

ON THE FEASIBILITY OF IMPROVING PATENT QUALITY ONE TECHNOLOGY AT A TIME: THE CASE OF BUSINESS METHODS

By John R. Allison[†] and Starling D. Hunter[‡]

TABLE OF CONTENTS

I. INTRODUCTION	730
II. RESEARCH METHODS AND DATA.....	739
A. OUR DATA SET.....	739
B. CATEGORIZATION OF PATENT AND NONPATENT PRIOR ART REFERENCES.....	741
III. ANALYTICAL METHODS.....	744
A. CONTROL VARIABLES	744
1. <i>Examiner experience effects</i>	744
2. <i>Foreign Inventor Effects</i>	745
B. STATISTICAL TECHNIQUES.....	746
IV. RESULTS.....	748
A. NUMBER OF U.S., FOREIGN, AND TOTAL NONPATENT PRIOR ART REFERENCES.....	748
B. NUMBER OF DIFFERENT TYPES OF NONPATENT PRIOR ART REFERENCES.....	751
V. AN ALTERNATE APPROACH.....	755
VI. EXAMINER-ADDED PRIOR ART	757

© 2006 John R. Allison and Starling D. Hunter

[†] Spence Centennial Professor of Business Administration, and Professor of Intellectual Property Law, McCombs School of Business and the College of Engineering, University of Texas at Austin. John.Allison@mcombs.utexas.edu.

[‡] Theodore T. Miller Career Development Assistant Professor, Sloan School of Management, Massachusetts Institute of Technology. starling@mit.edu.

The authors thank the participants at a National Bureau of Economic Research Workshop, Boston, MA, Sept. 26, 2004, and at the Southern Economics Association, New Orleans, LA, Nov. 22, 2004. In particular, we thank Iain Cockburn, Scott Stern, John Turner, Scott Kieff, and Mark Lemley for helpful comments on earlier drafts.

VII. UNDERINCLUSIVENESS, POST-SPER SHIFTS FROM MAIN 705, AND SOME UNANSWERED QUESTIONS.....	758
VIII. EXAMPLES OF BUSINESS METHOD PATENTS WITH SECONDARY 705 CLASSIFICATIONS AND NON-705 MAIN CLASSIFICATIONS.....	764
A. MAIN CLASS 235 (“REGISTERS”).....	768
B. MAIN CLASS 700 (“GENERIC CONTROL SYSTEMS OR SPECIFIC APPLICATIONS”).....	770
C. MAIN CLASS 707 (“DATA PROCESSING: DATABASE AND FILE MANAGEMENT OR DATA STRUCTURES”).....	774
D. MAIN CLASS 709 (“ELECTRICAL COMPUTERS AND DIGITAL PROCESSING SYSTEMS: MULTICOMPUTER DATA TRANSFERRING”).....	776
E. MAIN CLASS 713 (“ELECTRICAL COMPUTERS AND DIGITAL PROCESSING SYSTEMS: SUPPORT”).....	779
F. SOME OTHER MAIN CLASSIFICATIONS	782
G. SUMMARY OF FINDINGS FROM EXAMINING OTHER MAIN CLASSIFICATIONS WITH SUBSTANTIAL CONCENTRATIONS OF SECONDARY 705 PATENTS	784
IX. CONCLUSIONS.....	785
A. THE SPER INITIATIVE AND OUR EMPIRICAL FINDINGS ON ITS EFFECTS.....	785
B. THE SOUNDNESS OF TARGETING PATENT QUALITY REFORM AT SPECIFIC TECHNOLOGY AREAS.....	787
X. APPENDIX: EXAMPLES OF SOURCES OF NONPATENT PRIOR ART REFERENCES INCLUDED IN THE RANDOM SAMPLE OF 1,000 705 PATENTS.....	790

I. INTRODUCTION

In its 1998 *State Street Bank* decision, the U.S. Court of Appeals for the Federal Circuit held that business methods are eligible for patent protection.¹ The decision was quickly followed by a dramatic increase in the

1. *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1375-77 (Fed. Cir. 1998) (holding that there is no patentable subject matter exception for methods of doing business). The Federal Circuit actually concluded that there never had been a patentable subject matter exception for business methods despite much contrary conventional wisdom supported by dicta in several older cases. In *State Street*, the court explained that earlier decisions referring to such an exception were decided on other grounds. *Id.* at 1375-76. For a discussion of the widespread pre-*State Street* assumption among practicing patent attorneys that there was a patentable subject matter exception for business methods, and the absence of a basis for this assumption, see Rinaldo Del Gallo,

number of applications for and grants of business method patents.² During the ensuing two years, these patents received an unprecedented amount of criticism from academics, journalists, and politicians. The criticisms focused on both the policy of allowing patents on such subject matter and the perception that the business method patents issued were of uniquely inferior quality in comparison with patents in other fields.³ Two of the business method patents frequently cited by critics as being of questionable legitimacy were Amazon.com's patent on its "one-click" technique

III, *Are "Methods of Doing Business" Finally Out of Business as a Statutory Rejection?*, 38 IDEA 403 (1998).

No generally accepted definition of a "business method" exists and, indeed, the term is probably indefinable. Broadly speaking, a business method patent covers a business practice or technique. The circularity of this definition highlights the problem. The most obvious kinds of practices that fall within the common understanding of the term "business method" include those relating to advertising, shopping, sales, purchasing, financing, insurance, human resources activities, and specialized forms of communication within and between firms. As we will see, there are very plausible arguments for extending the definition of business method to include other business practices. As discussed throughout the remainder of the article, the definition problem is the primary reason why singling out a particular field for different treatment in the process of patent application examination is so problematic.

The patent at issue in *State Street* covered software described (and "claimed," using patent law terminology for the structure of the claims that follow the written description) as a data processing system for implementing an investment structure whereby mutual funds pooled their assets in an investment portfolio organized as a partnership in a way that assertedly achieved economies of scale in administration coupled with tax advantages. *See* U.S. Patent No. 5,193,056 (filed Mar. 11, 1991).

The *State Street* holding, that business methods are patentable subject matter, was not limited to those implemented by software, but when people speak of business method patents they ordinarily refer only to software-embodied ones. Patents on software-implemented business practices constitute the vast majority of such patents and clearly have been the most important and controversial. Thus viewed, business method patents are a subset of software patents.

2. *See* John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 991 & n.10 (2003) (finding that in U.S. PTO classification 705, in which the largest single concentration of business method patents is found, there were 469 patents in 1998, 833 in 1999, and 1,006 in 2000).

3. *See id.* at 1082 (comparing 1,093 internet-related business method patents issued through Dec. 31, 1999 with a randomly selected sample of 1,000 contemporaneously issued patents from the general population of patents); Starling D. Hunter III, *Have Business Method Patents Gotten A Bum Rap? Some Empirical Evidence*, 6 J. INFO. TECH. THEORY & APPLICATION 1, 4 (2004) (taking a 10% sample of 35,184 data processing patents in classifications 700 to 707 and 715 to 717 issued between 1975 and 1999 and comparing those patents in main classification 705 patents with those in the other "data processing" classifications).

for more efficiently ordering merchandise on-line⁴ and Priceline.com's patent on the reverse auction technique for buying airline tickets on the internet.⁵ Although patents in other areas of technology have brought forth complaints from various quarters,⁶ the magnitude of adverse commentary and reportage on business method patents was unprecedented.⁷

Complaints focused on business method patents' perceived lack of quality and were based primarily on the contention that these patents lacked adequate references to prior art. Patent quality, an inherently elusive concept, essentially consists of the likelihood that a patented inven-

4. U.S. Patent No. 5,960,411 (filed Sept. 12, 1997). Amazon sued Barnesandnoble.com for patent infringement and won a preliminary injunction. *Amazon.com v. Barnesandnoble.com, Inc.*, 73 F. Supp. 2d 1228, 1231-32 (W.D. Wash. 1999). On appeal, however, the Federal Circuit reversed, noting that there were sufficient obviousness-based doubts about the patent's validity to preclude a finding of substantial likelihood of success on the merits. *Amazon.com v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1366 (Fed. Cir. 2001).

5. U.S. Patent No. 5,797,127 (filed Dec. 31, 1996). The reverse auction is sometimes referred to as a Dutch auction. *See, e.g.*, Eugene R. Quinn, Jr., *The Proliferation of Electronic Commerce Patents: Don't Blame the PTO*, 28 RUTGERS COMPUTER & TECH. L.J. 121, 122 n.5 (2002).

6. Gene patents appear to be the only type that may have garnered more publicity than business method patents. A survey of articles in the Lexis "News Group File, All" using the simple "patent w/10 gene" search request reveals that comparable or even greater publicity has been given to patents on isolated, purified genes. This publicity in the popular press has been mixed, and most negative comments reveal the perception that such patents reward mere discovery rather than invention. This is not the case, however, because in their natural state, genes cannot exist in isolation. It is only through human intervention that genes can be isolated, purified, and put to use in medical and pharmaceutical research. Thus, genes are not eligible for patent protection in their natural state, but only after isolation, purification, and demonstration of specific utility. *See, e.g.*, Ned Hettinger, *Patenting Life: Biotechnology, Intellectual Property, and Environmental Ethics*, 22 B.C. ENVTL. AFF. L. REV. 267, 288 (1995); John M. Golden, *Biotechnology, Technology Policy, and Patentability: Natural Products and Invention in the American System*, 50 EMORY L.J. 101, 122-28 (2001); Jonathan Kahn, *What's the Use? Law and Authority In Patenting Human Genetic Material*, 14 STAN. L. & POL'Y REV. 417, 426-30 (2003).

Regardless of the reasons stated in objections to gene patentability, the magnitude of reported comment, criticism, and opinion on the subject likely resulted not so much from the expressed concerns or even from the relative newness of the technology as from underlying fears about privacy, the morality of private ownership of the basic building blocks of life, the uncertain consequences of genetic alterations that may pass to progeny, and other similarly unsettling ideas. *See generally* Leon R. Kass, *Triumph or Tragedy? The Moral Meaning of Genetic Technology*, 45 AM. J. JURIS. 1 (2000). These are quite different concerns than those regarding business method patents, but certainly help explain the vast amount of public discourse on biotechnology patents.

7. Allison & Tiller, *supra* note 2, at 1007-17.

tion really represents a novel⁸ and non-obvious⁹ advance over the prior state of the art and, thus, will be found valid if challenged in litigation. Patents that fail to meet these requirements should not have been granted in the first place. The number and type of prior art references in patents provide empirical bases for roughly measuring patent quality. Intuitively, these measures suggest a more thorough prior art search by the applicant and examiner to differentiate the invention from what has previously been done. Furthermore, the most common basis for judicial invalidation of patents is prior art found by the challenger that was not cited in the patent.¹⁰

Prior art comprises evidence of what has been done before in a given field of technology. It consists of prior U.S. and foreign patents, prior printed publications, and evidence that the same or a similar invention has previously been either put on sale or publicly used. Printed publications include those from a vast array of hard copy and electronic sources, including academic and trade journals, company and industry-sponsored publications, university publications such as theses and dissertations, government reports, software and its documentation, the popular press, published patent applications and search reports, various websites, and others. Here, we refer to printed publications as “nonpatent prior art” (NPPA). Critics of business method patents were primarily concerned about what they believed to be a lack of attention to relevant NPPA by both applicants and examiners.¹¹ Some observers expressed alarm that many business

8. 35 U.S.C. § 102(a) (2006). The requirement that an invention be novel demands that the invention be different from any invention previously revealed in a single piece of prior art.

9. 35 U.S.C. § 103 (2006). The requirement that an invention be non-obvious demands that the invention be more than a trivial, or obvious, improvement over the cumulative prior art viewed from the perspective of a hypothetical “person having ordinary skill in the art” (PHOSITA). In other words, novelty is “different,” and non-obvious is “different enough.”

10. See John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 231-34, 251 (1998) (examining litigated patents leading to final written decisions on validity or invalidity during 1989 to 1996). The “challenger” to a patent’s validity is usually the defendant in a patent infringement suit, but may be a plaintiff in a declaratory judgment action.

11. Allison & Tiller, *supra* note 2, at 991-92, 1015-18. Probably because of an assumption that there were relatively few relevant patents to serve as prior art during the early years after business method patents began to be issued in large numbers, commentators said little about whether business method patents adequately took account of prior U.S. patents. Surprisingly, however, Allison & Tiller found not only that internet-related business method patents cited far more NPPA than most other types of patents during their early years (through the end of 1999), but also that they cited significantly more patent prior art. *Id.* at 1040.

methods for which patents were being applied had been in practice without the creation of any relevant printed documents.¹²

Responding to the chorus of quality-related criticisms, in March 2000, the PTO began a patent quality improvement initiative for business method patent applications.¹³ The initiative comprised a number of features, including the hiring of more and better trained examiners for business method patent applications, a requirement that examiners consult certain identified sources for NPPA, and a second-level examination of applications after initial allowance. The program, referred to as the Second Pair of Eyes Review (SPER) because of the second-level examination, applies only to allowed applications with a main classification of 705.¹⁴ The greatest single concentration of business method patents is indeed found in class 705 ("Data processing: financial, business practice, management, or cost/price determination").¹⁵ The authors' own previous research has found, however, that many business method patents are also found in a number of other classifications, examples of which are presented later.¹⁶ Moreover, patent examiners usually place patents in multiple classifications, including a primary (main) classification and one or more secondary

12. See Allison & Tiller, *supra* note 2, at 1012-15.

13. UNITED STATES PATENT AND TRADEMARK OFFICE (USPTO), A USPTO WHITE PAPER: AUTOMATED FINANCIAL OR MANAGEMENT DATA PROCESSING METHODS (BUSINESS METHODS), available at <http://www.uspto.gov/web/menu/busmethp/> (section-by-section), and at <http://www.uspto.gov/web/menu/busmethp/whitepaper.pdf> (single document). The action plan, discussed in detail at these sites, is summarized at <http://www.uspto.gov/web/offices/com/sol/actionplan.html>. The sets of specifically identified prior art sources for particular subclasses of business method patents that examiners are now required to search are necessarily very incomplete, but do represent a good faith effort by the PTO to meet criticisms aimed at perceived deficiencies in the amount of nonpatent prior art cited in business method patents. See USPTO, Figures for Non-Patent Literature Databases, <http://www.uspto.gov/web/menu/busmethp/figurenpl.htm> (last visited Apr. 20, 2006). For a general summary of post-*State Street* developments, see Peter R. Lando, *Business Method Patents: Update Post State Street*, 9 TEX. INTELL. PROP. L.J. 403 (2001).

14. E-mail from Wynn Coggins, Outreach Coordinator, USPTO, to John R. Allison, Professor, University of Texas at Austin (Feb. 20, 2003, 04:34:00 CST) (on file with authors).

15. See USPTO, Class Definition for Class 705, <http://www.uspto.gov/web/patents/classification/uspc705/defs705.htm> (last visited Feb. 27, 2005).

16. After the PTO's SPER initiative, we found substantial concentrations of business method patents in main classifications 235, 340, 700, 707, 709, and 713, and lighter concentrations of business method patents in a number of other classes. See *infra* Part VIII.

classifications.¹⁷ The PTO's business method initiative ignores those allowed applications with 705 as a secondary classification. Thus, the initiative is underinclusive in two ways: it ignores applications in other classifications in which business method patents are known to exist, and it ignores applications on functionally similar inventions with secondary 705 classifications.¹⁸

Each of the authors previously conducted empirical business method patent research independent of one another, and each found that business method patents were not inferior to other kinds of patents in the quantity and quality of prior art they cited.¹⁹ We separately concluded, in other words, that the conventional wisdom was not empirically supportable and that business method patents in their early years were no more problematic than patents in other fields.²⁰ In comparison with the average patent in the general population of patents and with patents in most other individual

17. Patent applications are received and first dealt with substantively by the PTO's Office of Initial Patent Examination (OIPE). *See* USPTO, Office of Initial Patent Examination, <http://www.uspto.gov/web/offices/pac/oipe/index.htm> (last visited Feb. 27, 2006); *see also* USPTO, MANUAL OF PATENT EXAMINATION PROCEDURES § 501-07 (8th ed., rev. 2005), available at <http://www.uspto.gov/web/offices/pac/mpep/documents/0500.htm> [hereinafter MPEP]. OIPE suggests an appropriate classification for the application. *Id.* It then forwards the application to the examining group (also referred to as "Technology Center" or "art unit."). MPEP, *supra*, § 504. When the application arrives in the particular Technology Center, a supervisory patent examiner or other designated patent examiner within that group makes the final assignments to one or more classifications. *Id.* § 903.08(b), available at http://www.uspto.gov/web/offices/pac/mpep/documents/0900_903_08_b.htm#sect903.08b. These internal PTO procedures were explained by an official, Alan (who was not allowed to give last name) in the PTO's Inventor Assistance Center in a telephone conversation with John Allison on Feb. 3, 2006.

18. Moreover, it is easy to find patents clearly covering business methods that have *neither a primary nor a secondary 705 classification*. As part of an ongoing study of patents in the software industry, one of the authors (Allison) developed a data set of all 2,044 patents issued to Microsoft Corp. during the period 1998-2002. A quick examination of the patents issued to Microsoft in the latter half of 2002 yielded two patents on business methods having neither a main nor a secondary 705 classification. *See* U.S. Patent No. 6,397,208 (filed May 28, 2002). Its main classification is 707/003 (i.e., class 707, subclass 003), and its secondary classifications are three other 707 subclasses and one 701 main class. *See also* U.S. Patent No. 6,392,664 (filed May 21, 2002) (originally issued to Web TV Networks, Inc., which was later acquired by Microsoft). Its main classification is 715/717 (i.e., class 715, subclass 717), and its secondary classifications are 348, three other subclasses of 715, and 725. Note that these are the current classes shown for this patent in the Delphion patent research software, which have been modified somewhat from the classifications assigned to the patent when first issued, which were a main class of 345 and secondary classes of 348 and 725.

19. Allison & Tiller, *supra* note 2, at 1003-04; Hunter, *supra* note 2, at 15-16.

20. Allison & Tiller, *supra* note 2, at 1003-04.

technology areas, business method patents cited significantly more patent prior art and very significantly more NPPA. Furthermore, the NPPA referenced was not qualitatively inferior to NPPA referenced in most other types of patents.²¹ Neither author claimed that business method patents are necessarily of high quality, but we did conclude that they were not singularly inferior to most other patents. Problems with patent quality exist in all fields of technology.

Carving out business method patent applications for harsher treatment would ultimately prove largely futile and possibly even counterproductive—futile because skilled patent attorneys can often draft applications so as to opt out of a predefined category, and counterproductive because of the increased transaction costs associated with tortuous drafting.²² Ample evidence of this futility is found in the patent system's earlier experience with the broader category of software patents (of which software-implemented business method patents are a subset). While courts struggled during the 1980s and early 1990s with the question of whether software inventions were eligible for patent protection, attorneys had little difficulty drafting patent applications on software as though they claimed machines and devices of a more traditional physical nature.²³ We believe that strategic patent drafting to avoid the additional scrutiny of SPER occurs, but it will be several more years before sufficient data are available to empirically test this hypothesis because one can only use issued patents with post-SPER application filing dates to find evidence suggestive of diversionary drafting.²⁴

The under-inclusiveness of the PTO's initiative notwithstanding, it is important to ascertain whether it is achieving its intended objectives. If available evidence reveals little or no improvement in the apparent quality of these patents, then the merits of continuing the SPER program, much less expanding it, are lacking. If, on the other hand, the SPER initiative has produced significant improvements in the quality of patents within its

21. *Id.* at 1045-52.

22. This argument was made by John Allison. *See id.* at 1082.

23. *Id.*

24. If nothing else, avoiding the additional time required for the second-level review probably provides sufficient motivation to keep patents out of main class 705. Although strategic drafting will not always be successful, it can be done, and undoubtedly will be done when the decision whether to classify a patent application as covering a business method carries legal significance. *See, e.g.,* Jeffrey R. Kuester & Lawrence E. Thompson, *Risks Associated with Restricting Business Method and E-Commerce Patents*, 17 GA. ST. U. L. REV. 657, 678-79 (2001) (noting that practitioners are adept at drafting patent claims so as to avoid penalties based on categorization).

coverage, we need to ask whether a technology-targeted approach to patent reform is a model that should be considered for expansion.

Using a single narrow metric, the PTO has declared the SPER program a success.²⁵ Within the PTO, the Office of Patent Quality Review (OPQR) selects a small random sample of allowed patent applications in all technology groups for additional scrutiny.²⁶ The OPQR reviews the sample for evidence suggesting that the covered invention is nonpatentable and, in a smaller subsample, conducts an independent prior art search.²⁷ When the OPQR determines that one or more items of prior art cause the allowed application to be of questionable validity, “prosecution” (examination) of the application is reopened.²⁸ This quality review existed before the SPER program and applies across technology fields. One feature of SPER required that the OPQR select a substantially larger sample of allowed applications in main class 705 than in other classes for additional quality review.²⁹ In other words, all allowed applications in main class 705 receive the second-level review under SPER, and the OPQR then subjects a larger than normal sample of those to further quality review.³⁰

During the first several months after the SPER’s implementation, the OPQR ordered the reopening of a substantial number of main class 705 applications. In 2001 and 2002, however, the number of reopenings ordered by the OPQR declined dramatically.³¹ Based on the substantial reduction in OPQR-ordered reopenings, the PTO proclaimed the SPER initiative “a proven success” and announced plans to implement the program in other technology areas that have experienced a relatively large number of OPQR reopenings, such as semiconductors, telecommunications, and biotechnology.³²

A substantial decline in the number of OPQR reopenings in main class 705 is not a sufficient reason by itself for calling SPER a success. The OPQR review is a subjective, in-house process metric guided by no appar-

25. USPTO, PATENT QUALITY IMPROVEMENT: EXPANSION OF THE SECOND-PAIR-OF-EYES REVIEW [hereinafter SPER EXPANSION], <http://www.uspto.gov/web/offices/com/strat21/action/q3p17a.htm> (last visited Feb. 27, 2006).

26. MPEP, *supra* note 17, § 1308.03, available at http://www.uspto.gov/web/offices/pac/mpep/documents/1300_1308_03.htm#sect1308.03.

27. *Id.*

28. *Id.*

29. *See* BUSINESS METHOD WHITE PAPER, *supra* note 13.

30. *Id.*

31. *See* SPER EXPANSION, *supra* note 25.

32. *See id.* There is no evidence that the expansion of SPER has actually taken place, but this fact does not lessen the importance of evaluating whether such a narrowly focused approach to patent reform is ever a good idea.

ent standards and thus may fall victim to unconscious bias or external influences. Our confidence in the PTO's conclusion that SPER has improved patent quality would be bolstered by an objective test. The present study empirically analyzes the quality of business method patents before and after the SPER initiative. The existence of one set of patents to which the SPER initiative applies—those in main class 705—and another set of similar patents to which the SPER initiative does not apply—those with some other main class and a secondary class of 705—creates conditions that are amenable to a natural policy experiment focusing directly on the substantive question of patent quality. As explained below, we use several objective proxies for patent quality improvement.

Part II of this article discusses our research methods and the data we collected, Part III explains the statistical regression techniques we employed to assess the effects of the SPER initiative on the quantity and types of prior art cited in main 705 patents compared to secondary 705 patents before and after the initiative, and Part IV presents the results of this analysis. Overall, we find that SPER has had a positive effect on the number and types of prior art in main 705 patents. Part V assesses the effects of SPER from a different perspective, namely, whether it affected not only the quantity and types of prior art cited, but also whether it altered the likelihood that these patents would include *at least some prior art*. Here, too, we find that SPER appears to have had a positive effect. Because both patent applicants and examiners include prior art references in patent applications, Part VI analyzes yet another possible consequence of SPER—the possibility that it led examiners themselves to add more prior art references. SPER has also produced a positive result in this regard. On the negative side, Part VII examines the practically inevitable under-inclusiveness in a program like SPER. Moreover, there is empirical evidence showing dramatic migrations of patents after SPER into secondary 705 that arguably should have been in main 705 and thus subject to SPER. These changes appear to be more than just an artifact of the overall reduction in the number of main 705 patents, thus raising the question whether there has been a diversion of applications to avoid SPER. Part VIII provides numerous examples taken from a random sample of post-SPER patents with secondary 705 classifications and demonstrates how many of them can be characterized as covering software-implemented business methods that probably should have been included in the SPER initiative. Part IX presents our conclusions that, although the SPER initiative positively influenced patent quality within the domain in which it operates, we do not believe that attempting patent reform one technology at a time is the best approach. As we will explain, the patent classification system is

not well suited to the identification of a technology field for the purpose of treating the field differently in the examination process. Moreover, problems of definition are likely to be intractable in most cases, leading both to the serious under-inclusiveness of a technology-targeted reform effort and to the probable gaming of such an effort by patent applicants and even by those responsible for deciding which patents should be subject to the program calling for extra application scrutiny.

II. RESEARCH METHODS AND DATA

A. Our Data Set

Our analysis directly assesses the question whether the SPER initiative has positively affected the quality of business method patents, or at least those business method patents with either a main or a secondary class of 705, by comparing the quantity and type of prior art cited in main class 705 patents before and after the SPER program, as well as the quantity and type of prior art cited in secondary-class 705 patents. We compared prior art cited in the 1,227 main and secondary 705 patents issued during the year before the SPER initiative (Year 0) with prior art cited in the 3,669 main and secondary 705 patents issued during the four years after the initiative (Years 1-4).³³ For our pre-SPER data set of main and secondary 705 patents, we chose to use patents issued only during the final year before the SPER because: (1) this set would be less likely to include any artifacts from earlier times when the PTO had less overall experience with business method patents, and (2) this set would be much closer in time to the post-SPER data set and any possible longitudinal changes unrelated to SPER would thus be less likely to affect our comparisons. Although the SPER initiative was implemented in March 2000, we received information from the PTO that June 2000 was a conservative estimate of when all issued main 705 patents had been subjected to SPER.³⁴ Thus, we used June 1999 through May 2000 as our pre-SPER year.

The primary data for this study were obtained through a search of the Delphion commercial patent database. We searched the database for all patents meeting the following two criteria: (1) membership in main or secondary class 705, and (2) a publication date between June 1, 1999 and May 31, 2004. A total of 4,896 patents met the two criteria. Of this num-

33. We compared the quantity and quality of prior art from the pre-SPER year to the combined post-SPER years and to each post-SPER year individually.

34. E-mail from Wynn Coggins, Outreach Coordinator, USPTO, to John Allison, Professor, University of Texas at Austin, (Feb. 20, 2003, 04:34:00 CST) (on file with authors).

ber, 2,702 were “main 705” patents, i.e., the first listed class was 705. The remaining 2,194 patents were “secondary 705” patents, having a main class other than 705, and a secondary class of 705. These data are presented by years in the following table, with Year 0 representing the year prior to SPER and Years 1, 2, 3, and 4 representing each of the four years following SPER.

Table 1
Total Main and Secondary 705 Patents Pre-SPER Through Year 4 Post-SPER

Year	Total 705	Main 705	Secondary 705
0	1227	896	331
1	897	510	387
2	876	494	382
3	875	402	473
4	1021	400	621
Total	4896	2702	2194

We gathered the following bibliographic information for each of the 4,896 patents: (1) the issue date; (2) the country of residence of the first inventor; (3) the name of the primary examiner; (4) the number of references in each patent to U.S. patents (“US references”); (5) the number of references in each patent to foreign patents (“foreign references”); and (6) the list of nonpatent prior art (NPPA) references (references to other printed publications such as articles, books, etc.). Although the Delphion™ database provides complete lists of all NPPA references, it does not provide the number of such references, which itself is a very important piece of information because of what it suggests about (a) the thoroughness of both the applicant’s prior art search and the examination process³⁵

35. Regarding the thoroughness of both the applicant’s prior art search and the examination process, patent and nonpatent prior art references may be cited by both the applicant and the examiner. Several intuitive arguments support the idea that patent applicants are responsible for far more prior art references than examiners. *See Allison & Tiller, supra* note 2, at 1037-38 n.167. On January 1, 2001, the PTO began identifying which prior art references in patents were added by the examiner, which enabled far easier empirical analysis of the issue. *See* 1241 Off. Gaz. Pat. Office 104 (Nov. 29, 2000), available at <http://www.uspto.gov/web/offices/com/sol/og/2000/week52/patrefr.htm>. Prior to that time, one had to search the prosecution history in the PTO—the documentary record of the patent’s examination—to determine which prior art had been cited by the applicant and which by the examiner. Empirically confirming intuitive arguments that

and (b) the likelihood that a patent will be upheld if its validity is challenged in court.³⁶ The number of NPPA references can be very large in some patents, and because Delphion's™ lists of NPPA references in each patent are run together in text format, we used the Diction 5.0™ textual analysis software program to automate the counting of these references.³⁷

B. Categorization of Patent and Nonpatent Prior Art References

Our study centers on an assessment of the effect that SPER had on the number and type of prior art references in main and secondary 705 patents. Patent prior art is comprised of two groups: references to US patents and references to foreign patents. For a large set of patents, there is no practicable way to make quality distinctions among the patents referred to therein as prior art; that is, there are no feasible means of assessing the informational value of such references in a large data set.³⁸ NPPA references are, however, susceptible to such quality distinctions because they can be classified in various ways to roughly reflect the probable accuracy, reliability, and objectivity of information contained in them. Any typology of the many kinds of printed publications (NPPA) is necessarily subject to some subjectivity and uncertainty, but one can formulate NPPA categories in such a way as to aid in the assessment of their relative informational value. Our typology of NPPA was adapted with one modification from

applicants cite more prior art than examiners, Bhaven Sampat found that, between January 1, 2001 and December 31, 2003, applicants cited 59% of references to prior patents and 90% of references to NPPA, with examiners adding 41% and 10%, respectively. Bhaven N. Sampat, *Determinants of Patent Quality: An Empirical Analysis* 26 tbl. 1 (Working paper, Sept. 2005, on file with authors).

Of course, one cannot know how thoroughly an examiner studied an item of prior art, whether cited by the applicant or added by the examiner, but it stands to reason that examiners are more likely to have closely studied prior art that they themselves added.

We were unable to compare the incidence of examiner-added prior art reference before and after SPER, because the PTO did not begin identifying examiner-added references in patents until after the SPER initiative began. We do, however, provide some interesting statistics comparing examiner-added references in main 705 with those in secondary 705 from the time the PTO began identifying them, January 1, 2001, to the end of our data set, May 31, 2004. *See infra* Part VI.

36. Regarding the association between prior art citations in patents and the likelihood of patents being found valid if challenged, see *supra* text accompanying note 10.

37. Although the references are run together, they are separated by a unique symbol that a computer program can count.

38. To do so for a single patent, one would have to be a person having ordinary skill in the art—the specific field in which the patent purports to be a novel and non-obvious advance—and would have to conduct a thorough study of each prior patent that was referenced.

that used in a previous study by one of the authors.³⁹ When we refer to the “quality” of a type of NPPA, we mean the probable degree of reliability and objectivity. Examples of the different types of NPPA references are found in the Appendix.⁴⁰

(1) **Academic Publications:** This category represents publications of a type for which there is an *independent intermediating influence* such as one or more editors or referees to increase the probability of accuracy, reliability, and objectivity, and which are targeted primarily at an *academic, scholarly* audience. Academic books, book chapters, journal articles, and academic proceedings papers, which have been independently screened for accuracy and objectivity, are the primary components of this category. Academic publications are likely to be the most objective and reliable nonpatent prior art references because of the rigorous peer-review process to which such publications are typically subjected.

(2) **Trade Publications:** This category includes trade books and chapters, trade journal articles, and similar items. Trade publications are targeted primarily at a *practitioner* audience rather than an academic one and *report on* developments in a field rather than create new knowledge in that field as academic works are more likely to do. Like academic publications, trade publications are a type of nonpatent prior art for which there is an *independent intermediating influence* such as one or more editors or referees to increase the probability of accuracy and objectivity. Although these publications are quite unlikely to be subject to the same degree of rigorous peer review as academic publications, they nevertheless constitute prior art of relatively high quality and are a good reflection of the state of the art at the time of publication.

(3) **University Publications:** This category includes publications from universities or consortia of universities, such as those from university re-

39. Allison & Tiller, *supra* note 2, at 1046-47. This typology was developed by means of a trial run in which Allison and Tiller studied the NPPA references in over 100 randomly selected internet-related business method patents and over 100 randomly selected patents-in-general, and developed categories based on the nature of the reference sources found in those patents. *Id.* at 1046.

The only difference is that the previously used typology combined academic and trade publications. Because of experience gained since then, we are more confident in our ability to distinguish academic and practitioner-oriented trade journals and have separated them into two categories for the current study. One non-substantive change was also made—the NPPA category for published patent applications and search reports was renamed “Patent-Related.” The category retains the same content.

40. All NPPA references were manually examined in a random sample of 1,000 of the 4,896 main and secondary 705 patents in our data set. These examples are drawn from that sample.

search labs, departments (such as computer science, electrical engineering, information systems, business, etc.), individual faculty, and graduate student theses/dissertations. Because these types of publications are developed in an environment of objective academic inquiry, they typically will be prior art of good quality although this quality is probably quite variable.

(4) **Software:** This category includes software programs and software documentation. These are separated from other company- or industry-sponsored publications because of their functional nature and obvious need for a high degree of accuracy and objectivity compared with less functionally motivated company-sponsored prior art. Software and software documentation therefore represent prior art of comparatively high quality.

(5) **Patent-Related:** This category includes published patent applications and patent office search reports, such as PCT (Patent Cooperation Treaty) and EPO (European Patent Office) search reports. Such publications are likely to be of highly variable quality as prior art. Published patent applications are of uncertain quality as prior art because they have not yet been examined or otherwise tested. Published search reports are likely to be more objective and reliable than published applications because of the involvement of independent search authorities.

(6) **Government Documents:** This category includes documents published by U.S. and foreign governments and by international government organizations such as the World Intellectual Property Organization (WIPO), as well as websites sponsored by such entities. The category does not include U.S. and foreign patent-related documents such as published patent applications and search reports, which are treated separately because of their special nature. The quality of government documents as prior art is likely to be extremely variable.

(7) **Company/Industry Publications:** This category includes press releases, websites, advertisements, technical disclosure bulletins, and various other publications that were produced by individual companies or industry groups and published with *no independent intermediating influence* to increase the probability of accuracy and objectivity. It does not include software and software documentation, however, because these are sufficiently distinct from and inherently more reliable than other types of publications from companies or industry groups. After removing software and software documentation from the category, company- and industry-sponsored publications overall cannot be treated as high quality prior art.

(8) **Popular Press:** This category includes not only newspapers, magazines, and other publications of general interest, but also news publi-

cations aimed at general business and legal audiences. The relative quality of such publications varies greatly, but overall is relatively low.

(9) **Other:** Includes sundry items such as individual webpages, but most references placed in this category are those in which insufficient information was provided for determining what the item really was, even after we conducted a web search of key names and terms in the incomplete reference. One example is a reference to a partial title of an item, followed by “found on the web on x date.”

III. ANALYTICAL METHODS

A. Control Variables

1. Examiner experience effects

Differences among examiners undoubtedly account for some proportion of the variation in several patent statistics.⁴¹ Although many of these differences are unobservable, one that can be observed is the relative degree of experience that different examiners have with main and secondary 705 patents. As a result, we incorporated a measure to control for examiner experience effects by simply counting the number of patents in the sample for which a given examiner was responsible. The amount of experience they have with such patents can be due to the total amount of time they have worked as PTO examiners or the length of their tenure in an art unit responsible for examination of class 705 patents. As one might expect, this measure varied markedly, with some examiners being responsible for nearly 400 main and secondary 705 patents granted in the five-year pre- and post-SPER period, and many others accounting for fewer than five.

After finding that fifty examiners accounted for 71% of the total number of 4,896 main and secondary 705 patents in the data set, we decided to run our regression analyses in alternative ways, one including all of the patents and another including only those 71% of the patents having been

41. See Douglas Lichtman, *Rethinking Prosecution History Estoppel*, 71 U. CHI. L. REV. 151, 154-55 (2004) (finding substantial differences among patent examiners in changes in claim language between published applications and patents issuing from them); Iain M. Cockburn et al., *Are All Patent Examiners Equal? Examiners, Patent Characteristics, and Litigation Outcomes*, in PATENTS IN THE KNOWLEDGE BASED ECONOMY 19 (Wesley M. Cohen & Stephen A. Merrill eds., Nat'l Acads. 2003) (arguing, among other things, that some examiners are more likely than others to have their patents invalidated by the Federal Circuit).

examined by the top fifty examiners.⁴² The significance of our results for main 705 patents was the same whether all examiners were included or only the top fifty, revealing that the experience of the examiner had no meaningful effect on the significance of changes in the number of prior art references cited in main 705 patents after SPER was initiated. There were some experience-based differences in the significance of results for secondary 705 that appeared only in Years 3 and 4 after SPER, indicating that there probably was more homogeneity among examiners of main 705 patent applications than among examiners of secondary 705 patent applications—those in other main classes with a secondary class of 705.⁴³

2. *Foreign Inventor Effects*

It is intuitive that meaningful differences in the kinds of prior art cited by inventors residing in the U.S. and inventors residing in other countries may exist, and we did in fact observe different prior art citation patterns in patents attributable to foreign inventors.⁴⁴ In particular, we find that patents attributable to foreign inventors cited significantly fewer U.S. patent prior art, NPPA, and total prior art references, but significantly more foreign patent references. All of the results we subsequently report have been controlled for these effects by holding the inventor-domicile variable constant.⁴⁵ The effect of having foreign-domiciled inventors was consistent

42. Approximately 360 examiners accounted for the other 29%.

43. The actual results of our comparison of the number and type of prior art reference before and after SPER, alternatively for only patents examined by all examiners and those examined by the top 50 examiners, are discussed *infra* Part IV.

44. Out of a set of 4,896 patents, 1,142 were attributable to foreign inventors.

45. Our dummy variable only accounts for whether the first listed inventor in the patent has a U.S. or foreign domicile, even though many patents have multiple inventors. This control method is adequate because the U.S. or foreign domicile of the first listed inventor is very highly correlated with the U.S. or foreign domicile of inventors listed after the first one. This proposition is so obvious as to not require empirical demonstration. In patents with two or more inventors, if the first named inventor is domiciled in the U.S., the probability that all or most of the other inventors are also domiciled in the U.S. rather than in another country is high. Likewise, if the first named inventor is domiciled in some country other than the U.S., the probability that all or most of the other inventors are also domiciled outside the U.S. rather than within the U.S. is high.

Foreign inventors from various countries receive U.S. patents, but there is no reason to believe that any variances in patterns of prior art citation between U.S.-domiciled and foreign-domiciled inventors are affected by the particular foreign country of domicile. This assumption is probably even more true for business method patents than for many other kinds of patents because fewer countries allow the patenting of software-implemented business methods than allow the patenting of other types of inventions. Almost all of the foreign-domiciled inventors in our data set were from either Japan or one of the twenty countries in the European Patent Organization.

across both main and secondary 705 patents, as well as both before and after SPER, and was also consistent among those patents having been examined by the least and the most experienced main 705 examiners. After controlling for this effect, we found that the consequences of having patents in our data set with foreign inventors who exhibit different prior art reference citation propensities was completely independent of SPER, and that the existence of these foreign inventor patents does not affect the significance of the changes in prior art citations we observe from pre- to post-SPER.

B. Statistical Techniques

In comparing the mean number of various types of references per patent between main and secondary 705 pre- and post-SPER, we employed negative binomial regression (NBR). When an array of data points is not characterized by a normal distribution, the type of multiple regression model that best fits the data depends on the nature of the distribution.⁴⁶ Moreover, it is often the case that there is more than one appropriate way to adjust for particular types of skews in a distribution. In other words, a degree of judgment must be exercised when deciding which type of regression model is the best fit for a given distribution of data points. Moreover, more than one model may be workable with the same type of distribution.⁴⁷ In our data set of prior art references, we concluded that the negative binomial regression model is the best fit because (1) the variables with which we were dealing were “count variables,”⁴⁸ (2) the distribution

46. For example, when a distribution is skewed by upper outliers, a logarithmic transformation of means can bring the distribution closer to a normal one for subsequent testing. And, in such a distribution, the additional existence of some lower outliers may call for nonparametric median tests such as a Wilcoxon test as an additional check on the results obtained from comparing log-transformed means. Yet other non-parametric tests such as a Savage test can sometimes be used as an additional check on the results. *See, e.g.*, John R. Allison, Mark Lemley, Kimberly Moore, & Derek Trunkey, *Valuable Patents*, 92 GEO. L.J. 435, 447 n.45 (2004); Allison & Tiller, *supra* note 2, at 1040 n.175, 1061 n.219. If we had chosen the methods employed in the two cited articles, our results would have been the same, particularly because of the very high levels of significance we found. Using negative binomial regression, however, removes the need to use those secondary tests as a check.

47. Allison & Tiller, *supra* note 2, at 1040 n.175, 1061 n.219

48. Count variables are simply discrete number values, i.e., 0, 1, 2, 3 . . . N, such as the number of flights that arrive daily at an airport. They must be whole numbers: 6.72 flights cannot land at an airport in a day. The numbers of references in a patent are count variables. Count variables are contrasted with continuous variables, i.e., numbers that can have any value within a given range, such as the height or weight of each person in a flight that arrives at an airport. The heights or weights do not have to be whole numbers. People can be 5 feet 11.245 inches tall and weigh 175.678 pounds. Whether the data con-

of values was greatly overdispersed⁴⁹ due to some extreme upper outliers (some patents having very large numbers of certain types of references) and a very large range between the minimum and maximum values, and (3) there were a high proportion of zero values (large numbers of patents having no references of a particular type).⁵⁰

The way in which prior art references are distributed within a set of patents, with many patents citing either zero or very few references, and many patents citing a large number of references (i.e., bimodal) is true of all kinds of references but is especially observable in the case of NPPA references because it is more time-consuming and thus more costly to search for nonpatent prior art than it is to search for patents. Overall, this phenomenon is partly explained by the fact that, although patent law does not require applicants to conduct a prior art search at all, PTO Rule 56 does require applicants to cite all material prior art *of which they are aware*.⁵¹ A violation of this duty of candor regarding known prior art can result in a judicial finding that the patentee engaged in “inequitable conduct.”⁵² An inequitable conduct finding results in the unenforceability of the patent, even if the patent is otherwise valid and infringed. Indeed, such a finding can produce consequences substantially more severe than an invalidity finding. Both infringement and validity are determined on a

stitute count or continuous variables is one factor, in addition to the nature of the distribution, that determines which multiple regression model is the best fit.

These two types of number values are contrasted with categorical, or dummy, variables. Categorical or dummy variables do not reflect values, but instead reflect whether or not a particular state exists. In other words, categorical or dummy variables represent qualitative rather than quantitative values. When there are only two possibilities, we refer to them as “binary” or “dichotomous.” They represent “yes” or “no,” which are coded as 1 or 0, with the numbers 1 or 0 not representing values but states of being or not being. Logistic regression is used when the dependent variable is binary, a “yes” or “no.” See, e.g., JOSEPH F. HAIR, JR. ET AL., *MULTIVARIATE DATA ANALYSIS WITH READINGS* 129-31 (4th ed. 1995).

49. Overdispersion exists when the variance (standard deviation squared) exceeds the mean.

50. See, for example, David M. Drukker, STATA FAQ (Oct. 2005), *available at* <http://www.stata.com/support/faqs/stat/nbreg.html>, and references cited therein for an explanation of the nature of a data distribution that calls for use of negative binomial regression.

Regarding the high proportion of patents with none of particular types of references, two striking examples are that, in our total data set of 4,896 patents, 45% contained zero references to foreign patents and 33% contained zero references to nonpatent prior art.

51. 37 C.F.R. § 1.56 (2000).

52. See, e.g., *Kingsdown Med. Consultants, Ltd. v. Hollister, Inc.*, 863 F.2d 867, 874-5 (Fed. Cir. 1988) (en banc) (discussing inequitable conduct defense).

claim-by-claim basis, leading to situations in which certain claims in a patent may be invalid while others remain valid. A patentee's inequitable conduct, however, renders the entire patent unenforceable,⁵³ as well as potentially entitling the accused infringer successfully raising the defense to attorney fees.⁵⁴ Even other, related patents springing from the same original application may be unenforceable.⁵⁵ Thus, the absence of a duty to search the prior art and the cost of doing so, coupled with potentially severe penalties for not citing what has been found, tends to cause many applicants to conduct either very minimal searches or very thorough ones.⁵⁶

IV. RESULTS

A. Number of U.S., Foreign, and Total Nonpatent Prior Art References

After implementation of SPER, we observed highly significant increases in the (1) average number of U.S. patent references, (2) foreign patent references, and (3) total nonpatent prior art references (NPPA) in main 705 patents, both year-by-year and in the combined four post-SPER years.⁵⁷ These results hold for both the full population of main 705 patents and the subset of the population attributable to the top 50 examiners.

53. See, e.g., *J.P. Stevens & Co. v. Lex Tex, Ltd.*, 747 F.2d 1553, 1561 (Fed. Cir. 1984).

54. See, e.g., *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1480 (Fed. Cir. 1998).

55. *Consol. Aluminum Corp. v. Foseco Int'l, Ltd.*, 910 F.2d 804, 809-10 (Fed. Cir. 1990) (finding six related patents unenforceable on grounds of "unclean hands" because of inequitable conduct in intentionally failing to adequately disclose the best mode for one of them). See generally Scott D. Anderson, Comment, *Inequitable Conduct: Persistent Problems and Recommended Resolutions*, 82 MARQ. L. REV. 845 (1999) (discussing the various consequences of inequitable conduct).

56. Although both applicants and examiners cite prior art references in patents, applicants are responsible for most of them. In the general population of patents, applicants are responsible for almost 60% of references to prior patents and 90% of references to nonpatent prior art. See Sampat, *supra* note 35, at 26 tbl. 1.

57. We use the traditional level of 0.05 for significance of results. That is, if the hypothesis of "no change" or "no difference" can be rejected at a significance level of 0.05 or lower, we view the change or difference as not being attributable solely to random chance. Levels of significance are often reported as p-values. Thus, a result with a p-value of less than 0.05 is significant and indicates that the hypothesis of no change or no difference can be rejected at a 95% confidence level. Many of our results have p-values much smaller than 0.05, revealing very high levels of significance. Also, all of our p-values are two-tailed.

The significance of the increase in post-SPER prior art references within main class 705 patents would be diminished, however, by similar increases in non-705 main classifications and secondary 705 classifications because such a finding would raise the question whether causes other than SPER are responsible for the increase in prior art references within main 705 patents. Secondary 705 patents attributable to all examiners and not only to the most experienced ones did, in fact, experience some significant increases in average number of references to U.S. patents and foreign patents in the third and fourth years after SPER, which significantly raised the average for the combined four years compared to the year prior to SPER. Secondary 705 patents attributable to all examiners also experienced significant increases in the number of NPPA references in the third, fourth, and combined four post-SPER years, but the significance levels were substantially lower than for main 705 patents. These increases were almost completely absent, however, in secondary 705 patents attributable to the fifty most experienced examiners of 705 patents. Among these examiners, there was a barely significant increase only in the number of references to U.S. patents and only in the third year after SPER.⁵⁸ This slightly significant increase then disappeared in the fourth post-SPER year.

Thus, the SPER initiative appears to have produced a significant improvement in the quantity of all types of prior art cited in main class 705 patents in each of the four years after its implementation. The finding that reflects most favorably on the SPER initiative's effects is that there is a sharp difference in the way that the *top fifty examiners* treat the two groups of similar patents. The results show that secondary 705 patents evaluated by these examiners display none of the increases in any kind of prior art that the main 705 patents do. The following table summarizes these data. "Yr 0" is the one year before SPER, "Yr 1, 2, 3, and 4" are each of the post-SPER years, and "Yrs 1-4" represents the average of the four post-SPER years combined.⁵⁹ Each comparison is with "Pre-SPER"; we make no comparisons among the post-SPER years.

58. There also was an increase at the 0.05 level for total prior art references, but this was completely accounted for by the increase in references to U.S. patents.

59. It is important to note that, when comparing averages for the combined four post-SPER years with the pre-SPER year, the combined four years have a larger number of observations, and smaller changes can be significant.

Table 2
Summary of SPER's Effects on the Number and Type of Prior Art References⁶⁰;
Averages Per Patent for Each Year and for Combined Four Post-SPER Years

Type of Reference	Main 705 All Examiners	Main 705 Top 50 Examiners	Secondary 705 All Examiners	Secondary 705 Top 50 Examiners
Total Prior Art Yr 0	24.1	23.2	21.2	24.2
Total Prior Art Yr 1	29.1 ^a	29.7 ^a	22.9	21.2
Total Prior Art Yr 2	34.4 ^a	35.6 ^a	22.8	24.1
Total Prior Art Yr 3	34.2 ^a	35.9 ^a	25.9 ^a	28.2 ^d
Total Prior Art Yr 4	38.7 ^a	39.0 ^a	31.7 ^a	24.4
Total Prior Art Yrs 1-4	33.8 ^a	35.2 ^a	26.6 ^a	27.6
US Patents Yr 0	15.5	15	15.5	17.2
US Patents Yr 1	17.9 ^c	18.1 ^a	15.8	14.8
US Patents Yr 2	21.1 ^a	21.8 ^a	16.5	16.8
US Patents Yr 3	20.0 ^a	20.9 ^a	18.7 ^a	20.3 ^d
US Patents Yr 4	25.4 ^a	25.3 ^a	23.1 ^a	18
US Patents Yrs 1-4	20.9 ^a	21.4 ^a	19.1 ^a	19.8
Foreign Patents Yr 0	1.8	1.6	1.6	1.8
Foreign Patents Yr 1	1.9	1.9	2.4	1.9
Foreign Patents Yr 2	3.0 ^a	3.1 ^a	2	2.1
Foreign Patents Yr 3	2.9 ^a	2.9 ^a	2.3	2
Foreign Patents Yr 4	3.7 ^a	3.6 ^a	2.8 ^a	2.1
Foreign Patents Yrs 1-4	2.8 ^a	2.9 ^a	2.4 ^c	2.6
Total NPPA Yr 0	6.8	6.6	4.1	5.2
Total NPPA Yr 1	9.4 ^c	9.7 ^b	4.7	4.5
Total NPPA Yr 2	10.2 ^a	10.7 ^a	4.2	5.2
Total NPPA Yr 3	11.2 ^a	12.2 ^a	4.8 ^d	5.8
Total NPPA Yr 4	9.6 ^c	10.0 ^c	5.8 ^c	4.4
Total NPPA Yrs 1-4	10.1 ^a	10.9 ^a	5.0 ^d	5.3

Legend (Significance Levels): ^a p < 0.0001; ^b p < 0.001; ^c p < 0.01; ^d p < 0.05

60. These and all other p-values we report are two-tailed.

B. Number of Different Types of Nonpatent Prior Art References

Increases in the total number of U.S. and foreign patent references and in the total number NPPA references do not tell us all we need to know. It also is important to assess the effect that SPER may have had on the *informational quality* of NPPA references in main 705 patents relative to their kindred secondary 705 patents. We downloaded all NPPA references from a random sample of 1,000 pre- and post-SPER patents out of the 4,896 total patents and manually assigned each reference to one of the nine subcategories in our NPPA typology. After excluding the “Other” subcategory because it had such a low population, we then performed a negative binomial regression to assess the effect of SPER on the number of the eight different types of NPPA references.⁶¹ Such analysis provides us with a means to evaluate the relative informational quality of the larger number of NPPA references.

In main 705 patents attributable to all examiners, we found significant increases from the pre-SPER year to the four combined post-SPER years in three of the eight NPPA sub-categories. By far the most significant increase was in Trade Publications ($p < 0.0001$), followed by Company/Industry Publications ($p < 0.01$), and Patent-Related Publications ($p < 0.05$). There were no significant changes in the other five NPPA sub-categories. Thus, a substantial portion of the overall increase in NPPA references was attributable to one category, Trade Publications, which we view as a relatively high informational quality type for the patents under study. Except for some types of sophisticated financial patents, one would not expect to find many Academic Publications being cited as prior art for business method patents.⁶² As previously noted, our Trade subcategory

61. When a particular sub-category of NPPA was the dependent variable, such as the number of references to Trade Publications in a patent, we used the total number of NPPA references in that patent as a control variable. The reason is the obvious correlation between the total number of NPPA references in a patent and the number of references in a NPPA sub-category. By using the total number of NPPA references in a patent as a control, we were able to distinguish between a patent with one Trade Publication reference and ten overall NPPA references from a patent with one Trade Publication reference and no other NPPA references.

62. Although this type of business method patent deals with subject matter about which there is a substantial published body of sophisticated academic work, Josh Lerner found that financial patents actually do not cite much of this type of work. Josh Lerner, *Where Does State Street Lead? A First Look at Finance Patents, 1971-2000*, 57 J. FIN. 901, 927-28 (2002). His study ended before the SPER initiative, and we do not know whether this subset of business method patents has witnessed an increased in references to academic publications after SPER.

includes practitioner-oriented publications of a type that have had to clear one or more independent intermediaries such as an editor or referee.

The subcategory showing the second most significant increase, Company/Industry Publications, undoubtedly may contain some information relevant to the novelty or non-obviousness of a given patent, but on the average, this information will not be as reliable as that found in the Trade subcategory, because it has not been screened or tested by an independent intermediary such as a referee or editor. The other subcategory showing a significant increase, Patent-Related Publications (published patent applications and search reports), is likely to be characterized by higher average informational quality than Company/Industry Publications, and the post-SPER increase in this category should be viewed positively.⁶³

When we looked only at the main 705 patents that had been examined by the fifty most experienced examiners, the results were similar. The Trade subcategory experienced an increase at the same extremely high level of significance ($p < 0.0001$), the Company/Industry subcategory experienced an increase but at a lower level of significance ($p < 0.05$), but there was no increase in the Patent-Related subcategory.

In marked contrast to our findings with respect to main 705 patents, secondary 705's displayed no significant increases or decreases in any subcategory of NPPA references. While there was an overall increase in NPPA references in secondary 705 patents attributable to all examiners, no single subcategory showed a significant increase. This finding is explained by the barely significant ($p < 0.05$) overall increase in NPPA references in secondary 705 patents and the fact that the increase was widely dispersed across many types of NPPA references. When we looked only at the secondary 705 patents that had been examined by the fifty most experienced examiners, we found no significant increase in either the total number of NPPA references or in any individual subcategory.

Thus, the SPER initiative seems to have exerted a generally positive impact on the number of all kinds of prior art references, and its positive impact on the number of NPPA references has resulted in significant increases in references to U.S. and foreign patents and to a high information

63. One must take this result with some caution, however, because the only available published patent applications prior to SPER were foreign ones. U.S. patent applications were not published until March 15, 2001. As in other countries, U.S. applications are published eighteen months after filing, but in this country applications are published only if the applicant declares that she will not file in another country for a patent on the same invention. Thus, the significance of the increase in the Patent-Related Publication category may not have been attributable to SPER, but to the availability of more published patent applications in English after March 15, 2001.

value type of NPPA. On the other hand, the SPER program is subject to criticism for what appears to be a systematic overlooking of some other types of NPPA that are likely to contain high quality information relevant to many business method patents, such as university-sponsored publications and software/software documentation.

In addition to summarizing our findings from the comparison of the average numbers of different types of NPPA references per patent in the pre-SPER year to the averages per patent in the *combined four post-SPER years*, the following two tables also present such averages for each of the post-SPER years individually. As in the previous table, superscripts indicate whether changes were statistically significant, and if so, at what level.⁶⁴

In the following two tables, we have omitted University Publications, Government Publications, Software, and Other, either because these categories showed no significant changes at any point or involved numbers too small for statistical analysis. Table 3 presents summary findings for main 705 patents, and Table 4 for secondary 705 patents.

64. In a few instances, reported significance levels may appear a bit anomalous when looking at averages for individual years because each year will have fewer total observations than the averages for the combined four post-SPER years. Averages are averages, but when the total number of patents, and thus the total numbers of references are smaller, it takes a greater absolute change to be statistically significant. For example, in the table reporting results for those main 705 patents attributable to all examiners, the average number of references to Trade Publications in Yr 3 (3.1) is slightly higher than that for Yr 2 (3.0), yet the significance level of the change over Yr 0 is smaller in Yr 3 than in Yr 2.

In a couple of instances, the post-SPER averages for the top examiners appear as though they should represent significant increases because these averages are about the same as for all examiners, but are not quite significant because the top fifty examiners examined a smaller number of total patents than all examiners and, thus, the total number of observations is smaller. Again, absolute differences must be greater in order to be significant when the number of observations is smaller.

Table 3
Summary of SPER's Effects on the Number and Types of NPPA References
Averages Per Patent for Each Year and for Combined Four Post-SPER Years

Main 705						
Type of NPPA		Academic	Trade	Company/ Industry	Popular Press	Patent- Related
Avg # Refs	Yr 0	1.7	1.1	2.2	0.6	0.1
All Examiners	Yr 1	1.3	2.1 ^d	1.2	0.8	0.2
	Yr 2	1.3	3.0 ^a	3.4 ^c	0.7	0.2
	Yr 3	2.0	3.1 ^c	2.6	1.4	0.1
	Yr 4	1.8	1.8*	3.0 ^c	0.9	0.4 ^c
	Yrs 1-4	1.54	2.50 ^a	2.53 ^c	0.93	0.21 ^d
Avg # Refs	Yr 0	1.2	1.0	2.1	0.5	0.1
Top Examiners	Yr 1	1.3	2.1*	1.3	0.9	0.2
	Yr 2	1.3	3.3 ^b	3.6*	0.7	0.1
	Yr 3	2.4	3.2 ^d	2.3	1.3	0.1
	Yr 4	1.2	1.7	3.1*	0.9	0.5 ^c
	Yrs 1-4	1.49	2.64 ^a	2.53	0.91	0.21**

Legend: (Significance Levels): ^a p < 0.0001; ^b p < 0.001; ^c p < 0.01; ^d p < 0.05

*Significant at 0.10 level, but not quite at the 0.05 level.

**Although this average number of references to Patent-Related publications for top examiners was the same as for all examiners both in Yr 0 and in the four post-SPER years combined, the change was significant at the 0.05 level for all examiners, but not quite significant (0.055) for top examiners. The reason is that the total number of observations (total number of patents and, thus, total number of this type of reference) was smaller for the top examiners than for all examiners, and changes must be greater to be statistically significant when the number of observations is smaller.

Table 4
Summary of SPER's Effects on the Number and Types of NPPA References
Averages Per Patent for Each Year and for Combined Four Post-SPER Years

Secondary 705						
Type of NPPA		Academic	Trade	Company/ Industry	Popular Press	Patent- Related
Avg # Refs	Yr 0	2.4	0.6	1.3	0.0	0.2
All Examiners	Yr 1	1.7	0.7	2.7	0.2	0.1
	Yr 2	0.7	0.4	1.1	0.1	0.1
	Yr 3	1.4	0.5	2.7	0.2	0.2
	Yr 4	1.2	0.5	1.6	0.1	0.3
	Yrs 1-4	1.21	0.55	1.95	0.16	0.18
	Avg # Refs	Yr 0	3.5	0.7	1.7	0.1
Top Examiners	Yr 1	1.8	0.7	3.4	0	0.1
	Yr 2	0.9	0.6	1.0	0.2	0.1
	Yr 3	1.2	0.6	2.9	0.1	0.2
	Yr 4	2.0	1.0	1.4	0.3	0.2
	Yrs 1-4	1.51	0.74	2.17	0.17	0.15

Legend: (Significance Levels): None of the changes was statistically significant.

V. AN ALTERNATE APPROACH

All of the results discussed above concern the estimation, by means of negative binomial regressions, of the *average number* of various types or combinations of prior art references per patent. However, an analysis focused only on averages may fail to capture some types of important changes. For example, the SPER initiative may have made examiners more careful to see that patents contained *some* prior art, but not necessarily more of it. Thus, we also examined whether SPER has increased the number of patents containing at least one foreign or NPPA reference. This analysis employed *logistic*, rather than negative binomial, regressions. Logistic regression is used when there is one binary dependent variable—in this case whether a patent has at least one reference of a particular type.⁶⁵

65. See HAIR, *supra* note 48.

While the dependent variable in our first analysis was the *number* of references of a particular kind, the dependent variable in our logistic regressions is simply a “yes” or “no” (1, 0): did a patent have at least one prior art reference or did it not?

The results of logistic modeling, particularly when combined with results of the negative binomial regressions, provide information about the locus of the changes, or lack thereof, in the average number of references. For example, if there is an increase in the average number of references per patent, the results of the logistic regression indicate whether the increase was due to relatively few patents having many more references after SPER or a larger number of patents having at least one reference.

Because the purpose of our logistic regressions is primarily to verify the results obtained from our negative binomial regressions, we report results only for the combined four post-SPER years and not for each year separately. We found that, for both the entire population of main 705 patents and the subset of main 705 patents attributable to the top fifty examiners, there were highly significant post-SPER increases in the number of patents having at least one of the following types of prior art references: (1) foreign patents, (2) all NPPA (that is, at least one of the subcategories of NPPA); and, among the subcategories of NPPA, (3) academic publications, (4) trade publications, (5) company/industry publications, and (6) patent-related publications. We could not perform a logistic regression on the number of patents having at least one reference to a U.S. patent, because prior to the SPER initiative almost all patents in our data set had at least one such reference. Thus, there was an improvement in the citation of academic and patent-related publications that was not revealed when we looked only at the average number of such references per patent. In addition, the *significance levels* were greater when we focused on the number of patents having at least one of various kinds of references than when we looked at the average number of various kinds of references per patent.

In contrast, secondary 705 patents failed to show a similar increase in all but one prior art category: foreign patent references. However, even this increase was lost when we considered only those patents reviewed by the fifty most experienced examiners. Thus, logistic modeling reveals an even greater disparity in the effect of SPER between main and secondary 705 when compared with the binomial modeling we employed earlier.

Overall, our findings indicate that increases in both the average number of references per patent, and the number of patents having at least one reference, contribute to the positive changes we observed. The results of our logistic regressions are summarized in the following table.

Table 5
Summary of SPER's Effects on the Number of Patents Having at Least One Prior Art Reference in Various Categories

Type of Reference	Main 705 All Examiners	Main 705 Top Examiners	Secondary 705 All Examiners	Secondary 705 Top Examiners
Foreign Patents	Increased ^a	Increased ^a	Increased ^d	No Change
All NPPA	Increased ^a	Increased ^a	No Change	No Change
Academic	Increased ^a	Increased ^a	No Change	No Change
Trade	Increased ^a	Increased ^a	No Change	No Change
Company/Ind	Increased ^a	Increased ^b	No Change	No Change
University	No Change	No Change	No Change	No Change
Govt Docs	No Change	No Change	No Change	No Change
Software	No Change	No Change	No Change	No Change
Popular Press	No Change	No Change	No Change	No Change
Patent-Related	Increased ^c	Increased ^c	No Change	No Change

Legend: ^a $p < 0.0001$ ^b $p < 0.001$ ^c $p < 0.01$ ^d $p < 0.05$

VI. EXAMINER-ADDED PRIOR ART

It would be interesting to compare the quantity and type of prior art added to patents by examiners in main and secondary 705 before SPER with prior art added to such patents after SPER. Such a comparison would reveal much about the effect of SPER on examiner behavior. As noted earlier, it was not feasible for us to do so because the PTO did not begin identifying examiner-added prior art in published patents until January 1, 2001.

However, we were able to compare examiner-added prior art after SPER in main 705 patents with that in secondary 705 patents. Because the SPER initiative was more concerned with nonpatent than patent prior art, we made the comparison only with respect to NPPA references.

By examining main and secondary 705 patents issued between January 1, 2001 and May 31, 2004, we found that the SPER initiative apparently exerted a positive impact on the amount of NPPA added by examiners.

During this period, there were 1,651 patents issued in main 705. Of these, examiners added at least *some* NPPA references in 744 patents, representing 45% of the total. During the same period, 1,481 patents issued with secondary 705 classifications. Of these, examiners added at least *some* NPPA references in 492 patents, representing 33% of the total. The difference between the 45% of main 705 patents and the 33% of secondary 705 patents in which examiners added some NPPA references is highly significant ($p < 0.0001$).

When we focus on patents in which *all* of the NPPA references were added by examiners, we also find a highly significant difference between main and secondary 705. Of the 1,651 main 705 patents issued during this period, all of the NPPA references were attributable to examiners rather than applicants in 136 patents, representing 8.2% of the total. Of the 1,481 secondary 705 patents issued during this period, all of the NPPA references were attributable to examiners in 56 patents, representing 3.8% of the total. The difference between the 8.2% of patents in main 705 and the 3.8% of patents in secondary 705 in which examiners added *all* of the NPPA was significant at the same high level as the difference in the percentage of patents in which examiners just added *some* of the NPPA ($p < 0.0001$).

Thus, the SPER initiative clearly improved the degree of attention paid by examiners to NPPA and, inferentially, on the quality of the examination process for patent applications that were assigned to main class 705. This evidence, combined with other evidence already discussed, reveals that the SPER initiative has almost certainly succeeded in improving the quality of patents in the domain in which it operates.

VII. UNDERINCLUSIVENESS, POST-SPER SHIFTS FROM MAIN 705, AND SOME UNANSWERED QUESTIONS

Although there is welcome news in our analyses of the effects of the SPER initiative, evidence of the serious underinclusiveness of the SPER initiative suggests that celebration should be subdued. For various reasons, substantial numbers of business method patents escape the additional scrutiny. Much of the underinclusiveness is attributable to the innate difficulty associated with defining any technology area, including business methods. Moreover, the PTO's system of classification was never intended for use as a means to identify technology areas conceptually. The system is designed to aid in searching for previously issued patents as prior art⁶⁶ and

66. See Robert P. Merges, *One Hundred Years of Solicitude: Intellectual Property Law, 1900-2000*, 88 CALIF. L. REV. 2187, 2216 (2000) (tracing the evolution of the PTO

operates at a functional, not conceptual level. In addition, the functional level at which it operates is quite low on a scale of abstraction, further rendering it ill-suited for singling out a technology field. PTO classes and subclasses also are frequently entwined in rather cryptic ways.⁶⁷

Among the post-SPER patents having secondary 705 classifications and various main classifications other than 705, we found substantial numbers that would fall within any reasonable definition of a software-implemented business method patent. These patents were not, of course, subjected to the heightened scrutiny of SPER. Although these patents can be found in a variety of main classifications, the greatest concentrations were in main classes 235 (Registers),⁶⁸ 700 (Data processing: generic control systems or specific applications),⁶⁹ 707 (Data processing: database and file management or data structures),⁷⁰ 709 (Electrical computers and

and stating: "And with the increase in the volume of patents came the need to more quickly and accurately search the 'prior art,' and hence the development of modern patent classification." [footnote omitted]).

67. The following example should reveal why PTO classifications are not well suited for defining a technology field at a conceptual level. Class 345 is defined as "Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems." USPTO, Class Definition for Class 345, <http://www.uspto.gov/web/patents/classification/uspc345/defs345.htm> (last visited Feb. 27, 2006). The class definition states: "This class provides for processes and apparatus for selective electrical control of two or more light-generating or light-controlling display elements in accordance with a received or stored image data signal. The image data includes character, graphical information or display attribute data. The image data may include, for example, information data from a peripheral input device, from the reception of a television signal, from the recognition of image data, or from the generation or creation of image data by a computer. This class also provides for digital data processing systems or methods for data processing for visual presentation, wherein the processing of data includes the creation or manipulation of graphic objects (*e.g.*, artificial images), text or use of an operator interface by a digital data processing system prior to use by or within a specific display system." *Id.*

Not only does the class combine different technology areas, such as computer hardware, software, and optics, but it also does so in a very function-oriented way rather than a concept-oriented way. To further illustrate, subclass 74 within class 345 is "Machine Element or Mechanism, particularly subclass 471 for control elements which move in two planes," showing the system's focus on low-abstraction functionality. *Id.*

68. See USPTO, Class Definition for Class 235, <http://www.uspto.gov/web/patents/classification/uspc235/defs235.htm> (last visited Feb. 27, 2006).

69. See USPTO, Class Definition for Class 700, <http://www.uspto.gov/web/patents/classification/uspc700/defs700.htm> (last visited Feb. 27, 2006).

70. See USPTO, Class Definition for Class 707, <http://www.uspto.gov/web/patents/classification/uspc707/defs707.htm> (last visited Feb 27, 2006).

digital processing systems: multicomputer data transferring),⁷¹ and 713 (Electrical computers and digital processing systems: support).⁷² Although it is easy to see how business method patents with a secondary 705 classification might fit within main classes such as 700, 707, 709, and 713, classification 235 (Registers) may appear at first blush to be a strange place for business method patents. Class 235 is an old classification that once contained only patents on inventions such as mechanical cash registers and calculators. In modern times, however, there are many sub-classifications within 235 that cover inventions involving highly sophisticated computing and recording technology. Later, we provide examples of post-SPER business method patents in these classifications.

In our study of secondary 705 patents, we not only found ample evidence of SPER's underinclusiveness, but we also encountered some rather dramatic shifts among classifications for which it is difficult to account. First, we examined changes in the proportions of main and secondary 705 patents before and after SPER. We found that, in the post-SPER period, the proportion of main class 705 patents relative to the total of all class 705 patents (main plus secondary) has decreased. The proportion of main 705 patents relative to the combined total of main and secondary 705 patents decreased sharply after SPER was initiated, from 73% in the year prior to June 2000, to 56.9% in the first year of SPER, 56.4% in the second year of SPER, 45.9% in the third year of SPER, and just 39% in the fourth year of SPER. Correspondingly, the proportion of secondary-class 705 patents relative to the total of main and secondary 705 patents increased from 27% in the year before SPER to 43.1%, 43.6%, 54.1%, and 60.8%, respectively, in the four years after SPER.

This dramatic change in the *proportion* of main and secondary-class 705 patents could be attributable solely to the fact that the second-level review has substantially decreased the absolute number of main 705 applications being allowed, which necessarily results in those patents accounting for a smaller portion of total-705 patents.

The absolute number of granted main 705 patents did indeed decrease steadily in the years after SPER. However, something else appears to contribute to this finding. Not only did the *proportion* of secondary 705 to total 705 patents increase markedly, but the *total number* of secondary 705 patents increased substantially after SPER. Moreover, with the exception

71. See USPTO, Class Definition for Class 709, <http://www.uspto.gov/web/patents/classification/uspc709/defs709.htm> (last visited Feb 27, 2006).

72. See USPTO, Class Definition for Class 713, <http://www.uspto.gov/web/patents/classification/uspc713/defs713.htm> (last visited Feb 27, 2006).

of Year 2 after SPER, the *rate* of increase in the number of post-SPER secondary 705 patents grew each year. The *rate of increase* was particularly dramatic in post-SPER Years 3 and 4. Overall, the *rate of increase* in secondary 705 patents was much greater than the *rate of decrease* in both main 705 patents and total 705 patents. Necessarily, the ratio of main to secondary 705 patents also declined dramatically in each year after SPER. In the following table, Panel A shows the absolute numbers of patents in main 705, secondary 705, and total 705, as well as the proportions of main and secondary 705s to total 705s and the ratios of main to secondary 705 patents. Panel B in the table shows the percentage declines in main 705 patents and the percentage increases in secondary 705 patents from the year before SPER to each of the four years after SPER.

Table 6
Changes in Numbers of Patents Plus Rates of Change in Main,
Secondary, and Total 705

A	Total # Main 705	% of Total	Total # Secondary 705	% of Total	Total # All 705	Ratio of Main to Secondary
Year 0	896	73%	331	27%	1227	2.71
Year 1	510	57%	387	43%	897	1.32
Year 2	494	56%	382	44%	876	1.29
Year 3	402	46%	473	54%	875	0.85
Year 4	400	39%	621	61%	1021	0.64
B	Total # Main 705	% Change over Yr 0	Total # Secondary 705	% Change over Yr 0	Total # All 705	% Change in Total 705 from Yr 0
Year 0	896		331		1227	
Year 1	510	-43%	387	+17%	897	-27%
Year 2	494	-45%	382	+15%	876	-29%
Year 3	402	-55%	473	+43%	875	-29%
Year 4	400	-55%	621	+88%	1021	-17%

If we were looking solely at patents for which applications have been *filed* after SPER, this evidence is strongly suggestive of strategic drafting by patent attorneys to avoid SPER. Even though we believe that such diversionary drafting has almost certainly occurred, this evidence cannot support the argument because we are looking only at patents *issued* after SPER. Why have we witnessed such dramatic increases, and rates of increase, in patents in non-main classifications that were given secondary 705 classifications, especially in light of the fact that, as we will see later, substantial numbers of these patents fall within any reasonable definition of a business method patent? Although unprovable, one possibility is a greater reluctance by the PTO to assign patents to main 705. The SPER initiative requires examiner time and substantial other resources on the part of the PTO. Because those assigning applications to classifications know that an assignment to main 705 is now “something special,” an unconscious bias against placing patents in main 705 could have developed. If there is any reasonable argument for assigning a different main classification and then using a secondary 705 classification to aid in future prior art searching, perhaps such a bias could influence decision making. On the other hand, substantial numbers of the secondary 705 patents in non-705 main classifications are so obviously business method patents that it suggests a more conscious bias.⁷³ But to reiterate, our evidence only suggests that patents have been diverted, and we can only speculate as to whether the diversion results from conscious or unconscious bias.

As previously noted, we found business method patents with secondary 705 designations in various main classifications, but the greatest concentrations were in main classifications 235, 700, 707, 709, and 713, which are populated by many inventions that are similar to those covered by patents with main 705 classifications. Notably, we also discovered that the number of secondary 705 patents appearing in main classifications 235, 700, 707, 709, and 713 increased dramatically during the four years after SPER from the pre-SPER year. The proportion of Total (main plus secondary) 705 patents accounted for by secondary 705 patents with main classifications of 235 increased from 2.8% in the pre-SPER year to 7.1% in the fourth year after SPER. The percentages for the other main classes were 0.3% to 6.8% in class 700, 3.2% to 7.6% in class 707, 2.0% to 5.8% in class 709, and 1.9% to 6.0% in class 713. Secondary 705 patents with main classifications other than 235, 700, 707, 709, and 713 (“other main”) were more widely dispersed and as a group increased from 16.9% of all

73. Assignments to classifications are made by supervisory examiners. See MPEP, *supra* note 17, § 903.08(b), available at http://www.uspto.gov/web/offices/pac/mpep/documents/0900_903_08_b.htm.

705 patents in the year before SPER to 27.5% in the fourth year after SPER. These findings are summarized in the following table. Panel A shows the absolute numbers of patents in each year in main 705 and in other main classifications having a secondary 705 classification, Panel B shows percentage change in each of the four post-SPER years over the pre-SPER year, and Panel C shows p-values for the significance of changes in each post-SPER year over the pre-SPER year.

This evidence also would suggest diversionary drafting by patent attorneys if the filing dates were mostly after SPER, but they are not. The number of patents in our post-SPER database for which applications had also been filed after SPER was relatively small, and it will be several years before the highly intuitive diversionary drafting hypothesis can be tested. Again, however, something is at work here, and it could be unconscious or conscious bias that leads PTO examiners to assign applications to particular classifications. The data revealing shifts of secondary 705 patents into particular main classifications other than 705 are summarized in the following table.⁷⁴

74. We also found a large concentration of secondary 705 patents in main class 340 (“Communications: Electrical”) (“This is the residual home for subject matter, not elsewhere classified, relating to communication by means which are in part or in whole electrical.”). *See* USPTO, Class Definition for Class 340, <http://www.uspto.gov/web/patents/classification/uspc340/defs340.htm> (last visited Feb. 27, 2006). However, there were no significant shifts of main 340, secondary 705 patents from before to after SPER. In Part VIII, we provide a few examples of patents in main 340 that could easily be characterized as business method patents.

Table 7
Shifts in the Main Classifications of Patents With Secondary 705 Classifications

A	Main 705	Main 235	Main 700	Main 707	Main 709	Main 713	Other Main
Year 0	896	34	4	39	24	23	207
Year 1	510	43	25	68	30	53	168
Year 2	494	20	27	97	31	52	155
Year 3	402	65	34	80	49	53	192
Year 4	400	73	69	78	59	61	281
B							
Year 0	73.0%	2.8%	0.3%	3.2%	2.0%	1.9%	16.9%
Year 1	56.9%	4.8%	2.8%	7.6%	3.3%	5.9%	18.7%
Year 2	56.4%	2.3%	3.1%	11.1%	3.5%	5.9%	17.7%
Year 3	45.9%	7.4%	3.9%	9.1%	5.6%	6.1%	21.9%
Year 4	39.2%	7.1%	6.8%	7.6%	5.8%	6.0%	27.5%
C							
Year 1	p < 0.0001	p < 0.01	p < 0.0001	p < 0.0001	p < 0.05	p < 0.0001	X
Year 2	p < 0.0001	X	P < 0.0001	p < 0.0001	p < 0.05	p < 0.0001	X
Year 3	p < 0.0001	X					
Year 4	p < 0.0001	P < 0.001					

VIII. EXAMPLES OF BUSINESS METHOD PATENTS WITH SECONDARY 705 CLASSIFICATIONS AND NON-705 MAIN CLASSIFICATIONS

To provide evidence of the substantial underinclusiveness of SPER and of the possibility of a greater reluctance to assign applications to main 705, we provide examples of patents issued with secondary 705 classifications and main classes 235, 700, 707, 709, 713, and a few other main classes in which there are smaller concentrations of business method patents. We counted the number of post-SPER secondary 705 patents in each

of these main classes and, using a random number generator, selected a random sample of approximately 10% for study. Based on an examination of every randomly selected patent, we attempt to identify which ones could reasonably be called business method patents, and then provide a few examples in each main class. Naturally, we are hampered by the same problem that causes the SPER initiative to possess a meaningful degree of futility in the first place: the impossibility of defining exactly what a business method patent is.

All attempts by courts and Congress to arrive at a workable definition for business method patents have encountered intractable difficulties. As far back as 1994, in *In re Shrader*,⁷⁵ Judge Newman of the Federal Circuit observed that the concept of “business methods” is probably indefinable. In a dissenting opinion in which she responded to a request by the Board of Patent Appeals and Interferences for guidance from the Federal Circuit on whether business methods should be excluded from patentability, a request the majority declined to take up, Judge Newman stated:

The Board also relied on the “method of doing business” ground for finding Schrader’s subject matter non-statutory under section 101. In so doing the Board remarked that the “method of doing business” [sic] is a “fuzzy” concept, observed the inconclusiveness of precedent, and sought guidance from this court. Indeed it is fuzzy; and since it is also an unwarranted encumbrance to the definition of statutory subject matter in section 101 . . . , my guidance is that it be discarded as error-prone, redundant, and obsolete. It merits retirement from the glossary of section 101.⁷⁶

In its 1996 revised guidelines to assist examiners with software inventions, the PTO itself observed that its personnel had experienced “difficulty in properly treating claims directed to methods of doing business,” and further stated that patent “[c]laims should not be categorized as methods of doing business,” but “should be treated like any other process claims.”⁷⁷

Congress passed the First Inventor Defense Act in 1999 to create a new patent infringement defense for a prior inventor of a business method that is later patented by another.⁷⁸ The prior inventor would be vulnerable to an infringement claim if she kept her earlier invention secret and thus

75. 22 F.3d 290, 297-98 (Fed. Cir. 1994) (Newman, J., dissenting).

76. *Id.*

77. USPTO, Examination Guidelines for Computer-Related Inventions, 61 Fed. Reg. 7478, 7479 (1996).

78. First Inventor Defense Act of 1999, Pub. L. No. 106-113, 113 Stat. 1536 (codified as amended at 35 U.S.C. § 273 (2000)).

did not create prior art to prevent a later inventor from patenting the same method. In creating this defense, Congress made no attempt to define a business method, leaving the task to the courts. To date, there has been no reported case in which the First Inventor Defense Act was at issue, and we, thus, have not yet had a chance to sympathize with the plight of a court seeking to ascertain what a business method actually is.

When bills were introduced in Congress in 2000 and 2001 that would have made it more difficult for applicants to obtain business method patents, the bills' sponsors did attempt to define the term "business method." On October 3, 2000, Representatives Howard Berman and Rick Boucher introduced H.R. 5364, The Business Method Patent Improvement Act of 2000.⁷⁹ H.R. 5364 proposed to increase the difficulty of moving business methods from application to issuance, and to make them easier to challenge once issued.⁸⁰

In the first known attempt to define a business method, H.R. 5364 stated that it is:

- (1) a method of--(A) administering, managing, or otherwise operating an enterprise or organization, including a technique used in doing or conducting business; or (B) processing financial data;
- (2) any technique used in athletics, instruction, or personal skills;
- and (3) any computer-assisted implementation of a method described in paragraph (1) or a technique described in paragraph (2).⁸¹

This definition has been criticized on several grounds, including the likelihood that it also could apply to patents on computer hardware⁸² and, more importantly, that its cloud-like character could logically encompass process inventions in many fields. The heart of the definition in section (1)(A) is circular. Greg Aharonian, a longstanding and well-known commentator on the patent system, observed, for instance, that "part of the definition is '... a technique used in doing or conducting business'—well isn't using toluene instead of benzene in a chemical reaction a technique used in doing or conducting chemical engineering business?"⁸³ He also provided an

79. Business Method Patent Improvement Act of 2000, H.R. 5364, 106th Cong. (2000).

80. *Id.*

81. *Id.* § 2.

82. Kuester & Thompson, *supra* note 24, at 678.

83. Gregory Aharonian, *Problems in Defining Business Method Patents*, INTERNET PATENT NEWSLETTER, Oct. 10, 2000, available at <http://www.bustpatents.com/articles/bizmet.htm> [hereinafter *Business Method Law Proposed*]. In his comments about H.R. 5364, Aharonian used his characteristically subtle style to state: "In short, IT IS UT-

example of how the Amazon.com one-click patent could be redrafted so that it would be placed into one of the PTO's software engineering subclasses and escape special treatment as a business method patent.⁸⁴

After no action was taken on H.R. 5364, the same sponsors introduced H.R. 1332, The Business Method Patent Improvement Act of 2001 on April 3, 2001.⁸⁵ The bill, which also received no action by Congress, defined a business method similarly to the previous year's bill. The definition in the second bill, however, emphasized the inclusion of only software-implemented business methods.⁸⁶ H.R. 1332 defined a business method as:

(1) a method- (A) of- (i) processing data; or (ii) performing calculation operations; and (B) which is uniquely designed for or utilized in the practice, administration, or management of an enterprise; (2) any technique used in athletics, instruction, or personal skills; and (3) any computer-assisted implementation of a method described in paragraph (1) or a technique described in paragraph (2).⁸⁷

Although almost everyone thinks only of software-embodied business methods, the previous definition could have been interpreted more expansively. Two observers criticized H.R. 1332's definition as similarly inexact.⁸⁸ Hearings on H.R. 1332 revealed significant concerns that the question whether an invention can be characterized as a business method would impose unnecessary burdens on the federal judiciary.⁸⁹

We are thus left to our own devices in identifying what constitutes a patent on a business method. Very generally speaking, a business method patent covers a business practice or technique. The circularity of this definition highlights the problem. The most obvious kinds of practices that fall within the common understanding of the term "business method" include those relating to advertising, shopping, sales, purchasing, financing, insur-

TERLY IDIOTIC TO TRY TO DEFINE 'BUSINESS METHODS' AS A CLASS OF PATENT APPLICATIONS TO BE TREATED DIFFERENTLY."

84. *Id.*

85. H.R. 1332, 107th Cong. (2001).

86. *Id.* § 2 (2001).

87. *Id.*

88. Kuester & Thompson, *supra* note 24, at 679 n.125.

89. See *Oversight Hearing on Business Method Patents: Hearings on H.R. 1332 Before the Subcomm. on Courts, the Internet and Intellectual Prop. of the House Comm. on the Judiciary*, 107th Cong. (2001) (statement of Ronald E. Myrick, president of the Intellectual Property Owners Association), available at http://commdocs.house.gov/committees/judiciary/hju72299.000/hju72299_of.htm.

ance, human resources activities, and specialized forms of communication within and between firms. As we will see, there are very plausible arguments for extending the definition of business method to include other business practices that are often further upstream than those just mentioned.

We looked initially at the title and abstract of each patent, but when there was any doubt about whether the patent could reasonably be characterized as covering a business method, we examined the claims and written description.

A. Main Class 235 (“Registers”)⁹⁰

There were 201 post-SPER secondary 705 patents within main 235, from which we drew a random sample of twenty. Conservatively, two-thirds of these twenty patents can be characterized as covering business methods. The other one-third of the twenty consists of a couple of patents that clearly do not fit within any reasonable definition of business method and a couple that are on the borderline.

Following are three examples of those that can be clearly characterized as business methods:

U.S. Patent No. 6,651,884: System for ranking card reissue transactions⁹¹

A system and method for selectively processing information to reissue cards to cardholders. The method includes assigning scores to cardholder accounts. Thereafter, the cardholder accounts are evaluated to determine eligibility for reissue. The method further includes the step of classifying into one or more groups, those cardholder accounts found eligible for reissue, wherein a first one of the groups contain cardholder accounts with a first set of scores, and a second one of the groups contain cardholder accounts with a second set of scores. Thereafter, the first group with the first set of scores is processed before the second group with the second set of scores.

U.S. Patent No. 6,223,983: Interactive point access financial and information system⁹²

The invention relates to a remote interactive point access banking and information system. Particularly, the invention discloses

90. See USPTO, Class Definition for Class 235, <http://www.uspto.gov/web/patents/classification/uspc235/defs235.htm> (last visited Feb. 27, 2006).

91. U.S. Patent No. 6,651,884 (filed Mar. 26, 2002).

92. U.S. Patent No. 6,223,983 (filed Feb. 19, 1999).

an integrated set of platforms presenting various service and transaction options to a customer. The invention enables a customer to access personal account information, apply for a loan, make commercial deposits and videoconference, in real-time, with a bank representative at the main office. A software implemented in preferably a mainframe computer provides direct access to the bank's database to which a customer is able to connect to execute transactions

U.S. Patent No. 6,196,458: Method and apparatus for printing a billing statement to provide supplementary product sales⁹³

A central controller such as one operating for a credit card account issuer receives one or more billing items which are to be printed on an account holder's billing statement. The central controller determines if the billing items, which typically specify purchases, satisfy any merchant-specified upsell offer conditions. Some upsell offer conditions include the purchase of a predetermined product, or a purchase which exceeds a predefined price. Such upsell offer conditions, when satisfied, direct the central controller to offer an upsell on the billing statement. If any of the upsell offer conditions are satisfied, the central controller determines one or more upsells that correspond to the upsell offer condition.

Following is an example of a patent in main 235 that is on the borderline, in that reasonable people might disagree about whether it should be characterized as covering a software-implemented business method because it also includes a physical shopping cart. It would not be unreasonable, though, to place this patent into a business method category.

U.S. Patent No. 6,659,346: Semi-automated shopping system⁹⁴

A semi-automated shopping system includes a main cart assembly that has a frame portion. The frame portion provides both horizontal and vertical support for the main cart assembly. The frame portion has a bottom section. A plurality of wheels is operationally coupled to the bottom section. The plurality of wheels facilitates transport of the main cart assembly. The main cart assembly has a storage portion designed for receiving multiple items to be purchased. A scanner assembly is designed for recognizing universal product codes applied to a surface of an item to be purchased. The scanner assembly is operationally coupled

93. U.S. Patent No. 6,196,458 (filed Dec. 1, 1997).

94. U.S. Patent No. 6,659,346 (filed June 14, 2002).

to the main cart assembly. A processor assembly is operationally coupled to the scanner assembly. The processor assembly provides a plurality of data items associated with the universal product code.

Following is a patent in the sample of twenty that one could not reasonably call a business method patent, even after an examination of all of the claims and the written description.

U.S. Patent No. 6,666,383: Selective access to multiple registers having a common name⁹⁵

Among the embodiments of the present invention is a processor having a number of registers in a register bank. The registers include a general purpose register and a stack pointer register having a common register name. Processor includes logic responsive to programming to perform a program instruction that references the common register name. This instruction is performed with general purpose register under a first condition and with stack pointer register under a second condition. Accordingly, multiple registers identified by the same name can be selectively accessed based on the establishment of certain conditions.

B. Main Class 700 (“Generic control systems or specific applications”)⁹⁶

There were 155 post-SPER secondary 705 patents within main class 700, from which we drew a random sample of eighteen. These patents generally deal with controlling, scheduling, monitoring, and maintaining various types of systems. Assuming a definition of business method patents that includes systems or methods operating at earlier stages in the supply chain, fourteen or fifteen of these eighteen Main 700 patents cover business methods. Not everyone would define business method so broadly, however. Although there is no compelling argument for excluding from the business method definition software-implemented processes at earlier steps in the supply chain, we understand that not everyone would agree.

Following are four main class 700 patents that many knowledgeable observers would characterize as business methods patents.

95. U.S. Patent No. 6,666,383 (filed May 31, 2001). Number references to drawings in this patent are deleted from the abstract.

96. See USPTO, Class Definition for Class 700, <http://www.uspto.gov/web/patents/classification/uspc700/defs700.htm> (last visited Feb. 27, 2006).

U.S. Patent No. 6,711,463: Method and apparatus for managing delivery destination of baggage⁹⁷

An object of this invention is to securely deliver a [sic] baggage of a traveler a [sic] delivery destination designated by the traveler even in a case where the traveler cancels the travel or changes the destination. First, identification information, information of a contact address, boarding information, and information concerning the delivery destination of the baggage are received from a delivery receipt terminal and registered in a contract database. Then, information concerning boarding status of the traveler is acquired from a passenger carrier server, which manages the boarding status of the baggage. If there is inconsistency between the acquired information concerning the boarding status and the boarding information registered in the contract database, the delivery destination of the baggage is inquired to the traveler's contact address, and the information concerning the delivery destination, which is notified from the traveler in response to the inquiry, is registered in the contract database.

U.S. Patent No. 6,671,563: System and method for collecting data and managing patient care⁹⁸

A care management system in which the management of the administration of care for patients is automated. Hospital information systems are monitored and the information from those systems is used in verifying the administrations of care to patients. The care management system monitors ongoing administrations for progress and automatically updates records and provides alarms when necessary. The care management system is modular in nature but is fully integrated among its modules. Particular lists of data, such as the termination times of all ongoing infusions, provide hospital staff current information for increased accuracy and efficiency in planning. Features include the automatic provision of infusion parameters to pumps for accurate and efficient configuration of the pump, and providing an alarm when an unscheduled suspension of an infusion exceeds a predetermined length of time. A passive recognition system for identifying patients and care givers is provided.

97. U.S. Patent No. 6,711,463 (filed Oct. 15, 2002).

98. U.S. Patent No. 6,671,563 (filed July 13, 1998).

U.S. Patent No. 6,516,240: Apparatus and method for the remote production of customized clothing⁹⁹

An apparatus and method is provided for creating custom-fitted garments wherein the customer provides critical information which is known to or easily ascertainable by the customer without assistance. Using this critical information, a controller applies rules contained in a model to estimate other critical dimensions necessary for the production of a selected garment, and which are not easily ascertainable directly by the customer without assistance. Using the actual and estimated critical dimensions, the controller determines the pattern data which is used to produce custom-made clothing which provides a superior fit to that which a customer would typically experience from the retail purchase of a similar mass-produced garment.

U.S. Patent No. 6,181,979: Medication processing system¹⁰⁰

A drug preparation system which can indicate which drug processing or inspection station or stations are busy so that drugs can be prepared in an optimum way. Patient data recorded on prescriptions received at a pharmacy reception is entered into a host computer through an input device. On command of the host computer, patient data are transferred to respective drug processing units. Each processing unit enters time data including drug preparation completion time into trays with a memory function for collecting drugs prepared. The drugs collected in each tray are inspected and sent to a drug pickup window, where the time data are transferred to a data processing unit. Based on the transferred data, a total processing time in each station is displayed on a display.

Following are two of several examples from the sample of secondary 705 patents in main 700 that not everyone would view as business method patents because they involve processes farther upstream than retail marketing, sales, or finance. After closer inspection, however, a convincing argument can be made that both belong within any reasonable definition of a business method patent. The first covers a system for remote maintenance of a manufacturing facility *and billing* for that maintenance, and the second covers the online transmission of configuration data to hearing aid manufacturers. In the first of these, one should not be misled by the use of

99. U.S. Patent No. 6,516,240 (filed Mar. 4, 2002).

100. U.S. Patent No. 6,181,979 (filed Jan. 12, 1998).

the term “device” because a reading of the claims reveals that the device is a computer.

U.S. Patent No. 6,708,072: Remote maintenance method, industrial device, and semiconductor device¹⁰¹

The present invention provides a remote maintenance method, a remote maintenance system, and an industrial device for enabling control and thorough services and billing according to the contents of the remote maintenance operation and the request destination of maintenance and enabling access limit according to the attribute of a service person, access limit according to the device state, and output limit according to the output mode. The industrial device installed at the factory and the operation device installed in the maintenance center are connected via the network. The operation device transmits command information indicating a command concerning maintenance to the industrial device and the industrial device executes a process according to the received command information, generates charge information indicating a charge concerning maintenance according to the contents of the executed process, and outputs the whole or a part of the generated charge information to the output device of the industrial device.

U.S. Patent No. 6,658,307: Method for configuring the functional properties of an audiological device¹⁰²

The method for configuring the functional properties of an audiological device in the form of a hearing aid initially provides a hearing aid with an IC that can be differently configured in view of its properties, permitting configuration upgrade information to be employed that is either distributed to middlemen via a separate data carrier or transmitted on-line from a data store of the manufacturer to a programming station of the middleman. The middleman has the possibility of himself upgrading hearing aids initially present as basic hearing aids in customized fashion, the configuration information being used for this purpose and the hearing manufacturer being paid for this.

In this sample of eighteen patents from main 700, there were only three or four that would not be characterized as business method patents even by those accepting a somewhat broader definition including control,

101. U.S. Patent No. 6,708,072 (filed Feb. 25, 2002). Number references to drawings in this patent are deleted from the abstract.

102. U.S. Patent No. 6,658,307 (filed Oct. 12, 2002).

monitoring, maintenance, and similar systems farther upstream than retail marketing, sales, and finance.

C. Main Class 707 (“Data processing: database and file management or data structures”)¹⁰³

There were 323 post-SPER secondary 705 patents within main 707, from which we drew a random sample of 33. All of the database creation and management systems and data retrieval systems that populate this sample clearly possess business applications, and at least 80% of them are explicit about their business applications. Following are three of the many examples of those that are easily identifiable as business method patents.

U.S. Patent No. 6,721,763: Automated convention processing system and method¹⁰⁴

A convention processing system is provided that includes software operable to store show information identifying at least one show in which a plurality of exhibitors will exhibit their wares, service information identifying a plurality of services available to the exhibitors at the show, supplier information identifying at least one supplier for each of a plurality of service items and a plurality of different suppliers. The software is further operable to access the information, display the services for the show, receive a selection of a service item, and store the selection of the service item as an order.

U.S. Patent No. 6,658,427: Method and system for providing multi-user electronic calendaring and scheduling functions for online instruction in an extended enterprise environment¹⁰⁵

An exemplary embodiment of the invention relates to a computer-based method and system for providing multi-user electronic calendaring and scheduling functions in an extended enterprise environment. The method includes scheduling trainees for online classes conducted by a training system, presenting a template pertaining to an open class time, associating scheduled class data to the scheduler for tracking and confirmation purposes, e-mailing notifications to trainees, updating class registration and related databases in real time via replication functions, aggregating and transmitting class registration data to the training system, and transmitting results of classes to trainees and the

103. See USPTO, Class Definition for Class 707, <http://www.uspto.gov/web/patents/classification/uspc707/defs707.htm> (Feb. 27, 2006).

104. U.S. Patent No. 6,721,763 (filed Feb. 12, 2003).

105. U.S. Patent No. 6,658,427 (filed June 12, 2001).

scheduler all via a multi-user electronic calendaring and scheduling application.

U.S. Patent No. 6,477,533: Systems and methods of maintaining client relationships¹⁰⁶

In one embodiment, systems and methods are used to maintain client relationships by tracking and managing customers and agents involved in booking a cruise. Furthermore, various activities which take place between an agent and active customers are monitored, whereby the type and quantity of activities performed by the agent is evaluated to assign a period of time of ownership of the customer. During the period of time while the customer is owned, other agents are prevented from acquiring the customer and subsequent booking commission. A series of rules which determine the duration of ownership of the customer are maintained and applied to enable the ownership to be changed as needed.

Although the great majority of patents we found in our sample from main 707 are clearly business method patents, following is an example of a database management system patent in this group that not everyone would identify as a business method patent, especially if given only a cursory look.

U.S. Patent No. 6,154,750: Method and system for navigation and data entry in hierarchically-organized database views¹⁰⁷

A method and system for navigating hierarchical database views that supports the efficient entry, review, and updating of data using a navigation display that is clear and efficient—yet compact in terms of the screen area used. At any point in the navigation process, the navigation display consists of buttons corresponding to the nodes that lie along the path to the last node visited (the set of previously made choices) and the children of this node (the set of current choices). Unselected and unselectable choices are culled and do not clutter the display. The user navigates up and down the hierarchy and enters data by selecting these buttons.

However, upon closer examination of the claims and the written description, one finds that the inventors' objective was to provide an easily navigable software interface for a hand-held device providing a physician with access to medical data in the course of his or her medical practice. A

106. U.S. Patent No. 6,477,533 (filed Dec. 1, 2000).

107. U.S. Patent No. 6,154,750 (filed Apr. 1, 1998).

physician's medical practice is a business, and this patent covers software that enhances the efficiency of engaging in that business. A final example from main 707 that, at first blush, many observers likely would not characterize as a business method patent, but that reasonably could be so identified after closer study, is the following:

U.S. Patent No. 6,108,647: Method, apparatus and programmed medium for approximating the data cube and obtaining approximate answers to queries in relational databases¹⁰⁸

A novel and unique method of approximating the data cube and summarizing database data in order to provide quick and approximate answers to aggregate queries by precomputing a summary of the data cube using histograms and answering queries using the substantially smaller summary. A unique method according to the present invention provides for identifying accurate histogram classes and distributing the space among the histograms on various sub-cubes such that the errors are minimized, while at the same time computer resources are maximized.

The written description of the invention reveals that the inventors were seeking to develop a method for querying a database that would allow for "approximate" answers, i.e., that would tolerate "small errors" in responses to queries. Two of the main examples they provide make it clear that it would not be a great stretch to call this a business method patent: (1) "One example of 'small' error tolerance may be given in the context of market analysis performed by a large multi-national corporation to analyze sales data over the past several years to find a nation with a potential market for the company's products. . . ."¹⁰⁹ (2) "A second example may be given in the telecommunications area, where telecommunication switches are used to route calls based on current traffic load on various available channels. . . . Due to the approximate nature of the data, the switch may sometimes select a sub-optimal route, but this is not a critical hazard to the switch's operation, as long as it is not too frequent."¹¹⁰

D. Main Class 709 ("Electrical computers and digital processing systems: multicomputer data transferring")¹¹¹

There were 169 post-SPER secondary 705 patents within main 709, from which we drew a random sample of seventeen. The general theme of

108. U.S. Patent No. 6,108,647 (filed May 21, 1998).

109. *Id.* at 6.

110. *Id.*

111. See USPTO, Class Definition for Class 709, <http://www.uspto.gov/web/patents/classification/uspc709/defs709.htm> (last visited Feb. 27, 2006).

main 709 is computer network communications, many of the patents therein covering processes in the communications industry or business communications in various other business contexts. Starting at the beginning of the sample, the first patent obviously covers a business method.

U.S. Patent No. 6,721,783: E-mailer controller for privately and securely delivering bank notices, advices and monthly statements¹¹²

An e-mailer controller which privately and securely delivers bank notices, advices and monthly statements via the Internet, other e-mail networks or the like. The e-mailer controller allows existing banking systems to deliver either printed bank statements or e-mailed bank statements. Thus, the banking system with the e-mailer controller is capable of multi-mode delivery of bank statements. The e-mailed mandated periodic statements include pictorial images of hardcopy banking instruments in accordance with customer preferences for presentation of such hardcopy banking instruments.

The title and abstract of the second patent in the list do not immediately inform one of its status as a business method:

U.S. Patent No. 6,708,226: Multithreaded batch processing system¹¹³

A system for processing a batch which is distributed into a plurality of independent segments. A preferred embodiment of this invention calls for implementation on a symmetrical multiprocessing platform, however, the invention is also applicable to massively parallel architectures as well as uniprocessor environments. Each segment comprises a plurality of discrete events, each discrete event comprising a plurality of sub-events to be processed.

However, the owner of the patent is AT&T Wireless Services, Inc. and the second sentence of the written description states: "This invention has particular application to the batch processing of customer account information in order to perform periodic customer billing." The written description also makes it clear that the invention consists of a software system for processing information about cellular phone customers who have different types of accounts so that billing is more efficient and more informative to those customers. This is a business method patent under any definition.

112. U.S. Patent No. 6,721,783 (filed Nov. 24, 1999).

113. U.S. Patent No. 6,708,226 (filed Sept. 4, 2001).

Like the second patent in the sample, the title and abstract of the third do not unquestionably announce that it is a business method patent.

U.S. Patent No. 6,704,771: Electronic message payload for interfacing with text contained in the message¹¹⁴

The present invention includes a system, method, and article of manufacture for communicating via an application program included as a payload of an electronic message. At least one application program is initialized after an electronic message is selected by a user. After initialization, the application program is executed. The execution of the application program includes displaying text included with the electronic message, and running a code segment including as a parameter at least a portion of the text included with the electronic message.

One does not have to look far to find, however, that the invention is intended to facilitate the delivery of advertisements by e-mail, and is a business method patent.

Examples of three other patents in our sample that, on their face, cover business methods are the following.

U.S. Patent No. 6,567,854: Internet service delivery via server pushed personalized advertising dashboard¹¹⁵

A communication service with a computer application is presented. The application provides an advertising dashboard to a subscriber engaged in a session of a service. The advertising dashboard includes an advertisement. The advertising dashboard may also include personalized information such as hotlinks to customized web pages.

U.S. Patent No. 6,460,072: Method and system for tracking the purchase of a product and services over the internet¹¹⁶

A method for establishing and maintaining a virtual outlet ("VO") relationship on the Internet between an entity that controls and manages a Web site constituting a VO and a merchant that controls and manages a different Web site. The VO presents a series of VO Web pages to customers that contain descriptive information about products from one or more merchants. Customers can link through the VO Web pages directly to a merchant Web page provided to the customer computer by the mer-

114. U.S. Patent No. 6,704,771 (filed Sept. 21, 1999).

115. U.S. Patent No. 6,567,854 (filed Oct. 21, 1999).

116. U.S. Patent No. 6,460,072 (filed Nov. 23, 1999).

chant computer for the purpose of obtaining more detailed information about the product and for ordering the product. When the customer has finished ordering a product, the customer computer returns to a VO Web page. To the customer, it appears that the entire ordering process is conducted entirely within the VO Web pages. The merchant then credits the VO for the sale of the product to the customer, charges the purchase to the customer, and sends the ordered product to the customer.

U.S. Patent No. 6,411,992: Method and apparatus for broadcasting information over a network¹¹⁷

An apparatus and method provides for the scheduling and broadcast of commercials and other information during transmission of multimedia information over a data network. Demographic information is gathered with regards to potential viewers of the broadcast. Through use of this demographic information, during designated commercial breaks during broadcasts of the audio or video information, advertising information can be broadcast to individuals based on the demographic information. The system includes a number of databases which correlate the broadcast schedule with the available commercials for transmission over the data network.

The other eleven patents in our sample from main 709 all are either business method patents on their face, or are found to be so after a closer look at the claims and written descriptions.¹¹⁸

E. Main Class 713 (“Electrical computers and digital processing systems: support”)¹¹⁹

There were 219 post-SPER secondary 705 patents within main 713, from which we drew a random sample of twenty-two. Main 713 is a very broad class covering software that provides support for other software systems and products. Many of those with a secondary 705 classification

117. U.S. Patent No. 6,411,992 (filed May 28, 1999).

118. This statement even includes one patent in our sample that was originally in main 709 (and thus ended up in our data base) but was later reclassified into main 718, retaining its secondary 705 classification. U.S. Patent No. 6,356,928, “Method for partitioning tasks into stateless elements,” filed Oct. 9, 1997). Classification 718 is defined as “Electrical computers and digital processing systems: virtual machine task or process management or task management/control.” See USPTO, Class Definition for Class 718, <http://www.uspto.gov/web/patents/classification/uspc718/defs718.htm> (last visited Feb. 27, 2006).

119. See USPTO, Class Definition for Class 713, <http://www.uspto.gov/web/patents/classification/uspc713/defs713.htm> (last visited Feb. 27, 2006).

claim inventions on security mechanisms for these software systems and products. In our sample of twenty-two, almost one-third (six or seven) cannot be called business method patents under any reasonable definition. Even the patents in this group, however, have clear business applications. One example is U.S. Patent No. 6,742,123, "Apparatus and methods for preventing denial of service attacks,"¹²⁰ a software security system to prevent business and government organizations' servers from being overwhelmed by malicious, mass e-mail messages.

Over half (twelve) of the patents in our sample claim secure means for facilitating business transactions. Three examples follow.

U.S. Patent No. 6,272,636: Digital product execution control and security¹²¹

Digital product execution control as disclosed contemplates production of a final version of a digital product and subsequently imposing execution control on that digital product. The manufacturer of the original digital product need not incorporate execution control features into the final version of the product. Execution control programming attaches to an executable file of the digital product to create a controlled executable file.

The claims and written description in this patent reveal that it covers a secure system, with copy protection, for a "try before you buy" model for selling copyrighted digital products such as applications software programs and is thus a business method.

U.S. Patent No. 6,314,519: Secure messaging system overlay for a selective call signaling system¹²²

A secure messaging system generates a secure financial transaction message. A wireless selective call signaling system controller receives the secure financial transaction message as a selective call message request including a destination identifier. A selective call message processor encapsulates the secure financial transaction message in a selective call message that includes a selective call address corresponding with the destination identifier. A selective call transmission service conveys the selective call message to a financial messaging unit that receives the selective call message, and in response to correlating the selective call address with a selective call address corresponding with the fi-

120. U.S. Patent No. 6,742,123 (filed Sept. 10, 1999).

121. U.S. Patent No. 6,272,636 (filed Apr. 11, 1997).

122. U.S. Patent No. 6,314,519 (filed Dec. 22, 1997). Number references to the drawings in this patent have been deleted from the abstract.

financial messaging unit, recovers the secure financial transaction message to effect a financial transaction.

As indicated by the abstract, this patent covers software that implements an encrypted wireless messaging system for financial information and the execution of financial transactions.

U.S. Patent No. 6,516,416: Subscription access system for use with an untrusted network¹²³

A system and method is disclosed for controlling access to computer resources using an untrusted network. The system preferably uses a hardware key connected to each subscriber client computer and adds software to the subscriber client computer and to the existing server computer. A clearinghouse is provided to store client and server identification data, including demographic data, including URL data, usage data and billing information. The clearinghouse authenticates the subscriber and server computers before an operating session occurs.

The invention claimed in this patent covers software and firmware (software code embedded in a chip) that provide a secure means for subscribing to an information source over the internet (the “untrusted” network). The “information sources” are commercial websites on which the customer can buy music, magazines, subscriptions to various commercial databases, and so on.

Another of the patents covers a secure system for renting software, the preferred embodiment of which is a system for renting postage metering software.¹²⁴ Two of the patents cover “smart cards.” The first of these covers a card (or “electronic wallet” or similar devices) including a tiny integrated circuit configured with software code allowing the storage, manipulation, and retrieval of personal authenticating data for a person making a retail purchase with a check or credit card.¹²⁵ The second of the

123. U.S. Patent No. 6,516,416 (filed June 11, 1997).

124. Secure On-line PC Postage Metering Sys., U.S. Patent No. 6,385,731 (filed Jan. 5, 2001).

125. Integrated Circuit Card with Identity Authentication Table and Authorization Tables Defining Access Rights Based on Boolean Expressions of Authenticated Identities, U.S. Patent No. 6,567,915 (filed Oct. 23, 1998). The patent has “method” claims making it clear that the patent covers software embedded in a chip, i.e., the actual processing of data: independent claims 28, 33, 35, 36, and 48. A patent covers a “software invention” regardless of whether the code carrying out the algorithms for processing data is on a magnetic storage medium (like a hard drive) or embedded in chips (“firmware”). The patent also includes a number of “device” claims on the same invention—these claims cover an integrated circuit chip configured to store and execute software code:

“smart card” patents in the sample covers both a physical card encoded with encrypted personal data or a “virtual card” (software executed from a computer providing encrypted personal data over the internet) to be used in transacting business with entities such as trade show exhibitors, medical care providers, and insurance companies.¹²⁶

Of the remaining main 713 patents that could be classified as covering business methods, several cover software that provides copy protection, access control, or rights management in connection with the purchase of copyright digital products.¹²⁷

Three patents in the sample do not emphasize security but instead provide other types of facilitating support for business transactions. Two of them, both owned by Compaq Computer Corp., cover software used on the internet that enables a customer to input various desired features and requirements for a computer system. On the vendor’s end, the software system recommends configurations of software and hardware components and provides price estimates.¹²⁸ The third patent not emphasizing security covers software that calculates the electric power needs of a utility customer which also produces some of its own electricity,¹²⁹ informs the electric utility of its needs, and generates data for billing purposes.¹³⁰

F. Some Other Main Classifications

The main classes on which we have focused in this section are those that not only have large concentrations of secondary 705 patents but also

independent claims 1, 8, 14, 21, 41. Like the method claims, the device claims include the processing of data by the chip. Finally, the patent includes claims drafted as though they cover a “storage medium”: independent claims 38, 39, 40, and 53. These, too, cover data processing actions. In addition to providing an example of a business method patent in secondary 705, this patent also illustrates how a software invention can be claimed in a number of different ways.

126. Secure Pers. Info. Card Database Sys., U.S. Patent No. 6,523,116 (filed Mar. 5, 1999).

127. *See, e.g.*, Sys. and Method for Regulating the Transmission of Media Data, U.S. Patent No. 6,487,663 (filed Oct. 19, 1998); Copy Prot. Sys. and Method, U.S. Patent No. 6,397,333 (filed Oct. 7, 1998).

128. Configuration Sizer for Determining a Plurality of Price Values and Performance Values for a Plurality of Candidate Sys. Configurations and Displaying Them for User Selection, U.S. Patent No. 6,578,141 (filed Jan. 19, 2001); Configuration Sizer for Selecting Sys. of Computer Components Based on Price/Performance Normalization, U.S. Patent No. 6,192,470 (filed Apr. 27, 2000).

129. Such a utility customer normally will be a manufacturer that produces heat or motion energy as a byproduct of its manufacturing process, such energy being used to power a generator for supplying part of its demand for electricity.

130. Distributed Elec. Power Mgmt. Sys. for Selecting Remote or Local Power Generators, U.S. Patent No. 6,697,951 (filed Apr. 26, 2000).

have experienced large incoming shifts from pre- to post-SPER. However, we encountered little difficulty in locating business method patents in a wide variety of other main classifications. For example, main class 52 is defined as covering “Static Structures (E.G., Buildings).”¹³¹ One is immediately struck by the incongruity of finding a secondary 705 patent in this class at all. In U.S. Patent No. 6,415,555, “System and method for accepting customer orders,”¹³² the first part of the abstract states: “A kiosk system and method is provided for accepting and processing customer orders and payments in a retail environment. The kiosk system and method is particularly applicable to the restaurant business” The claims and written description show that the inventor’s envisioned embodiment is a computer placed in the lobby of a restaurant for customers to select items from a food menu and transmit the order to the kitchen when the restaurant is very busy and the customer would otherwise have a long wait. Apparently, the term “kiosk” led to the assignment of a main 52 classification although this patent covers a software patent for carrying out a business transaction.¹³³

Main class 186 is defined as covering “Merchandising.”¹³⁴ Among our secondary 705 patents, four were in main 186. One of these covered what one would be hard-pressed to call anything other than a software-implemented business method patent. U.S. Patent No. 6,722,473, “Cash dispensing system for merchandise delivery facility,”¹³⁵ covers an integrated cash request, merchandise order, and cash/merchandise pickup sys-

131. See USPTO, Class Definition for Class 52, <http://www.uspto.gov/web/patents/classification/uspc052/defs052.htm> (last visited Mar. 21, 2006).

132. U.S. Patent No. 6,415,555 (filed Apr. 27, 2000).

133. *Id.* The patent also has other data processing secondary classifications in addition to 705, namely, 700, 707, and 715, as well as 235.

134. See USPTO, Class Definition for Class 186, <http://www.uspto.gov/web/patents/classification/uspc186/defs186.htm> (last visited Feb. 27, 2006).

135. U.S. Patent No. 6,722,473 (filed Apr. 17, 2002). Of the other three main 186 patents in our data set, one was a slight variation of the patent cited in the text, having derived from the same original application: Cash Dispensing Method and Sys. for Merchandise Delivery Facility, U.S. Patent No. 6,386,323 (filed Nov. 12, 1999). The other two patents also cover subject matter that could reasonably be characterized as business methods, although they include more non-software elements than the example cited in the text: Elec. Ordering of Goods with Delivery by Automatic Drive-up Storage Device, U.S. Patent No. 6,688,435 (filed Oct. 31, 2001) (covering internet and other software means for facilitating the ordering of retail merchandise, delivery to localized storage containers [because people are so often not at home to take delivery], and pickup by the customer); and Item Pick-up Sys., U.S. Patent No. 6,439,345 (filed May 22, 1996) (covering internet and other software means for facilitating the ordering and pickup or delivery of merchandise at a retailer’s on-site stock room).

tem. The merchandise could be fast-food, gasoline, or anything else amenable to such a system.

Although we could cite examples in many other main classifications, we end with main class 340, defined as “Communications: Electrical” (“This is the residual home for subject matter, not elsewhere classified, relating to communication by means which are in part or in whole electrical.”).¹³⁶ Our data set of secondary 705 patents included ninety-eight in main 340. Although this main class obviously includes a large concentration of secondary 705 patents, a significant number comport with most observers’ notions of the term business method. We did not include it as one of our primary areas of focus because it did not experience dramatic incoming shifts from pre- to post-SPER. One example of a main 340, secondary 705 patent covering a business method is U.S. Patent No. 6,198,391, “Self service sales and security system.”¹³⁷ The system claimed in the patent consists of customer contact and credit information stored on a computer at a retail establishment such as a clothing store. At a location on a rack of merchandise, the customer swipes a smart card identifying the customer and chooses merchandise from a rack. The act of removing the item from the rack triggers the sending of inventory data about the item to the store’s computer, such information being correlated with the customer information. The customer is automatically charged and billed, and the item is automatically removed from the store’s inventory. If the customer’s credit limit has been exceeded, or if the customer tampers with the rack, an alarm sounds.

G. Summary of Findings from Examining Other Main Classifications with Substantial Concentrations of Secondary 705 Patents

By examining a random sample of patents in other main classifications having substantial concentrations of secondary 705 patents, we find many examples of patents that clearly belonged in any knowledgeable observer’s definition of a software-implemented business method patent. We found many others that could easily fall within a more expansive definition that includes business activities further upstream than those such as advertising and selling. Our sample study clearly shows the underinclusiveness of the SPER initiative. Furthermore, many of the examples so obviously belong in main 705 that one is led to wonder whether there may

136. See USPTO, Class Definition for Class 340, <http://www.uspto.gov/web/patents/classification/uspc340/defs340.htm> (last visited Feb. 27, 2006).

137. U.S. Patent No. 6,198,391 (filed Oct. 12, 1998).

be a conscious or unconscious diversion of some applications away from the class subject to SPER.

IX. CONCLUSIONS

A. The SPER Initiative and Our Empirical Findings on its Effects

In response to a large volume of criticism of software-implemented business method patents, the PTO invested substantial resources in the SPER initiative, which, among other things, requires a second-level review of patent applications assigned to main class 705. Based on an internal process metric, the PTO declared the program to be a success and announced plans to expand it to other fields, such as semiconductors, biotechnology, and communications. Because the PTO is supported by user fees, any wasted resources represent a tax on innovation. Thus, it is important to examine the effects of SPER using external objective metrics that serve as a good proxy for patent quality improvement. If available evidence reveals little if any improvement in the apparent quality of these patents, SPER should not be continued, much less expanded. If on the other hand, the SPER initiative has produced significant improvements in the quality of patents within its coverage, further thought must be given to the question of whether expansion is a good idea. This conclusion is true regardless of whether the PTO actually expands the initiative in the near term, because it is important to know whether targeting patent reforms at particular technology fields is a sound approach.

In fact, the SPER initiative produced significant positive effects on the number and type of prior art references cited in main 705 patents, as well as significant positive effects on the number of main 705 patents having at least one of the various types of prior art references. Moreover, the SPER initiative also apparently led to significantly greater incidences of patent examiners themselves adding prior art to applications in main 705, thus probably enhancing the rigor of the examination process.

We are convinced, however, that this success is heavily tempered by several factors. The program is limited, first of all, by the fact that it is devilishly hard to define a business method and to cabin it within a particular patent classification. In previous research, we found that business method patents were located within several classifications other than 705. Thus, by focusing only on patents within class 705, the program is underinclusive. The initiative is also underinclusive by applying only to main 705 patents and not to secondary 705 patents. Moreover, the PTO's classification system itself is inadequate for the purpose because it makes distinctions based on very specific functions at low levels of abstraction. It

was designed as an aid to prior-art searching and not for the purpose of singling out an entire field of technology for different treatment.¹³⁸

Furthermore, an effort to define or classify patent applications for the purpose of treating them in a substantially different way invites gamesmanship. Previously, attorneys strategically drafted software patents to make them appear to be something else (such as hardware) when there was still doubt about the patentability of software; consequently, it was highly likely that the SPER initiative would likewise lead to strategic drafting to avoid SPER.¹³⁹ Although we remain convinced that diversionary drafting to avoid the second-level review of main 705 has been occurring, it is too early for us to establish the proposition empirically because there are not yet large enough numbers of post-SPER 705 patents the applications for which were also filed after the advent of SPER. Something unusual has been going on, however. We have empirically shown striking shifts of patents from main 705 to other main classifications having secondary 705 classifications. We believe that these shifts reveal much more than just a diminution in the total number of patents in main 705. The SPER initiative consumes substantial PTO resources. Additional examiners have been hired, but examiner time is nonetheless zero-sum. For every hour spent reviewing an application a second time, less time is available to review other applications either a first or a second time. Examiners have production quotas, which necessarily makes them time-conscious and, in general, they simply do not have ample time to adequately examine all of the applications that come across their desks.¹⁴⁰ We believe that the evidence suggests, at a minimum, an unconscious bias in the PTO against placing an application in Main 705.¹⁴¹

138. Although the International Patent Classification (IPC) system is generally viewed as better designed than the PTO classification system, IPC's are designed for the same purpose as PTO classes, operate in the same basic way, and are likewise unsuitable for carving out particular technology areas for different treatment.

139. Even if there were no other reason to avoid SPER, getting the applicant's patent issued faster is probably enough reason to avoid it.

140. See, e.g., Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495, 1496 n.3, 1500 n.19 (2001) (discussing both the limited time that examiners have to examine applications and the incentives they have to favor quantity over quality in allowing applications).

141. The Office of Initial Patent Examination first suggests a classification for a patent application and sends it to the Technology Center (also referred to as the "examining group" or "art unit") to which it thinks it may belong, and supervisory examiners or other designated examiners within that group then make the final assignment of classifications and decide whether the application belongs in their group or a different one. See *supra* note 17.

We identified patents in those main classifications that experienced dramatic post-SPER increases in the presence of secondary 705 patents. A random sample of approximately 10% of these patents revealed that large percentages of them can reasonably be characterized as covering software-implemented business methods. We presented examples of these, as well as several examples of business method patents from three of the many other main classifications having patents with secondary 705 classifications. Meaningful numbers of these patents cover business methods. Thus, the SPER initiative possesses deeply embedded deficiencies despite its success in the limited domain in which it operates.

B. The Soundness of Targeting Patent Quality Reform at Specific Technology Areas

What we view as underinclusiveness and probable gaming in the business method SPER program naturally raises the question whether such problems would necessarily attend such a program applied to other areas of technology. The PTO announced a plan to expand SPER to other areas where there have been relatively large numbers of examination reopenings ordered by the Office of Patent Quality Review, such as semiconductors, communications, and biotechnology.¹⁴² There was no indication of how these areas were to be defined.

Problems with definitions and patent classifications will be confronted in each of the above-mentioned areas in which the PTO has announced expansion plans. One attempting to define “semiconductors” or to use patent classifications for the purpose of identifying them will face a daunting task. Would a SPER-like program be applied only to patent applications that include the term semiconductor in the patent claims? If so, it would overlook applications in which the term “integrated circuit” is used instead of the term “semiconductor.” Indeed, such a program applied to patent applications using either of these terms in the claims would also capture many applications covering inventions in which a semiconductor device is not part of the invention itself, but that is used in connection with such a device. Would a SPER-like program be applied to machines and methods used in the fabrication of semiconductor devices? The fabrication of semiconductors involves a variety of technologies, including optics, chemistry, software, and mechanics. Thus, the term “semiconductors” applies more to an industry than it does to any particular technology field. Just as it would be practically impossible to define the subject matter of such a program, it

142. See SPER EXPANSION, *supra* note 25.

also would be very difficult to identify subject matter by using PTO classifications.

The term “biotechnology” likewise describes an industry more than it does a particular technology. It may be somewhat more feasible to single out some kinds of patents in the biotechnology industry for differential treatment than those in most other fields because patents on genetic engineering processes and products are likely to be more difficult to disguise than most others. To avoid underinclusiveness, strategic claim drafting, and possible bias in the PTO’s assignment of patents to a category that would be subjected to greater scrutiny, however, a SPER-like program in biotechnology would have to be very narrowly drawn. For example, if the primary quality problems lie in gene patents, as is likely to be the case, then a program applicable only to patents with DNA in the claims might work relatively well because it would be much more difficult to disguise the subject matter by strategic drafting, and there would be less subjectivity in identifying the subject matter for assignment to a SPER-like program.

With respect to “communications” patents, the category is so broad that any SPER-like program simply could not work unless very specific technologies were identified within the communications industry. A great many different technologies are used in communications, including traditional electronic circuitry, software, optics (light waves carrying data), many different types of mechanical hardware, and so on. Unlike biotechnology patents, it is hard to envision a particular field that might be singled out with the specificity necessary to avoid the problems encountered by the business method SPER initiative.

One trying to identify other “fields” for more rigid treatment in the examination process will encounter the same problems. To have any chance of avoiding these problems, any other category would have to be very narrowly circumscribed and would need to focus on the claims. The business method SPER program did not focus on the claims, and we are unsure how effective the PTO would be in singling out applications based on claim language. And, needless to say, we are persuaded that the classification system is not amenable to use for such a purpose.

An additional problem is that many inventions can be claimed in several different ways. When there was doubt about the patentability of software, many patent claims on software were drafted as though the subject matter was a machine or apparatus.¹⁴³ In various areas of technology, one

143. See *supra* note 125 (illustrating a software patent with claims on methods, devices, and storage media, all covering the same invention).

can claim the same invention as a machine, device, method, or a means for accomplishing particular functions. The type of claim format used can affect the language used in the claims. In the end, the real problem with singling out any particular subject matter for differential treatment in examination may result from the fact that patents are really about language more than they are about technology. Language often is not just slippery, but frustratingly elusive.

In summary, problems with patent quality are systemic rather than localized. Not only does the PTO issue substantial numbers of low quality patents in practically all fields, but it issues many patents across all technology fields that are subsequently invalidated in litigation.¹⁴⁴ Our study of the SPER program for business method patents demonstrates the existence of virtually inevitable deficiencies that will characterize any similar technology-targeted approach. Problems with patent quality result from more fundamental problems that require reforms aimed at increasing overall patent quality.¹⁴⁵

144. See, e.g., Allison & Lemley, *supra* note 10, at 194, 205-06 (finding that, of all litigated patents leading to final written decisions on validity or invalidity during 1989-96, 46% were found by a court to be invalid).

145. See generally ADAM B. JAFFE & JOSH LERNER, A BALANCED PROPOSAL INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS, AND WHAT TO DO ABOUT IT (2004); Joseph Farrell & Robert P. Merges, *Implementing Reform of The Patent System: Incentives to Challenge and Defend Patents: Why Litigation Won't Reliably Fix Patent Office Errors and Why Administrative Patent Review Might Help*, 19 BERKELEY TECH. L.J. 943 (2004); Bronwyn H. Hall & Dietmar Harhoff, *Implementing Reform of The Patent System: Post-Grant Reviews in the U.S. Patent System - Design Choices and Expected Impact*, 19 BERKELEY TECH. L.J. 989 (2004).

X. APPENDIX: EXAMPLES OF SOURCES OF NONPATENT PRIOR ART REFERENCES INCLUDED IN THE RANDOM SAMPLE OF 1,000 705 PATENTS¹⁴⁶

Academic

- L.M. Kilbourne et al., "The Effect of Information Diagnosticity and Clarity in Image Ads on Judgments About the Company", *Proceedings Decision Sciences Institute*, 1994, pp. 478-480.
- J. Salemi, et al. entitled "Linking EDI to MRPII to Reduce Cycle Time"; *IEEE*, pp. 558-570, 1994.
- "A Cryptologic Based Trust Center for Medical Images", S. Wong, *Journal of the American Medical Informatics Association*, vol. 3, No. 6, Nov./Dec. 1996, p. 410-421.
- *A Corner Matching Algorithm with Uncertainty handling Capability*, Proceedings of the Sixth IEEE International Conference on Fuzzy Systems, vol. 3, p. 1469-74, vol. 3.
- Shiller, R.J., "Measuring Asset Values for Cash Settlement in Derivative Markets: Hedonic Repeated Measures Indices and Perpetual Futures," *Journal of Finance*, vol. 48, No. 3, p. 911, Jul. 1993.

Trade

- McCarthy, Shira, "DVD promises an interim step towards interactive video", *Telephony* v229n22, pp 22, Nov. 27, 1995.
- "Work Measurement Program", *Small Business Report*, v10n10, pp: 58, Dialog File 15, Access No. 00297089, Oct. 1985.
- Nyweide, J., "Simply Sophisticated: Human resources management welcomes computerization", *Management World*, v16, n3, p34(2), Dialog File 75, Access No. 00112427, 1987.
- Heinen, J.C, "Automating the process for HRIS selection", *Employment Relations Today*, v21, n4, p371 (10), 1994.
- Taylor, Scott. "Don't Become Confined by 'The Box'", *Advertising Age*, vol. 68, Issue 23, p. 26, Jun. 9, 1997.

146. All source examples in this appendix are listed as they appear on the patent from which the source was taken. Patent numbers are on file with the authors. Patents available at LEXIS, Utility, Design, and Plant Patents Database (search for source).

- Beck, Joseph, “3 Types of Systems Drive Coupon Programs”, *Supermarket News*, vol. 37, p. 48, Jul. 13, 1987.
- Booker, Ellis, “Wal-Mart Deploys Handheld Computers,” *Computerworld*, vol. 26, No. 42, p. 68(1), Oct. 1992.
- “Electronic Price Labels Add Accuracy, May Boom in '90s,” *Drug Store News*, vol. 0, No. 0, p. 8, Oct. 1990.
- Tarnoff, Stephen, “Insurers Guaranteeing Lease Payments”, *Business Insurance*, vol. 18, No. 20, p. 36 (start page), May 1984.
- Wollard, David A., “Lease Guarantee Insurance —Aid to Small Businessmen”, *Mortgage Banker*, vol. 34, No. 2, p. 18 (start page), Nov. 1973.
- Starr, John O., “Lease Guarantee Insurance”, *The Appraisal Journal*, vol. 40, No. 2, p. 175 (start page), Apr. 1972.

Company/Industry

- F. Leymann, et al., *Managing Business Processes As An Information Resource*, *IBM Systems Journal*, vol. 33, No. 2, pp. 326-348, 1994.
- H.A. Inniss and J.H. Sheridan, “Workflow Management Based on an Object-Oriented Paradigm”, *IBM Technical Disclosure Bulletin*, vol. 37, No. 3, p. 185, Mar. 1994.
- “Information Technology—Coded Representation of Picture and Audio Information—Progressive Bi-Level Image Compression,” *International Standard*, ISO/IEC 11544:1993(e), First Edition, Dec. 15, 1993, pp. 26-51.
- PR Newswire, “PC Quote Makes One of the Busiest Web Sites on the Internet Available to Advertisers”, *Dialog File 148:IAC Trade & Industry Database*, pp. 1-2, Apr. 1996.
- PR Newswire, *Emagnet's E-Centives Extends IBM's Net.Commerce Solution With Breakthrough Internet Marketing Technology*, pp. 1-2, Dec. 1997.
- *Business Wire*, “Intergraph Announces Next Generation Geospatial Resource Management”, Apr. 26, 1999.
- *eShop Technology Overview*.
[HTTP://www.eshop.com/corp/technology.html](http://www.eshop.com/corp/technology.html), Jan. 1, 1996.
- *eShop In The News—Recent Press Release*.
[HTTP://www.eshop.com/corp/press.html](http://www.eshop.com/corp/press.html), Jan. 1, 1996.

University Publications

- Information Sciences Institute, "Transmission Control Protocol", DARPA Internet Program, Protocol Specification, pp. 1-77, Sept. 1981.
- Cohen, Danny, "Electronic Commerce," ISI Research Report, University of Southern California, Oct. 1989.
- Sean Smith and J.D. Tygar, *Signed Vector Timestamps: A Secure Protocol for Partial Order Time*, CMU-93-116, School of Computer Science Carnegie Mellon University, Pittsburgh, Pennsylvania, Oct. 1991; version of Feb. 1993, 15 pages.
- J.D. Tygar and Bennet Yee, *Cryptography: It's Not Just For Electronic Mail Anymore*, CMU-CS-93-107, School of Computer Science Carnegie Mellon University, Pittsburgh, PA, Mar. 1, 1993, 21 pages.
- J.D. Tygar and Bennet Yee, *Dyad: A System for Using Physically Secure Coprocessors*, School of Computer Science, Carnegie Mellon University, Pittsburgh, PA, May 1991, 36 pages.

Government Documents

- United States Postal Service, Information Based Indicia Program Postal Security Device Specification, Jun. 13, 1996, Draft Document XP-002137734.
- "Guidelines for the Diagnosis and Management of Asthma," *National Institutes of Health*, NIH Publication No. 97-4051, pp. 1-148 (1997).
- "Information Based Indicia Program (IBIP) Host Specification", United States Postal Service, No. XP-002142880, Oct. 6, 1996.
- "Information Based Indicia Program (IBIP) Key Management Plan," United States Postal Service, Draft dated Apr. 25, 1997.
- Stromeyer, J. and Nice, J., "Carrier Sequence Bar Code Sorter," *United States Postal Service Advanced Technology Conference*, vol. 2, pp. 1061-1074, Nov. 1992.
- Patent, Trademark and Copyright Laws, 2001 Edition, 17 U.S.C. §114 and §115.

Software

- Precision Visuals, Inc., Visual Data Analysis Software, Command Language, 1992.
- *eShop™ Technology Merchant Manual*, Feb. 21, 1996. This document contains proprietary material subject to MPEP §724.
- IBM Corporation, *Application System/400™, PC Support: DOS Users Guide*, SC21-8199-0, Copyright 1990.
- IBM Corporation, *Application System/400™, PC Support: DOS and OS/2 Technical Reference*, SC21-8091-2, Copyright 1988, 1990.
- Doc. No. S25H-6960-00 “IBM Visual Age C ++for OS/2—Visual Builder User’s Guide.”
- Doc. No. S25H-6968-00 “IBM Visual Age C ++for OS/2—Building Visual Age C ++Parts for Fun and Profit, Version 3.0.”

Popular Press

- Steiner, “New Amex ‘Spiders’ Mimic S&P Index,” *The Wall Street Journal*, Feb. 22, 1992.
- “Save the Mark”, *Financial Times* (London), p. I12, Feb. 1, 1983.
- Brown, Christie. “An Electronic Market for Art? (Centrox on-line Image Database).” *Forbes*, vol. 147, No. 6, p. 137, Mar. 1991.
- McElvogue, Louise, “Web User Develops Program to Delete Unwanted Commercials”, *Los Angeles Times*, 2 pp., Jun. 1996.
- Bryant, Adam, “Shaking Up Air Fares' Status Quo”, *The New York Times*, Mar. 31, 1997.
- “Business Communications: Challenges for the '80s”, *Fortune*, vol. 107, p. 37 (22), Apr. 4, 1983.
- Peter Coy, *Exploiting Uncertainty*, in “Business Week” of Jun. 7, 1999, pp. 118-124.
- Peline, Jeff, “Travelers Bidding on Airline Tickets; SF Firm Offers Chance for Cut-Rate Fares”, *San Francisco Chronicle*, Section A4, Aug. 19, 1991.
- Carey, Christopher, “Firm Offers Auction For Airline Tickets”, *St. Louis Post-Dispatch*, Aug. 7, 1991 at p. 1B.
- Wallace, David, “Company Planning to Let Fliers Bid on Airfares”, *Philadelphia Business Journal*, Mar. 26, 1990 at p. 15.

- “Letter to Business Extra”, The San Francisco Chronicle, Dec. 26, 1989 at p. C7.

Patent-Related

- U.S. application No. 09/007,492, Carey et al., filed Jan. 15, 1998.
- U.S. application No. 09/038,349, Carey et al., filed Mar. 11, 1998.
- U.S. application No. 09/296,988, Carey et al., filed Apr. 22, 1999.
- JP-57 197606 (Tokyo Shibaura KK) Dec. 3, 1982, Patent Abstracts of Japan vol. 7, No. 51 (p-179) Feb. 26, 1983.
- U.S. patent application Ser. No. 09/780,037, Wright et al., filed Feb. 9, 2002.
- European Patent Office, European Search Report, Application No. EP 97 30 9471, mailed on Apr. 23, 1998, 3 pages.
- Patent Cooperation Treaty, International Search Report, International Application No. PCT/US 97/21457, mailed on Apr. 23, 1998, 4 pages.