than \$25,000. D. BENDER, *COMPUTER LAW* 1-13 (1977). Similar systems sell today as PCs for less than 10% of that price ceiling.

179. Large computer systems, for example, may require false floors to run cables, electrical circuits with voltage fluctuation control, and power-outage protection.

180. Temperature, humidity, dust, and magnetic field forces must all be controlled.

181. But access between such areas typically is controlled, because both functional and physical separation are recommended as security measures.

182. See Counterfeit Access Device and Computer Fraud and Abuse Act of 1984, 18 U.S.C. § 1030 (Supp. 1985). See generally A. BEQUAI, *COMPUTER CRIME* (1978); Taber, *A Survey of Computer Crime Studies*, 2 *COMPUTER L.J.* 275 (1980).

Although passwords or other codes would seem to make a significant difference, they usually are ineffective in deterring unauthorized access to computer systems. The many reasons include a password's typical longevity, its careless handling by users, its vulnerability to interception over communications (telephone) links, and its frequent accessibility in a system dictionary of passwords. One-time passwords offer a far superior alternative,

greater problems. Three developments contribute to the increased difficulty of controlling access to business records stored, maintained, or accessible by personal computer. First, physical access is easier because PCs often occupy desktops in common areas or in clerical or secretarial workspace. As a result, both the PCs and the data, often kept on cassette tapes or (floppy) discs at deskside, are more susceptible to unauthorized change, extraordinary access, or environmental effects.

Second, because PCs are easily tied into several varieties of complex networks, system security is no longer an internal problem. Although the best-known instance of unauthorized access is the "Milwaukee 14" case of high schoolers' entry into sensitive medical and restricted governmental databases, precipitating FBI confiscations, "hackers'" testimony before congressional committees, and federal crime legislation,<sup>183</sup> less spectacular and less visible intrusions occur regularly. Indeed, many businesses neither publicize nor report many instances of unauthorized access.<sup>184</sup> Whether a PC is connected to another PC, to a database hundreds of feet or hundreds of miles away, or to a large computer system, whether directly or by telephone, networking means that security procedures are more difficult to define and control, that access is more difficult to record or limit, and that accountability has less institutional force than with large systems. As a result, data are less reliable. These circumstances raise even greater concerns when parties join issue over the information maintained by such systems. Unlike the scrivined entries of traditional shop books, changes or errors in computerized business records are not conspicuous, and unlike large computer systems, with limited physical access, PCs linked to networks or databases are subject to complex and remote security problems.

The third development that has exacerbated the problem of system insecurity is "canned" software—that is, prewritten, mass-marketed programs that perform functions like inventory control, maintaining accounts payable and receivable, or even word processing, without requiring any sort of computer expertise. Because the operation of such programs is widely known or easily learned, few barriers must be over-

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but are uncommon. See, e.g., Wong, *One-Time Passwords Fortify System Security*, COMPUTERWORLD, Dec. 23, 1985, at 31.

183. See, e.g., Kleiman, *Hospital in City Reports Computer Tampering*, N.Y. Times, Aug. 19, 1983, at 1, col. 2; Treaster, *Trial and Error by Intruders Led to Entry into Computers*, N.Y. Times, Aug. 23, 1983, at 1, col. 5.

184. One estimate is that only 1% of computer crimes are even detected. *The Federal Computer Systems Protection Act: Hearings on § 1766 Before the Subcomm. on Criminal Laws and Procedures of the Judiciary*, 95th Cong., 2d Sess. 4 (1978) (statement of Senator Biden) (estimate attributed to Professor August Bequai of American University Law School).



come to access PCs and databases. In combination, easy physical access, the proliferation of computer networks, and mass-marketed software raise serious and unanswered questions about computer system security, and thus about the trustworthiness of information, including business records, maintained on small computer systems.

The burgeoning cottage industry of producing "canned" software is an expected entrepreneurial response as well as an attraction to smaller and less knowledgeable customers, who can now computerize their information management functions at very low cost. That affordability is even greater due to the PC's declining purchase price and the minimal amount of investment required for workspace, supplies, and skilled personnel. PCs and canned software can obviate the need for experienced computer operators, programmers, and systems analysts. Running a computer has become very much like driving an automobile with automatic transmission: just a few simple steps and you're on your way. You don't have to be an auto mechanic until something goes awry, but then you'd better know a good one.

The developing market in PCs invites reliance and creates a knowledge gap, an increasing disparity between user and supplier that has detrimental effects on computer system reliability. The user is less likely to recognize certain kinds of error<sup>185</sup> and less capable of doing anything to rectify conditions causing recognized errors. The first response to an error is to try the software again. If reruns result in the same error, a supplier's advice or intervention is sought. Certainly this course of conduct is a reasonable one. But unlike the typical transaction between the owner of a large system and one supplier, the PC purchase resembles a consumer transaction. Retailers and distributors stand between the users and the producers. Further, the hardware and software suppliers are more commonly independent parties. Who does the user contact for assistance—the retailer across town, the hardware supplier in California, or the software company in Massachusetts? Not only are two of the parties contacted in the form of faceless long distance calls, but all three parties stand in adversarial positions when something has gone wrong: each knowledgeably and somewhat convincingly explains why one of the others must be contacted to solve the problem.<sup>186</sup> Even if the problem is eventually solved or patched for fu-

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185. For example, a less knowledgeable user might not recognize transient errors—that is, random errors caused by marginal hardware. He might think that the error was his own and simply try again. The current effects of transient errors on data and the ever-increasing risk of catastrophic failure might not be appreciated.

186. For a highly unusual circumstance—recovery against the manufacturer after settlement with the software vendor—see *Convoy Co. v. Sperry Rand Corp.*, 672 F.2d 781 (9th Cir. 1982).

ture use, significant time has passed, and data accuracy probably has suffered in the interim.

Should proponents of computerized business records be required to offer evidence of system reliability, of procedures to protect data during unavoidable system errors, whether attributed to hardware, software, or more directly to human beings? The question is not whether errors will occur, but rather what has been done to minimize their impact. With small systems, lower levels of user sophistication in combination with the increased complexity of system security may well have an effect on system reliability and data accuracy, and therefore call for close scrutiny of business records so maintained or accessed. Courts should demand more comprehensive foundations for their admissibility.

2. *Large Systems: Marketing Practices and the Process of Conversion.*—Most of us are less familiar with the workings of large computer systems but more cognizant of their susceptibility to fraudulent manipulation or to unintended error. The Equity Funding case has become synonymous with computer fraud on a grand scale.<sup>187</sup> More recently, the tale of the Internal Revenue Service tape portrays the staggering consequences of a computer's inability to read one record.<sup>188</sup> Because a magnetic tape had faulty coding on its first record—its label or identifier—the IRS National Computer Center system could not process it. Although the National Center requested a replacement tape from its Philadelphia regional processing center, none was forthcoming. Moreover, after an IRS computer expert attempted to create a new label (a simple task), the tape still would not run. According to IRS Commissioner Roscoe Egger, the new tape probably would not run because some data were lost in the relabelling process.<sup>189</sup> Consequently, payment information regarding 26,000 taxpayers and \$300 million was not posted for over three months. No one intervened in the computerized procedure, which sent notices to the 26,000 taxpayers, and IRS personnel were less than cooperative, when available, in responding to inquiries and attempts to offer corroborating evidence of payment in order to cut short the agency process of dealing with delinquent taxpayers.<sup>190</sup>

In his testimony at a hearing of the House Ways and Means Committee's Subcommittee on (IRS) Oversight, Commissioner Egger also mentioned in passing that IRS employees' preoccupation with the Service Center Replacement Program contributed indirectly to the inci-

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187. See *supra* note 4.

188. Numerous articles have appeared. See, e.g., *COMPUTERWORLD*, Mar. 18, 1985, at 15; *Philadelphia Inquirer*, Apr. 30, 1985, at 1, col. 5.

189. *COMPUTERWORLD*, Mar. 18, 1985, at 15.

190. *Philadelphia Inquirer*, Apr. 30, 1985, at 1, col. 5. Bell Atlantic diverted millions of calls in order to avoid gridlocking the regional telephone circuits.

dent.<sup>191</sup> In other words, data processing personnel were so absorbed in the massive project of replacing the center's hardware and software that they spent little time and energy on the system's day-to-day processing. Although that might seem a weak excuse to anyone who has never participated in a system conversion, it brings back images of working all night, sleeping on cots, and weeks of fast food to those of us who have converted or installed computer systems.<sup>192</sup> In short, the typical conversion scenario could be mistaken for finals week after a semester of studied neglect. Even if the IRS Replacement Program includes no new software applications, much time and effort are nonetheless necessary. Because the project includes hardware replacement, current software and data probably require substantial conversion in order to run properly on the new equipment.

To conclude this brief investigation into four practical limitations of computer technology, this subsection looks at the problem of conversion and at the marketing practices that sometimes precipitate replacement of large systems. The context for this analysis derives from a sampling of recently reported cases and from my representation of the plaintiff in a prolonged and sometimes bitter lawsuit claiming that a major computer manufacturer made misrepresentations in order to induce the plaintiff to enter into an agreement to lease computer equipment, software, and support services.<sup>193</sup>

The Government Employees Credit Union (GECU), the largest employee credit union in Texas, computerized its operation in the mid-1960s with the installation of a Univac system. As its customer base grew, GECU expanded its data processing capabilities by adding equipment and later by upgrading to larger and newer Univac computer systems. In early 1975, Univac convinced GECU to convert its operations to Univac's most powerful operating system.<sup>194</sup> Announced shortly

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191. COMPUTERWORLD, Mar. 18, 1985, at 15.

192. That statement derives from my personal experience and from statements of other systems analysts some 15 years ago. Apparently, the experience today has not changed appreciably. See *infra* text accompanying notes 210-13.

193. Of counsel to the plaintiff in *Government Employees Credit Union v. Sperry Rand Corp.*, No. SA-78-260 (W.D. Tex.) (settled by agreement of the parties on July 1, 1982). All facts in this Article pertaining to the foregoing lawsuit derive from conversations with GECU employees and representatives, GECU documents, Univac marketing and other materials in the public domain, and my familiarity with the computer industry. No facts derive from documents produced by Univac or depositions of Univac employees or representatives.

194. The operating system was intended for Univac's mid-sized mainframe computers. By operating system, I mean software that controls the execution of applications programs such as inventory control, payroll, or word processing. A traffic cop of sorts, an operating system may also provide scheduling, debugging, input/output control, accounting, compilation, storage assignment, and related services. See AMERICAN NATIONAL DICTIONARY FOR INFORMATION PROCESSING (Am. Nat'l Stands. Inst. 1977).

before the decision to convert, the software for the operating system was based on the concept of "virtual resources" first developed in the mid-1960s by RCA and IBM.<sup>195</sup>

Univac's announcement was not a surprise to those familiar with the industry because Univac had acquired RCA's customer base, including a significant number of virtual resource operating system customers, and some research and development assets in 1972. Thus, in 1975, in its glossy marketing literature and its proposal to GECU, Univac represented its "new" operating system as an "old" product, proven and customer-tested since the late 1960s—that is, as the already developed and tested RCA system. What was really new, Univac announced, was its more powerful and more sophisticated hardware. The combination of proven software and better hardware seemed to be a good strategy for maximizing output from limited (that is, expensive) physical resources.

In practice, the strategy was an abysmal failure, not only with GECU, but also with two customers who filed lawsuits against Univac in Michigan and California, as well as other customers who replaced their Univac systems. For anyone familiar with the trends in hardware design at that time, the cause of the failure was clear. Because Univac's new hardware was different from the older RCA equipment, the RCA software simply would not work without some revision. Significant portions of the software must have been revised and were actually new software—even newer than the equipment it was written to control.

Marketing practices like those of Univac have not been unusual in the computer industry. When I was a professional systems engineer, selling "futures" was an unspoken industry practice, particularly regarding software. In other words, software was often written shortly before or even after its sale, though it was sometimes represented as already completed and tested. Perhaps the classic case of selling futures

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195. Virtual resources software allows computer users to design and run programs whose requirements exceed the system's physical capabilities. For example, programs that ordinarily would require 128K of memory can perform their tasks in 64K, if that is what is available. Thus, two 128K programs can run at the same time, even though each of them typically would require the computer's entire memory. Moreover, user personnel need do nothing to accomplish this doubling of system capability. The operating system allows the user to process data as if memory were virtually limitless, by partitioning programs into smaller segments and loading into memory only those segments currently needed. Other segments are stored on very fast disc drives until needed. In similar fashion, two programs, each of which requires a printer, can run simultaneously, even though the system has only one printer, because the operating system creates a "virtual printer." That is, it diverts one program's output to a disc file until the other program has concluded, and the printer is available. Although such swapping is less cost-effective now that memory is so cheap, many PCs, particularly those using CP/M software, have the capability and use it to the extent necessary.

is *United States v. Wegematic Corp.*<sup>196</sup> During precontractual negotiations, Wegematic promised a revolutionary system.<sup>197</sup> When the necessary technological breakthroughs were not made, it attempted to back out of the agreement based on a claim of impossibility.<sup>198</sup> The court rightfully found that Wegematic assumed the risk of its representations.<sup>199</sup> That attitude of "best efforts" always being good enough, whether or not successful, however, is common fare in the computer industry.<sup>200</sup>

A number of reported opinions involving Burroughs Corporation address similar practices. In *Beaver Insurance Co. v. Burroughs Corp.*,<sup>201</sup> for example, the jury found that Burroughs deliberately had overstated the capabilities of its B800 machine. Moreover, it was alleged that Burroughs knew about serious internal memory problems, but delivered and installed the machine anyway. During the first several months of operation, the machine was inoperative roughly forty percent of the time. The jury awarded Beaver Insurance \$783,500 in damages.<sup>202</sup>

Several suits have been brought against NCR based on similar claims. In *Glovatorium, Inc. v. NCR*,<sup>203</sup> the plaintiff purchased a computer that ran so slowly that some calculations could be done more quickly by hand. Not only was NCR aware of system defects and limitations, but Glovatorium proved that NCR performed sales demonstrations on systems covertly enhanced to run faster than the models being marketed and sold.<sup>204</sup> Although the court rightfully found intentional misrepresentation, NCR certainly was working on the problems reported, and from their point of view, they were selling "futures." They

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196. 360 F.2d 674 (2d Cir. 1966).

197. *Id.* at 674-75.

198. *Id.* at 675.

199. *Id.* at 676-77.

200. See *F & M Schaefer Corp. v. Electronic Data Sys. Corp.*, 430 F. Supp. 988 (S.D.N.Y. 1977) (action for breach of contract based on poor equipment performance), *aff'd*, 614 F.2d 1286 (2d Cir. 1979), *cert. denied*, 449 U.S. 829 (1980); *IBM v. Catamore Enters., Inc.* 548 F.2d 1065 (1st Cir. 1976) (customer filed counterclaim against IBM for failure to complete and deliver merchandise control system), *cert. denied*, 431 U.S. 960 (1977); *Sanitary Linen Servs. v. Alexander Proudfoot Co.*, 304 F. Supp. 339 (S.D. Fla. 1969) (promising and failing to supply a "workable system" with substantial savings), *aff'd*, 435 F.2d 292 (5th Cir. 1970).

201. *COMPUTERWORLD*, Mar. 4, 1985, at 1 (N.D. Cal. Feb. 22, 1985); see also *Iten Leasing Co. v. Burroughs Corp.*, 684 F.2d 573 (8th Cir. 1982); *Earman Oil Co. v. Burroughs Corp.*, 625 F.2d 1291 (5th Cir. 1980).

202. *COMPUTERWORLD*, Mar. 4, 1985 at 1 (N.D. Cal. Feb. 22, 1985).

203. 684 F.2d 658 (9th Cir. 1982); see also *Chatlos Sys., Inc. v. NCR*, 479 F. Supp. 738 (D.N.J. 1979), *aff'd in part and remanded in part*, 635 F.2d 1081 (3d Cir. 1980), *cert. denied*, 457 U.S. 1112 (1982). For a bibliography of litigation, see Walker, *Computer Litigation and the Manufacturer's Defenses against Fraud*, 3 *COMPUTER L.J.* 427 (1982).

204. *Glovatorium*, 684 F.2d at 660-62.

anticipated that the system problems would be resolved.<sup>205</sup>

Similarly, in *Dunn Appraisal v. Honeywell Information Systems*,<sup>206</sup> Honeywell was found liable for fraudulent misrepresentation during its initial Cleveland-area marketing of a new system. In response to a customer's concern about purchasing a new system that would require the conversion of 400 programs written to run on the system to be replaced, Honeywell representatives, eager to place the first new machine in northern Ohio, assured Dunn that Honeywell would convert all of the programs. When Honeywell presented the written sales agreement, Dunn questioned a provision stating that Honeywell would convert only 250 programs. The salespeople again assured Dunn employees that the provision was included only to satisfy Honeywell's front office and that all 400 programs would indeed be converted. With a signed contract in hand, Honeywell subsequently refused to convert the last 150 programs.<sup>207</sup> Moreover, the 250 programs converted turned out to be an "unmitigated disaster."<sup>208</sup> Dunn was awarded actual and punitive damages, as well as attorneys' fees.<sup>209</sup>

Although large-system users usually have in-house expertise, they still must rely on computer system suppliers for new product information and for conversion of their existing programs, in large part because the new technology is outside the experience of customer personnel.<sup>210</sup> The system users' reliance can lead to adverse consequences. In the *GECU* case, for example, Univac's conversion efforts were disastrous. Disc drives and tape drives suddenly would stop during processing. Such "silent deaths" often would necessitate the rebuilding of large data files, followed by reprocessing of programs that had been running for hours. The entire system sometimes would come to a halt when a printer cabinet was opened to change paper. One horrible month, the computer broke down seventy-two times; it never broke down less than once a day.<sup>211</sup> Even after Univac sent a special team of experts to solve program conversion and hardware installation problems, *GECU* person-

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205. See *id.* In *GECU*, Univac attempted to solve similar problems by installing, free of current charges, almost twice the amount of hardware originally recommended.

206. 687 F.2d 877 (6th Cir. 1982).

207. *Id.* at 879-80.

208. *Id.* at 879.

209. *Id.* at 881; see also *Clements Auto Co. v. Service Bureau Corp.* 444 F.2d 169 (8th Cir. 1971) (liability based on innocent misrepresentation); *Ford Motor Credit Co. v. Swarens*, 447 S.W.2d 53 (Ky. 1969) (negligent overreliance on computer); *Palmer v. Columbia Gas Co.*, 342 F. Supp. 241 (M.D. Ohio 1972), *aff'd*, 479 F.2d 153 (6th Cir. 1973), *modified by* *Turner v. Impala Motors, Inc.*, 503 F.2d 607 (6th Cir. 1974) (42 U.S.C. § 1983 claim based on computer-generated utility service termination).

210. See, e.g., *Strand v. Librascope, Inc.*, 197 F. Supp. 743, 753 (E.D. Mich. 1961).

211. The figure is based on monthly averaging. In other words, the system could have crashed twice on Monday but not on Tuesday.

nel worked long hours and weekends, slept on cots, and endured months of unprofessional treatment; some were even fired based on Univac personnel's complaints of incompetency.<sup>212</sup>

Although the tensions of prolonged system unreliability served to obfuscate the underlying pattern, 20-20 hindsight allows for clear recognition of the symptoms' common origin: the new Univac hardware and old RCA (or perhaps inadequately rewritten) software were incompatible in significant ways. Take for example the "silent deaths" of the disc drives. Most likely, some sort of error occurred in attempting to read or write information—not an uncommon event in the life of a magnetic disc or tape.<sup>213</sup> If the Univac hardware was designed and properly manufactured to recognize such error, it would pass an error message to the RCA (or inadequately rewritten) software. The ensuing silence was probably a language barrier: the message, written in Univac-ese, was not intelligible to software written to expect RCA-ese. The consequence was "silent death." GECU personnel, unfamiliar with the software's life cycle, could not be expected to recognize such problems. Apparently, Univac's people also did not recognize the problem or could not implement the appropriate changes.

The longrunning GECU conversion disaster can be traced in the following pattern of events. First, the computer system serves a large number of branch offices all over the state of Texas. Each branch has a teller terminal that communicates with the central system over telephone lines. These connections allow for immediate account information and updating. Under the old Univac system, data entry errors at the teller terminals were anticipated and did not disrupt overall system processing. Such errors should have been handled quickly and easily, because they were undoubtedly commonplace—for example, accidentally entering a letter into an all-numeric account number field. Usually, the system software is written to monitor such fields and upon recognizing a nonnumeric character, to request the terminal operator to resubmit the data item. Not only did the new system fail to perform such checks, but the entire system, including all teller terminals in the state, often crashed to a halt as a result of data entry errors. Since GECU's programs and the teller terminals had not changed, something in Univac's new system must have changed. Given Univac's expertise, it should have been able to convert GECU's programs or advise GECU's personnel on making appropriate changes. Instead, the problems persisted for over a year until the system was replaced.

As published opinions and periodicals attest, neither Univac's mar-

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212. The terminated employees were later rehired when GECU changed over to another manufacturer's system.

213. See *supra* text accompanying notes 188-92.

keting strategy nor GECU's disastrous conversion experience is an isolated occurrence. Large systems like GECU's, or like the IRS' monstrous computer facilities, regularly if not constantly produce unreliable results. In combination with system security problems and uneven levels of expertise, both large and small computer systems do not merit the presumption of reliability awarded under the Federal Rules of Evidence. Whether or not computer data fall under the category of business records, substantial questions of trustworthiness remain. Federal courts should require proponents of computerized business records to carry a burden of proving computer system reliability as part of the foundation for qualification.

### V. Conclusion

Reported cases as well as the limitations of computer technology advise against embracing the popular vision of computerized perfection. Even if the goal is perfectly reliable electronic repetition of uncomplicated bookkeeping tasks, its achievement is not automatic. Still, my emphasizing that fact should not be mistaken as calling for a shutdown of the nation's business practices. As the Tenth Circuit has stated, "[H]olding a company responsible for the actions of its computer does not exhibit a distaste for modern business practice. . . . A computer operates only in accordance with the information and directions supplied by its human programmers."<sup>214</sup>

In short, neither a naive faith in technology nor Luddite sentiments

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214. *State Farm Mutual Ins. Co. v. Bockhorst*, 453 F.2d 533 (10th Cir. 1972).

I do not take up in this Article any philosophy of science questions associated with the formal and mathematical presuppositions of computer system design and implementation. For example, here I mention only briefly the implications of Kurt Gödel's work. See, e.g., Davis, *What is Computation?*, in *MATHEMATICS TODAY* 261-69 (L.A. Steen ed. 1980); E. NAGEL & J.R. NEWMAN, *GÖDEL'S PROOF* (1958). See generally D. HOFSTADTER, *K. GÖDEL, ESCHER & BACH: AN ETERNAL GOLDEN BRAID* (1980).

Some sixty years ago, mathematician and logician Kurt Gödel published his Incompleteness Theorem, a demonstration of the necessary incompleteness of sound formal systems, a project whose importance the community of theoretical mathematicians and philosophers did not recognize for many years. Computers are designed and programmed as if Gödel had never exposed the distressing limitations of Bertrand Russell's neo-Platonic vision of mathematics as the only pure ideal for all of our less precise and thus less aesthetically pleasing practices—philosophy or law, for example. Russell's idealism crumbled under the weight of Gödel's Theorem. The world of numbers and sets turns out to be less than perfectly predictable. Even the purest abstraction cannot provide the vehicle for returning to a philosophical or empirical Eden—to the nominalist's Garden of stability and control. Yet most of us embrace science as having falsified Nietzsche's unnerving claim that final authority for any proposition is ultimately unavailable—that God is dead. Cf. Serres, *The Algebra of Literature: The Wolf's Game*, in *TEXTUAL STRATEGIES* 260 (J. Harari ed. 1979) (portraying western metaphysics as sets of ordering principles, derived from and serving the discourse of science). On a more practical level, computers cannot,



in favor of machine-breaking can underwrite the constructive changes needed. Thus, my interest is pragmatic. Computers provide an illusory basis for shortcircuiting traditional legal processes because they cannot be isolated from the people who build and run them. They simply cannot guarantee error-free processing. A realistic assessment of the limitations of computer technology reinforces this Article's ethical and statutory arguments, which call for the proponent to carry a more comprehensive burden to qualify computerized business records. In sum, not only our experience with computers, but also a strong sense of fairness and a close reading of the Federal Rules of Evidence call upon federal judges to require proof of computer system reliability.

Some years ago, Joseph Weizenbaum, a Professor of Computer Science at Massachusetts Institute of Technology, wrote ELIZA, a computer program capable of simulating a limited conversation with a human being through the medium of a video screen and keyboard. Written in one of the "Artificial Intelligence" programming languages, Weizenbaum's program analyzes a person's keyboard input to generate data for its next response. In a limited sense, ELIZA "learns" as the session proceeds. More specifically, the program was written to play the part of a Rogerian psychotherapist by treating the person's typed-in responses as if they were given in the context of psychotherapy.<sup>215</sup> A significant number of Weizenbaum's co-workers, practicing therapists, and others hailed the program as a breakthrough in lowering the cost, and thus the availability, of therapy. A concomitant of these rave reviews was the program's anthropomorphization. Weizenbaum's secretary, for example, who earlier had helped him enter the program instructions into the computer, asked him to leave the room when she "conversed" with the program. She wanted privacy for sessions with her "therapist."<sup>216</sup> Weizenbaum's deep distress at this course of events impelled him to write *Computer Power and Human Reason* to articulate his beliefs about the limitations of instrumental reason.<sup>217</sup>

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even in theory, fulfill our desires of technologized perfection. See Davis, *supra*. And that does not begin to consider our material and human frailties.

215. The therapy technique is nondirective; that is, the analyst's responses are open ended. Typical responses to "I am angry at my brother" would be "Why are you angry with your brother?," or "Your brother?," or simply "Oh, really?" J. WEIZENBAUM, *COMPUTER POWER AND HUMAN REASON* 3, 4 (1976).

216. *Id.* at 6, 7.

217. J. WEIZENBAUM, *supra* note 215; see also J. HABERMAS, *TOWARD A RATIONAL SOCIETY* 62-80 (1970) (describing the scientization of politics and public opinion). For an argument against Weizenbaum's position and in favor of the view that artificial intelligence research offers a pathway into the workings of the human mind, see M. BODEN, *ARTIFICIAL INTELLIGENCE AND NATURAL MAN* (1977); cf. D. HOFSTADTER, *supra* note 214. For arguments consistent with Weizenbaum's position, but founded in Gestalt psychology and phenomenological existentialism, see H. DREYFUS, *WHAT COMPUTERS CAN'T DO* (1979).

In short, Weizenbaum is as much concerned with our electronic self-images, reflections of ourselves as axonic circuitry, as he is with the startling humanization of ELIZA. We should not, he would agree, judge ourselves and all that we do based on computer technology as our ideal image. Human reason encompasses greater possibilities than the limited paths engineered and programmed through micrologic gates.<sup>218</sup> Moreover, to grant greater credibility to computerized records, as did the court in *Vela*, because they have not been touched by "the hand of man"<sup>219</sup> succumbs to two delusions. First, it is the hands and intellects of men and women that produce computers and the programs that guide them. To believe that the absence of direct physical contact means that records are untouched betrays a naive view of electronic data processing, one that ignores the centrality of humans to any computer system's functioning. Second, trustworthiness is equated with electronic processing and opposed to human reckoning. This troubling view of the computer as an ideal that human beings should emulate but cannot achieve not only exemplifies Weizenbaum's fear about imposing an electronic standard to judge the human condition, but also subordinates the human reason in traditional practices like in-court testimony and cross-examination. It ignores, for example, the great dangers of traceless change and unauthorized access, as well as the benefits of having the proponent present evidence to prove systemic accuracy.

Even if we can, do we really want to eliminate or subordinate "the hand of man"?<sup>220</sup> Having suggested that the possibility of somehow freeing complex technology from human intelligence and governance as both delusory and pernicious, I will conclude with a few remarks about the question of subordination, about the desire for technological governance.

Throughout law's intellectual history, scholars and jurists have sought methodological objectivity to justify legal decisionmaking.<sup>221</sup> Whether the nineteenth-century Formalists' belief in a deductive legal logic that guarantees consistent concrete results from general principles<sup>222</sup> or the contemporary Price Theorists' faith in a logic of efficiency,<sup>223</sup> legal writers have essayed theories purporting to bridle the

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218. J. WEIZENBAUM, *supra* note 215, at 9-16; *cf.* H. DREYFUS, *supra* note 217.

219. *United States v. Vela*, 673 F.2d 86, 90 (5th Cir. 1982).

220. For an analysis of similar sentiments underlying the law and economics movement, see Leff, *Economic Analysis of Law: Some Realism about Nominalism*, 60 VA. L. REV. 451, 459 (1974) (reviewing R. POSNER, *ECONOMIC ANALYSIS OF LAW* (2d ed. 1973)).

221. *See, e.g.*, Frug, *The Ideology of Bureaucracy in American Law*, 97 HARV. L. REV. 1277 (1984).

222. *See, e.g.*, O.W. HOLMES, *THE COMMON LAW* 5 (M. Howe ed. 1963) (the life of the law has not been logic).

223. For a critique within the context of antitrust law, see Peritz, *The Predicament of*

discretion of governmental intermediaries, whether judge, administrator, or police officer. The jurisprudential lure of computer technology is a perceived absence of discretion. Once designed, built, and programmed, the machinery objectively executes the will of its creators, and thus is perceived as trustworthy. But closer scrutiny reveals, at best, a paradox of complete submission and complete autonomy. A computer performs relentlessly just as we have designed and programmed it, and in so doing, it is entirely independent of us. Computerized records also are treated as trustworthy for a second reason—because the technology is perceived as error-free. Moreover, even on those exceptional occasions of technological failure, we believe, a computer will still inform us that an error has occurred. In sum, we have come to believe that unacknowledged error and subjectivity are not only undesirable, but also indigenous to the human domain.

But experience can teach us that such idealization of technology is a mirage that obfuscates the overlapping horizons of humans and computers, as well as their distinctive characteristics. In the human drama of litigation, better attention to the pragmatic jurisprudence of the Federal Rules of Evidence, as well as to the thoughtful practice recommended by the *Manual for Complex Litigation*, can help to dispel such harmful illusions. The concrete result of this attention will be the extension to the objecting party and to the court of a fair opportunity to evaluate the trustworthiness of all documents generated from computerized data.