# Electronic and Software Patents – Law and Practice

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## *Chapter One: Electronic and Software Technologies*

### §1.01 Introduction

- Introduction: This chapter will summarize the state of the art in electronic and software technologies, across many levels of architecture (circuits, operating systems, programming) – a solid grasp of the entire system is often helpful in understanding the context and purpose of any one area

### §1.02 Short History of Electronic Technology

- Overview: The field of electronics was created with the invention of the electron tube in 1907, followed by the transistor in 1948 and the adoption of the semiconductor in the 1970s – additional research created the differential amplifier and logic circuit, and eventually the integrated circuit, which often combines analog and digital circuitry onto a single board – these are known today as application-specific integrated circuits (ASICs), and these are often cobbled together from prefabricated components called macrocells
- Electron tubes: These fall into two classes: gas-filled tubes, which rely on high-power rectifiers, and vacuum tubes – these were first designed as triodes (switches having a third electrode between the cathode and the anode), giving rise to tetrodes, which could handle higher frequencies, and pentodes, which included a suppressor grid – many tube designs are still used in CRTs, microwave devices, X-ray machines, and high-fidelity speakers
- Transistors: These replaced electron tubes in signal-processing applications due to their smaller size and low power requirements – several classes of transistors exist with different properties: bipolar transistors: these may exist in different polarities (PNP vs. NPN), and are primarily used as current amplifiers; modern transistors are created by precisely diffusing impurities into semiconductive material in order to form electron pathways – transistors can perform several kinds of logic (emitter-coupled vs. current-mode), and logic gates created from transistors are widely used in large-scale integration circuitry, e.g., transistor-transistor logic (TTL) and integrated-injection logic ($I^2L$) – four-layer devices, a specialized kind of transistor, including triacs, are used to control power by switching of high voltages and currents – field-effect transistors (FETs): these semiconductors have a main conductive path, with the conductivity of the path controlled by an electrode attached to the gate transistor, which may configured in many ways (voltage may either cause conductivity to occur [enhancement-mode FET] or fall [depletion-mode FET])
- Integrated circuits: The modern electronics field started in 1959 with the creation of the integrated circuit – after doping to create electron paths, the circuit is coated with insulating silicon dioxide – integrated circuits greatly benefit by allowing multiple components on one board – development of integrated circuits

scaled up from small-scale integration (SSI, less than 20 components) to very-large-scale integration (VLSI, millions of components), driven by photolithography and manufacturing improvements – one method of circuit design is the creation of a set of maskworks that define conductive regions of the circuit; these are then reduced to create masks, which is positioned over a photosensitive material, and light shining through the mask produces a precisely-crafted circuit – currently in vogue are complementary metal-oxide semiconductors (CMOS circuits), which require no electricity flow to maintain state; current is only required when the state is changing, and switched capacitors, which charge or discharge in response to changes in a multiphase clock signal

- Application-specific integrated circuits (ASICs): These integrated circuits are created by assembling sets of smaller circuits – to facilitate deign, creators may simply specify inputs and outputs along with a mapping function – this allows the designer to produce and test a simulation of the circuit before sending the design to an ASIC manufacturer for circuit printing – note: this may create a problem in patenting the circuit; use means-plus-function language, a table of useful and common components (any one that matches the mapping function will be covered), a software appendix, timing diagrams, flowcharts, etc.

**§1.03 Computer Technologies**

- History: First general-purpose, programmable computer, the Analytical Engine, was designed by Charles Babbage in the 1800's; never built, but designed with a punched-card reader, a processor (the "mill") capable of mathematical operations on 50-digit numbers, and a memory section (the "store") – the first working computer, ENIAC, was built in 1945 from 17,468 vacuum tubes, and required 174kW and six full-time engineers (mean failure time, 5.6 hours) – ENIAC was a 1.25MHz machine that could perform 5,000 additions per second – all programming was hard-wired, but its successor, UNIVAC 1 (1951), was programmable – John von Neumann conceived of the first machines approximating modern computers, which fetched instructions into an instruction register that fed them into the processor; this design defines a von Neumann machine – we also have non-von Neumann machines, e.g., pipelining and multiple-instruction, multiple-datapath (MIMD) designs – of course, the real advances began when computers arrived on the desktop in the early 1970's (the 4004 and the 8008)
- Current organization: Most modern computers live in a client-server-based, local-area-network configuration – these local networks may be connected together by network bridges to form a larger network, which can be connected to a wide-area network, e.g., the Internet – higher-bandwidth technologies, like asynchronous transfer mode (ATM), are also being designed – today's computers are primarily von Neumann instruction sequencers, performing sequences of operations specified in by a machine-language program – this program can be directly created by the use of assembly language, which translates programming mnemonics into opcodes and register specifications (also allows commentary, which is ignored by the machine but important to people reading the code) – even better, these programs can be written in more abstract, hardware- and instruction-set-agnostic languages, like FORTRAN, BASIC, or COBOL (all used in the

1960's), which made for portable programming – the next development involved structured programming, and associated languages like Algol, Pascal, and C, which allowed people to collaborate to build much larger applications – this concept was taken even further into object-oriented programming, where every module is treated as a distinct module, including languages like C++, Simula, and Java

- Basic computer technology: At its most basic, a computer involves a central processing unit (CPU), a memory store, and a sequencing unit – the memory unit stores data according to addresses, which may be accessed in any desired order (random-access memory) – the sequencing unit used to be an extraordinarily complex device that coordinated the processing of every instruction by the CPU and returned results – this was realized as difficult to maintain and a performance bottleneck, so modern computers incorporate a microkernel, a tiny, dedicated computer embedded within the architecture that coordinates the operation of the rest of the machine (e.g., generates control signals for processor and memory operations) – the microkernel runs using its own program (microcode) that is much easier to maintain than a tangle of circuitry – however, ASIC development tools are evolving to the point where microkernels may not be needed; the design tools generate all of the design logic for performing the complex coordinating steps – another improvement: parallelism, which involves altering the von Neumann model of executing one instruction at a time – this is helpful because modern machines have many independently-operating devices, and performance degrades when any of them sit waiting if they could otherwise be working – parallelism may occur in different ways: allowing a single program to perform multiple operations concurrently (an add and a multiply), allowing two programs to run simultaneously on individual CPUs that share the same resources, allowing many instructions to execute at different stages on the same processor (pipelining), or allowing several programs to swap access to a CPU (multiprogramming)
- von Neumann computers: These fall into two categories, based on working memory structure: general register machines (many registers, each holding some numbers, and CPU uses all of them together and interchangeably to compute results); stack machines (all of memory is accessed as a last-in-first-out stack, and mathematical operations always happen at the top of the stack; good for recursive operations) – most modern machines use a mix of these structures: general registers can be used like a stack, and vice versa (e.g., *n* simulated registers are stored on the stack, and top *n* values of stack can be individually popped) – von Neumann machines can still benefit from parallelism, e.g., one instruction set performed by a number of processors on the same number of identically-structured data sets (SIMD computers); this is good for complex simulations, e.g., weather forecasting algorithms
- Non-von Neumann computers: Some kinds of computers exist with more than one path between memory and the sequencing unit, but these are very difficult to program – e.g., multiple-instruction, multiple-datapath processing (MIMD computing) occurs on a machine with multiple processors, each reaching a separate program store; may even work on the same data set – alternatively, each

processor may own a particular share of memory, and the data that an instruction accesses determines which processor executes it (data-driven computers) – as a second alternative, each processor may run the same program asynchronously, and processors receive input and output from other processors (systolic array) – finally, many von Neumann machines may be connected by a local network, and may each operate on different parts of a shared file system, like different parts of a shared database (distributed computing)

- Classes of computers: Architecture of each machine is chosen to balance its needs against costs – supercomputers: fast logic circuitry coupled to arrays of processors; useful for processing large scientific problems that can be separated into discrete parts – mainframes: large, fast with extensive I/O and multiple processors, designed for executing a large number of concurrent tasks; used to power many individual machines ("dumb terminals") that had no independent processing power – mainframes were the first to incorporate advanced pipelining concepts (out-of-order processing: letting small, fast instructions finish before large, slow ones; branch prediction: predicting which conditional branch will be taken and hypothetically executing the chosen path) – workstations: high-performance processors in desktop machines designed to serve a single user; these processors often focus on using small, quick microcode instructions that can be executed very quickly, often in a single cycle (reduced-instruction-set computing, or RISC design, as contrasted with CISC design) – microcomputers: small machines designed to operate small, slow computers or devices (e.g., appliances); may include separate math coprocessors for carrying out long multiplication/division operations – note: these distinctions are blurring; the Pentium III Xeon processor incorporates many mainframe technologies, and many Xeons can be used in parallel
- Special-purpose computers: Microcontrollers: small microprocessors that run devices attached to a larger machine, e.g., analog-to-digital converters and universal asynchronous receiver/transmitters (UARTs) – digital signal processors: computers that perform complex signal-processing functions, e.g., filtering – both kinds of dedicated computers are usually programmed via read-only memory - neural network: a computer that can perform complex functions without explicit programming; the network can train itself to produce desired outputs; in fact, it's often tough to tell how the network arrived at a conclusion – fuzzy logic: useful for designing control modules

**§1.04 Computer Software**

- Overview: All von Neumann machines operate on machine code, which is stored in binary and understood by the computer, but difficult to read and write – for this reason, programmers developed assemblers that translate English-readable assembly commands into machine language
- Compilers and interpreters: These programs are used to execute programs written in high-level languages (those that are substantially removed from the hardware operations of binary code) – compilers convert the entire program into machine language code that can be directly executed, whereas interpreters step through the program converting one instruction at a time – these packages usually use a two-pass technique, first parsing the code and then generating instructions; some

compilers also run through a third time to optimize the code for execution (e.g., take repetitive statements out of loops)

- Programming languages: High-level languages have evolved over several stages of organization: first, non-block-structured languages (scripts of instructions – e.g., BASIC); next, block-structured languages (organized code divided into nested sections and subroutines, with a specification that facilitates reuse of code and grouping into libraries – e.g., C); finally, object-oriented languages (code organized into objects that can be subclassed, and easily shared or dropped into new projects – e.g., C++) – well-organized packages are probably easier to patent: their organization makes them easier to describe; the claims can be crafted around the code specification; and some design documents might be useful to include as drawings
- Operating systems: The operating system manages resources like memory, input/output devices, and CPU processing time, and allows programs to access them (programs can use a generic "print" instruction, and the operating system can handle the details for any particular printer) – for shared resources, the operating system provides synchronization (via mechanisms like "test and set" operators) to prevent them from access collisions – synchronizing access to the operating system also allows for multiprogramming, so that many programs can run at the same time without disrupting each other – this gives rise to server/client architecture, where a service running (passively) in the background provides a queue for incoming requests and waits for work to be done – one way to achieve this is to give every program an equal slice of operating time, but this is wasteful for processes that are just waiting for work; a better solution is to create a scheduling process that doles out processing time as needed – the operating system can also provide programs with virtual memory (disk space treated as system memory), and can provide an entire virtual machine (a simulation of a stand-alone machine with dedicated resources, inside which the program runs); the client/server model can be considered a virtual environment, in which the client treats the server as a peripheral device – one alternative to multiprogramming is real-time applications, which run only one process with very strict timing requirements (e.g., industrial machines) – common operating systems: command-line interface operating systems like VM/ESA, UNIX, DOS vs. graphical user interface operating systems like OS/2 Windows, and XWindows
- Applications software: Most user interaction occurs with an application (as mediated by the operating system) – applications are usually written in a high-level language and compiled to produce an executable program – applications can share certain code objects (e.g., Microsoft Word contains parts of Microsoft Excel for handling embedded spreadsheets) – internally, applications are usually organized as a main program that calls many subroutines and communicates with the operating system to gain access to resources
- The Internet: The Internet functions by coupling a message delivery system (TCP) with a routing and addressing system (IP), borrowing Unix file system conventions for naming and addressing – the Internet began in 1983 as the government network ARPANET, with rather rudimentary uses; was expanded in

1989 to its current structure following research advances by the NSF – even then, the Internet was still comprised of hard-to-use applications like Gopher, and was not broadly useful until the advent of the World Wide Web, created by Tim Berners-Lee at CERN (European Centre for Nuclear Research) – the first popular web browser was Mosaic, developed by the National Center for Supercomputer Research (NCSA), and all modern browsers adapt this model – the modern Internet browser runs as an application that translates between user I/O (web pages, addresses) and network traffic; the web pages that it parses are sent via hypertext transfer protocol (HTT) and are formatted in hypertext markup language (HTML) – this format can reference, and implicitly embed, resources like graphics (GIF and JPG), audio (MP3 and WAV), and custom content that the browser interprets by relying on a custom program ("plug-in") – the Internet is gradually adapting to new uses by new and revised communications standards, which are publicly documented and open for comments

## Chapter Two: Relationship to Other Intellectual Property Areas

### §2.01 Introduction

- Introduction: Computer hardware and software technologies can be protected by a number of different mechanisms (patent, copyright, trademark/service mark, trade secret, etc.), sometimes overlapping and sometimes conflicting – optimal protection usually involves a combination of these intellectual property forms

### §2.02 Trade Secret Protection

- Overview of trade secret law: Trade secrets originated with Roman law, and have been protected by U.S. common law for 150 years (*Vickery v. Welch* (1837)) and was harmonized among states by the Uniform Trade Secrets Act (UTSA), but were not covered by federal law until the Economic Espionage Act of 1996 (18 USC §90 et seq) – a trade secret consists of any information (formulas, patterns, programs, devices, methods, etc.) that provides an economic benefit, is not readily ascertainable by competitors, and is protected as confidential by the owner with reasonable efforts – trade secrets can also protect information that is not patentable – the trade-secret status of software is difficult to determine, due to its incomplete incompatibility with the principles of trade-secret law, but relevant factors include the efforts of the owner in developing the technology, the extent of internal knowledge by employees, security measures adopted by the owner, the degree of value conferred to the owner, the extent of knowledge of the secret outside the owner, and the costs required by competitors for independently creating the technology (*Gates Rubber v. Bando Chemical Industries*) – a trade secret can still exist if shared among a few market competitors, so long as they jointly protect it
- Protection of trade secrets: The UTSA extends protection to industry practices that provide economic value (actual or potential) and over which the owner has exercised reasonable efforts to prevent it from becoming generally well-known – this does not apply to information that is "readily ascertainable," which usually requires a hypothetical cost-benefit analysis in a misappropriation case – the plaintiff/owner must also prove misappropriation based on some kind of improper conduct: (a) knowingly acquiring an improperly acquired a trade secret, (b)

disclosure of a trade secret by one who has improperly acquired it or breached a duty of confidentiality, or (c) knowingly disclosing a trade secret acquired by accident or mistake – the UTSA provides relief in the form of injunctions (for actual or threatened disclosure) and damages (actual loss, unjust enrichment, punitive damages in cases of malicious misappropriation, and reasonable royalties) – also, the Economic Espionage Act provides criminal fines, imprisonment up to 10 years, or property forfeiture

- Trade secrets vs. patents: Trade secrets and patents are mutually exclusive, since the disclosure that destroys a trade secret is a prerequisite for patenting – thus, a trade secret may be transformed into a patent (but not vice versa) – also, a product may include both patented and trade-secret features, e.g., a trade-secret improvement of a patented feature – trade secret law covers a broader class of information than patent law (includes non-patent-eligible subject matter, e.g. food recipes, and unpatentable inventions, e.g. inventions that are obvious or not novel, or is published abroad but not known in the U.S.) – trade secrets can also be shared, because protection is not exclusive to the first and true inventor – finally, trade secrets have no term limitation (Coca-Cola's formula, "7X", has been a trade secret for 110 years) – however, these mutually exclusive areas of law coexist: state trade-secret law is not preempted by federal patent law(*Kewanee Oil Co. v. Bicron Corp.*)

**§2.03 Trademark Protection**

- Overview of trademark law: Unlike other forms of intellectual property protection, trademarks do not protect products but the association between a product and its producer – the core purpose of a trademark is to identify the producer of goods, in order to allow customers to make discriminating purchasing decisions – this can be a very valuable corporate asset, especially in highly technical markets where quality is largely measured by the reputation of the manufacturer (e.g., high-performance computing)
- Protection of trademarks: Whereas patent law protects any unauthorized use of a patent, trademark infringement only occurs where the unauthorized use creates a "likelihood of confusion," misleading customers into mistakenly buying the infringer's goods (contrast *Citibank, N.A. v. City Bank* (1980), where confusion was likely, with *Mead Data Ctr., Inc. v. Toyota Motor Sales* (1989), where Lexis-Nexus and Lexus were not confusingly similar) – many factors relevant to likelihood of confusion were set forth in *In re E.I. du Pont de Nemours & Co.* (1973): similarly of the marks, similarity of the products, similarity of commercial channels used by each party, conditions of sale of each product (careful vs. careless), the "sophistication" of the market, the fame of the senior mark, the density and nature of other marks in the field, and the magnitude of actual or potential confusion – this framework is applied as a "totality of the circumstances" analysis, thus rendering infringement a case-specific inquiry with little predictability
- Trademarks vs. patents: Whereas patents are issued at the discretion of the federal government, trademarks are created primarily through the company's actual use of the trademark; registration with the USPTO merely strengthens the protection

already due to the trademark – like trade secrets, trademarks have no fixed term, and only expire when the company stops using and enforcing it

**§2.04 Copyright Protection**

- Overview of copyright law: Copyright grants owners of artistic works a distinct bundle of rights over the work: the exclusive right of copying, derivation, distribution, public display, and public performance – artworks are defined as an original work of authorship fixed in a tangible medium of expression (need not be human-readable); the author is the original author, but most such works are "works made for hire," which transfer all rights to the commissioner (except for personal rights, e.g., moral rights)
- Protection of copyrighted works: Copyright attaches to the work automatically upon fixation in the tangible medium; however, the work must be registered with the U.S. Copyright Office before the copyright can be enforced (but this registration can be completed at any time) – infringement occurs where the defendant violates one of the copyright owner's exclusive rights – for copying, the copied portion must "go so far as to constitute improper appropriation": "protected expression test" (did the defendant copy the heart of the expression?) or the "audience test" (would the audience find the defendant's work "substantially similar" to the plaintiff's?) – for copying by creating a very similar work, copying can be inferred from similarity + proof of access, or in the absence of access, proof of "striking similarity" is sufficient to infer access – relief is available in the form of temporary or permanent injunctions, the impound or destruction of infringing works, damages (actual, unjust profits, statutory damages: willful infringement can involve statutory damages up to $100,000), and attorney's fees and costs
- Copyrights vs. patents: The federal copyright power stems from the same constitutional clause as federal patent power – however, these forms of protection cover different aspects of the work: a patent protects the functional elements, whereas a copyright protects the original expression of the subject matter – these forms of protection can often be combined (for software, two aspects may be protectable by copyright: the literary work (source and object code) and the audiovisual work created thereby) – while a patent focuses on particular features of the invention and claims each of them, copyright is not so delineated, but may apply to the work as a whole or only to certain portions of it (if the rest is uncopyrightable) – the critical difference is that copyright never reaches "the idea itself," but only the author's distinct expression of it – copyright does not require novelty, and as such, no examination is needed; registration is sufficient – though fixed in duration as patents are, copyright lasts much longer: individual works are protected for the life of the author + 70 years; works made for hire are protected for 95 years from first publication, or 120 years from creation
- Important copyright cases: *Baker v. Selden* (1879): addressed a copyright for an accounting system, and distinguished patents from copyrights – *Mazer v. Stein* (1954): addressed a copyright for an industrial lamp design, and confirmed the mutual compatibility of copyrights and design patents – *In re Yardley* (1974): invalidation of a design patent for a watch having human-like hands for watch

hands, in light of very similar design patent; CCPA reaffirmed the non-exclusivity of copyright and design patents

- Important software copyright cases: *Whelan v. Jaslow Dental Labs* (1986): addressed copying of nonliteral structures in dental-lab-management software; in defining the copyrightable portion of the program, Third Circuit distinguished the utilitarian, functional elements (comprising the "idea") from everything else (the "expression"), the latter including the source code (this decision is criticized as lumping together multiple "ideas" that can be expressed in the same program) – *Computer Associates v. Altai, Inc.* (1992): addressed copyrighted portion of a job scheduling algorithm; in denying infringement, Second Circuit created the "abstraction-filtration-comparison test" ("AFC test"): break down the artistic concept into constituent parts, filter out those in the public domain, and compare the remainder with the accused work – *Sega v. Accolade* (1992): in considering whether Accolade's display of Sega's password was the sole method of writing games for the Sega Genesis, Ninth Circuit affirmed as fair use, applying the four factors of Copyright Act §107: the purpose and character of the use, the nature of the copyrighted work, the amount and substantiality of the copied portion, and the effect of the use on the market
- Important patent/copyright interface case: *Lotus Development Corp. v. Borland International, Inc.* (1995): in considering the copyrightability Lotus's hierarchical menu system, the Supreme Ct held that the menu system comprised part of the electronic operation of the program, and that "methods of operation" are excluded from copyright law, relying on the legislative history of the Copyright Act of 1976 ("the actual processes or methods embodied within the program are not within the scope of copyright law") – the Supreme Ct also affirmed as copyrightable the literal computer code; the "look and feel" of the program; the sequence, structure, and organization of the program; and the filtered protectible elements of the program

**§2.05 Combining Patent, Copyright, and Trade Secret Protection**

- Combining copyrights and patents: As noted, these areas protect different aspects of the invention, and different feature sets of a product – full coverage requires both forms of protection, since many elements are unpatentable, and the copyright for the literal code may be circumvented by rewriting the application in a different language, or by making many syntactic changes (e.g., changing the structure of iterative loops) – sometimes, infringement may be brought under either the patent or the copyright, and each basis may have distinct advantages (scope of protection, specificity, forms of relief)
- Use of copyright notices in patent specifications and drawings: Source code included in a patent application may retain its copyright protection, and should include a copyright notice ("© 1987 Microsoft Corp."), but *must* also include an authorization in the specification, reading exactly as follows: "A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent file or records, but otherwise reserves all copyright rights whatsoever."

- Combining trade secrets and patents: While a patent requires the disclosure of the "best mode" of the invention, the form of that disclosure is not dictated; the actual code of a software program embodying a trade secret need not be disclosed in the patent application, so long as the "best mode" can be described by other means (flowchart, pseudocode, plaintext, etc.) – most software patentees opt for a plaintext description, as this is adequate to explain the concept to one of "ordinary skill in the art"; thus, the actual embodiment utilized by the patentee may be preserved as a trade secret

## Chapter Three: Searching Software Inventions

### §3.01 Introduction and Brief History

- USPTO searching: The USPTO has historically opposed software patents, in large measure due to the difficulty in performing novelty searches and supporting office actions – this intransigence only exacerbated the problem: patent attorneys still filed for software inventions, but cast them in different contexts (machines, processes, circuits) that made them unavailable for later searching – the first USPTO search systems were crude mechanical devices (e.g., "Peek-A-Boo System": a punched-hole system of identifying relevant references; a search was conducted by selecting a spot on the grid, running a bar through the cards, and raising it upward to lift up all cards without punched holes) – this was followed by Computer Controlled Microfilm Search, a document archive, and the Computer Aided Search and Image Retrieval (CASPIR) system
- USPTO classification: As software patents became more common and accepted, the USPTO added classes 340 (Data Processing and Diverse Storage) and 364 (Electrical Computers and Data Processing Systems) – most patents were routed into two subclasses (364/200 and 364/900), which became crowded and unsearchable – finally, the USPTO added class 395 (Information Processing System Organization) and classes 701-711 for various fields; this improved prior art classification, but further development is still needed – currently, classes 364 and 395 continue to dominate, with 7.16% of all issued patents in 1995 falling into these classes, totaling more than 10,000 software-related patents in issuance.

### §3.02 How to Search Software Inventions

- Timing of searches: Prior art searches may be useful even before developing technology, in order to find known solutions to a problem, to resolve freedom-to-operate issues (has a competitor already patented technologies in this area, or can patented solutions be licensed?), or to find opportunities for improving known solutions – searching before drafting the application will enable the drafting of claims that avoid the prior art – finally, searching may be useful to resolve post-issuance questions, such as the need for reexamination or infringement analysis
- Identifying sources of software prior art: USPTO patent and application database: this database groups patents into classes and subclasses, which are detailed in the Manual of Classification – other sources include magazine articles, the web, newsgroups and group email lists, and academic textbooks – USPTO patent examiners: patent examiners specialize in particular fields of technology, and the patent examining group most likely to handle the application may cite classification subclasses that are likely to be relevant (and cited against the

application) – examiners may be found via the PTO Information Directory (indexed by art unit) – EPO and foreign patent databases: these databases are less useful, since software patents are (at present) less tolerated in foreign patent systems – commercial patent databases: Derwent, LEXIS/NEXIS, World Patent Index, INPADOC, and the Software Patent Institute offer the same information as official databases but with additional information and advanced search capabilities – in some cases, these databases are available for licensing as an in-house search system, which may be much faster and more robust – commercial literature databases: these sources index trade journals (e.g., www.acm.org) – the Internet: search engines can be used to research online publications, public email lists, industry newsgroups, etc.

- Developing a search strategy: Selecting the searcher: the search might be conducted by the inventors (who might spot comparative advantages in different technologies), or by professional search firms (who might approach the invention more as a patent examiner would) – technology definition: the search should begin by defining the technology at issue with precision (including USPTO classification) – keyword selection: relevant industry terminology, and common combinations of such terms, should be identified to improve search yield – source selection: the search should identify and focus on sources most likely to contain relevant information; different sources have different lag times behind the state of the art, resource selection may depend on the age of the field in which the invention resides (cutting-edge technology vs. well-established) – the search process: the actual search constitutes an iterative process, which may need refinement as it progresses
- Analyzing patent prior art: Several factors in a patent may be useful in addition to the text – references: useful in identifying noteworthy references in the field and development chronology – forward references: patents cited by this patent; backward references: patents that this patent cites as relevant – ownership: it may be possible to identify companies that own a cluster of patents in the field; such companies may fit some common patterns: imitator vs. pioneer (are the company's patents cited more or less frequently by competitors than it cites its competitors' patents?), teaching vs. protecting (are the company's patents cited more or less frequently by other companies than by its own subsequent patents?)

## Chapter Four: Practice Under *Alappat* (and Its Progeny) and the PTO Guidelines

### §4.01 Introduction: Impact of *Alappat* and the Examination Guidelines for Computer-Related Inventions on 35 U.S.C. §101

- Introduction: Many tests have been developed for determining what kinds of software are patentable, based on terms commonly applied in §101 analysis ("mathematical algorithm", "abstract idea", "physical transformation", "law of nature", "natural phenomenon"), but no bright line has been identified – before 1978, the common test was whether the invention was a mathematical algorithm – after 1978, the USPTO applied the *Freeman-Walter-Abele* two-step test – this ended in 1994 with the ruling in *Alappat*, which implicitly supplanted *Freeman-Walter-Abele* with a traditional §101 test; many §101 cases relevant to software

patents issued in 1994 and 1995 – software was expressly approved as patentable subject matter in the USPTO's Examination Guidelines for Computer-Related Inventions (1996), and affirmed by the CAFC in *State Street Bank & Trust Co. v. Signature Financial Group* (1998)

**§4.02 Primary Authorities: Section 101 and the Supreme Court's Trilogy of Statutory Subject Matter Decisions**

- 35 USC §101: This primary authority broadly reads: "Whoever invents or discovers any new and useful process, machine, manufacture or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore" – this plain wording was "clarified" by numerous exceptions created in court opinions, but has more recently been given an expansive reading by the CAFC and Supreme Ct (*see Diamond v. Chakrabarty, infra*)
- Nonstatutory unapplied mathematical process: *Gottschalk v. Benson* (409 U.S. 63 (1972)): This case first brought software to the attention of the CCPA – the applicant filed method claims for a mathematical technique for converting binary-coded decimal (BCD) numbers into pure binary form – the USPTO rejected the claims, but the CCPA reversed the rejection – the Supreme Ct concluded that the claimed invention "can be done mentally," was "not limited to any particular art," and was "so abstract and sweeping as to cover both known and unknown uses" without an apparatus – the Supreme Ct thus held that the invention fell within the "phenomena of nature, mental processes, and abstract intellectual concepts" exception to §101 – however, the Ct declined to hold that all software was precluded from patentability
- Nonstatutory postsolution activity: *Parker v. Flook* (437 US. 584 (1978)): This case involved the management a catalytic conversion by computing alarm limits with a simple formula, which the patentee claimed as a novel method – the USPTO rejected the claims as involving a known formula; the CCPA reversed, noting that the applicant limited his claims to use of the formula in a specific industrial process (citing the claim preamble) – Supreme Ct reinstated USPTO's rejection, applying the "point of novelty test" (if the mathematical algorithm were considered prior art, the patent lacked any other inventive concept) – the Ct rejected the applicant's reliance on post-solution activity, stating that the presence of post-solution activity could not confer patentability upon otherwise unpatentable subject matter ("a competent draftsman could attach some form of post-solution activity to almost any mathematical formula") – however, the Ct noted that the claimed invention must be considered as a whole, and that the incorporation of unpatentable components would not nullify patent eligibility for an otherwise patentable invention
- Impact of section 101 on new technology: *Diamond v. Chakrabarty* (447 U.S. 303 (1980)): This case involved novel bacteria (not software), but significantly limited the scope of judicially-created exceptions to §101; the Supreme Ct affirmed patentability of new technologies, like genetic engineering, absent tacit Congressional approval of patent eligibility – the Ct cited the word "any" in §101 as an expansive term, and cited the Committee Reports on the 1952 Patent Act as evidence that "Congress intended statutory subject matter to 'include anything

under the sun that is made by man'" – the Ct acknowledged exceptions (with narrow scope) for laws of nature, physical phenomena, and abstract ideas

- Statutory use of a mathematical formula: *Diamond v. Diehr* (450 U.S. 175 (1981)): This case involved a "method of operating a rubber-molding press" by controlling curing time using the well-known Arrhenius equation – the USPTO rejected the application, but the CCPA reversed, noting the considerable improvement of the claimed invention over the inaccurate prior art methods – the Supreme Ct affirmed patentability, expressly affirming the potential patentability of software – the Ct contrasted the unpatentability of an abstract algorithm running on a general-purpose computer with a method of solving a specific problem – the Ct again affirmed that an otherwise patentable invention does not become unpatentable by utilizing a mathematical algorithm, and again instructed the USPTO to consider the invention "as a whole," rather than "dissecting the claims into old and new elements" (noting that a combination of known elements may still be novel and patentable) – on the other hand, the Ct denied patentability for the non-inventive application of a formula to a specific problem, and for recitation of "insignificant post-solution activity"

**§4.03 Rise and Fall of the *Freeman-Walter-Abele* Two-Step Test**

- Initial statement of the two-step test: *In re Freeman* (573 F.2d 1237 (1978)): This case dealt with a typesetting method for arranging mathematical symbols stored in a font library on a publishable page; the applicant suggested a software method in his specification, but claimed it broadly as a system – the CCPA fixed on a comment from *Gottschalk v. Benson* that a patent should not "preempt" a mathematical algorithm in all circumstances, and formulated a two-step test: 1) do the claims directly or indirectly recite an algorithm? If so, 2) does the claim "in its entirely wholly preempt that algorithm"? – applying this test, the CCPA affirmed the patentability of this invention, holding that it did not disclose and claim an "algorithm" in the *Gottschalk* sense of the term
- Restriction of the two-step test: *In re Walter* (618 F.2d 758 (1980)): This case involved a method of correlating seismic wave signals into usable "partial product signals" via an algorithm, with Jepson claims placing it in the context of seismic prospecting and surveying – the CCPA clarified the second step of the *Freeman* test by advocating examination of the claim as a whole – patentable scenario: "the mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claims or to refine or limit claim steps"; unpatentable scenario: "the mathematical algorithm is merely presented and solved by the claimed invention, and is not applied in any manner to physical elements or process steps" – the CCPA held the invention unpatentable, characterizing it as essentially a mathematical data-processing method, lacking an integral physical component – the CCPA dismissed the seismic prospecting context as merely "mathematical modeling" of a physical condition, while not involving actual physical steps
- Expansion of the scope of statutory invention: *In re Abele* (684 F.2d 902 (1982)): This case dealt with a computed tomography improvement by using a data processing step for eliminating some artifacts from the outputted image; the applicant claimed this algorithm broadly as "a method of displaying data in a

field," with a dependent claim focusing on computed tomography – the CCPA first clarified *Walter* as not limiting patentable subject matter to algorithms defining structural relationships between physical elements or process steps, but to the broader class of algorithms that could be "applied in any manner to physical elements or process steps" – the CCPA then affirmed rejection of the broad independent claim, but granted patentability to the dependent claim, because the algorithm in this context connected a specific claim element ("X-ray attenuation data") to another claim element (some kind of display apparatus)

- Other section 101 tests: Cases following *Freeman, Walter,* and *Abele* cast doubt on the rigid application of the test – *In re Meyer*: CCPA acknowledged the existence of other tests of §101 patent eligibility – *Arrhythmia Research Technology Inc. v. Corazonix Corp.*: CAFC criticized the Freeman-Walter-Abele test as "without a statutory anchor" and potentially conflicting with the Supreme Ct rulings in *Benson*, *Flook*, and *Diehr*
- Extreme application of the *Freeman-Walter-Abele* test: *In re Schrader* (22 F.3d 290 (1994)): This case involved a bidding algorithm that allowed bidders to place multiple bids on different combinations of items, and resolved the bids in order to maximize purchase price for buyers while reducing purchase price for each seller – the applicant claimed this solely as a method, though it was implicitly easiest to implement as a software algorithm – the CAFC acknowledged the indefiniteness of the term "algorithm," stating only that it "described the solving of a mathematical problem" – the CAFC thereby purported to apply the Freeman-Walter-Abele test to hold the invention unpatentable – in applying the second step, the CAFC did not discuss the traditional analysis (whether the claim "wholly preempts" the patent), but relied on *Arrhythmia Research Technology Inc. v. Corazonix Corp.* in considering whether the invention was strictly an algorithm, or whether it is "an algorithm applied in one or more steps of an otherwise statutory process claim" – the CAFC affirmatively answered this question, rejecting applicant's arguments that the method "physically" rearranges bids, and instead finding that "there is nothing physical about the bids per se" – thus, the CAFC rejected the application as "data gathering," lacking any data transformation in accordance with *Walter* – the CAFC acknowledged the patentability of similar inventions with a physical component, including transformation of electronic signals and data (noting the transformative features present in *Arrhythma*, *Abele*, and *Taner*) – Newman dissent criticized the majority's focus on the "summing" property of the invention; characterized the present invention featured more than the summation, instead focusing on the transformative step in the application – Newman further criticized the ban on business patents as "fuzzy," and criticized decisions that applied this test

**§4.04 Federal Circuit Return to the Primary Authorities**

- Demotion of the *Freeman-Walter-Abele* test: *In re Alappat* (33 F.3d 1526 (1994)): This case dealt with a rasterizer for anti-aliasing a digital display, which the applicant claimed via an independent method claim – the CAFC first affirmed the courts' needs to return to "primary authorities" for patentability determinations; while acknowledging that laws of nature were not patentable in the abstract, the CAFC affirmed that the application of such a principle to a discrete application

might be – on the other hand, the CAFC affirmed the constitutional standard ("anything that can or will be made in the sun" ) – the CAFC allowed applicant's patent, noting that each of the claims featured a software invention, but that this alone did not disqualify the application from patentability

- Inapplicability of the *Freeman-Walter-Abele* test: *In re Warmerdam* (33 F.3d 1354 (1994)): This case involved a patent application disclosing a data structure organized as a "hierarchy of bubbles" for collision detection, and claiming "a method for generating a data structure" – the USPTO had rejected the application as an attempt to "preempt" the algorithm – the CAFC affirmed the rejection, but held that decisions of patentability should not be based on new criteria that lacked basis in the patent act (like "transformation of subject matter" and "method of doing business"), and that the proper criterion was simply "whether the claim is for a process that goes beyond simply manipulating 'abstract ideas' or 'natural phenomena'" – thus the court rejected the Freeman-Walter-Abele test focusing on the presence of an algorithm

**§4.05 Use of 35 USC §112 ¶6 in Section 101 Determinations**

- The *Walter* burden (or test): Apart from the method claims that formed the basis of the *Walter* rejection, the applicant also included apparatus claims based on §112 ¶6, merely reciting "means for" before each step – the USPTO refused even to consider these claims, holding that the patentee had merely attempted to dress up the method in apparatus language – CAFC affirmed, holding that such claims should be treated as directed to the method ("the apparatus claims differ from the method claims only in that the term 'means for' has been inserted before each process step to convert the step into the 'means' for performing it, they do not have separate meaning as apparatus claims"), and thus held the apparatus claims invalid on the same grounds as the method claims
- Reliance on disclosed digital circuits: *In re Iwahashi* (999 F.2d 1370 (1989)): This case involved a pattern-recognition invention, claimed first as a method and then as a series of means for accomplishing each step ("means for extracting N pieces of sample input values X… means responsive to the output for providing an auto-correlation coefficient…"), and also reciting a block of ROM for holding reference values – the USPTO rejected the claim for CAFC held the claim unpatentable, noting that each "means" could be accomplished by a wide variety of objects – the CAFC reversed, having been persuaded by the applicant's citation of an element in the specified preferred embodiment that specifically corresponded to each of the claimed means – the CAFC rejected the USPTO's broad reading, holding that §112 ¶6 "means" did not cover any potential mechanism for achieving the means, but only the specific means suggested in the specification and equivalents thereof
- Statutory presolution activity: *Arrhythmia Research Technology v. Corazonix Corp.* (958 F.2d 1053 (1992)): This case involved an invention for detecting QRS complexes in patient electrocardiograph data to diagnose susceptibility to a fatal heart condition – Arrhythmia (ART) successfully claimed the invention in means-plus-function form, but Corazonix, accused infringer, asserted invalidity based on the operation of the invention as merely a "data-gathering step" followed by outputting a pure number prompting no post-solution activity – thus, Corazonix

argued that the patent was non-statutory, since the steps and means purposes could be performed by many kinds of devices, including a general-purpose computer – the CAFC affirmed the validity of the patent; as in *Iwahashi*, the court found a component in the specification corresponding to each claimed means and step – the court acknowledged the availability of tests other than the Freeman-Walter-Abele test, but purportedly applied that one anyway – the court first found the presence of an algorithm (by finding that some clam elements involved "mathematical formula"), but disputed that the input and output were "pure numbers," but rather measurements of heart activity – the court summarized the test of §101 satisfaction: "claims directed solely to an abstract mathematical formula or equation, including the mathematical expression of scientific truth or a law of nature, whether directly or indirectly stated, are nonstatutory under section 101; whereas claims to a specific process or apparatus that is implemented in accordance with a mathematical algorithm will generally satisfy section 101"

- Obligatory use by PTO of ¶6 in 35 USC §102 and §103 determinations: *In re Donaldson Co.* (16 F.3d 1189 (1994)): This reexamination case involved the use of 35 USC §112 ¶6 to avoid prior art cited under §102 and §103 – the applicant claimed a dust collector featuring "means, responsive to pressure increases, for moving particular matter in a downward direction to a bottommost pit" – the BPAI rejected the application as obvious, citing a dust collector with a similar hopper but with a rigid surface; the BPAO acknowledged that the applicant's suggested embodiment showed a flexible sloping surface, but refused to import it into the claims – the CAFC reversed, holding that interpretation of means-plus-function elements must consider the embodiments suggested in the specification in any patentability, validity, or infringement contest – however, the CAFC limited this consideration to language used in the §112 ¶6 clause of the claim: "we are dealing with the construction of a limitation already in the claim in the form of a means-plus-function clause and a statutory mandate on how that clause is construed" – thus, the CAFC affirmed the novelty of the use of a flexible wall in this design – in response to this case, the USPTO issued new guidelines for interpreting §112 ¶6 (1162 OG 59 (1994)), requiring the examiner to show "identity of function to that specified in a claim" as proof of *prima facie* obviousness
- Obligatory use by PTO of ¶6 in 35 USC §101 determinations: *In re Alappat* (33 F.3d 1526 (1994)): The inventor of a circuit applied for a patent reciting some arithmetic processing components in means-plus-function form – the USPTO again refused to read the claim element in light of equivalents disclosed in the specification – the CAFC held that the USPTO was required to give effect to §112 ¶6 in its reading, and held that the invention claimed in this format described a cooperation of elements that comprised a patentable machine – the majority distinguished *In re Walter* for its lack of any disclosed embodiment for the means-plus-function element, with claims therefore operating as "process claims in the guide of apparatus claims" – since these process claims simply described a programmed general-purpose computer, the *Walter* applicant was required (and failed) to prove statutory eligibility – however, the CAFC left open the test of statutory eligibility of a programmed general-purpose machine

**§4.06 Statutory Data Structures**

- Patentable data structures: *In re Warmerdam* (1994): The applicant invented an improvement to a collision avoidance algorithm – the prior-art version of this algorithm involved a novel data structure that modeled the search space as a series of spheres where collisions were predicted if the path of the subject intersected a sphere; accuracy was heightened by a refinement into successively smaller spheres for each object – the applicant's improvement comprised a computationally more efficient method of generating the sphere hierarchy data structure – the application claimed this as a method, as "a machine having a memory which contains data representing a bubble hierarchy generated by the method," and "a data structure generated by the method" – the CAFC affirmed the Board's finding that a "data structure" is not a statutory class, contrasted with the clearly allowable claims to a "machine" or "process"
- Inapplicability of §103 "printed matter" rejection to data structures: *In re Lowry* (1994): This case involved a data structure holding data organized as a relational database – the applicant claimed this as "a memory for storing data for access by an application program," comprising a data structure and some attribute data objects (ADOs) – the examiner rejected these claims as nonstatutory under §101 and §103, and also rejected the claim to a "memory" component under the "printed matter doctrine," where the "printing" involved the imprinting of data into memory – the Board affirmed the §103 rejection but reversed as to §101 – the Board also affirmed as to the "printed matter doctrine," reciting the test as "whether a new, nonobvious functional relationship exists between the printed matter (data structure with ADOs) and the substrate (memory)," and holding that it did not – the CAFC affirmed the §103 rejection – however, the CAFC held the "printed matter doctrine" inapplicable to computer-readable memory – the court characterized the "printed matter doctrine" as involving unpatentable "novel arrangements of printed lines and characters, useful and intelligible only to the human mind," and thus distinguished from media parsed only electronically – thus, the applicatn's invention did not function solely as an information container, but had "tangible benefits" deriving from its organization (as evidenced by the applicant's attempt to patent the organization of information on the medium) – however, the CAFC did not abandon the "printed matter doctrine" as a valid basis of rejection where applicable – the CAFC did recommend claiming an "article of manufacture" instead of as the nonstatutory class of "memory" – this raised the question whether Warmerdam's improved algorithm would have been patentable if cast as an "article of manufacture" containing functionally organized data, instead of the nonstatutory class "memory"
- Applicability of *Lowry* rationale to §101 determinations: *In re Beauregard*: This case involved an improved algorithm for drawing polygons – the applicant claimed this program thus: "A computer program product (or article of manufacture) comprising: computer usable medium having computer readable program code means embodied therein," reciting a plurality of means representing the algorithmic steps; or alternatively claimed as "a program storage device readable by a machine tangibly embodying a program of instructions executable by a machine to perform method steps," reciting a plurality of method steps – the

examiner rejected the claims under the "printed matter doctrine," and the Board affirmed, analogizing program code to a computer-readable text of a book – the Board invoked the "printed matter doctrine," characterizing "printed" instructions with "printed" data representing multimedia (echoing concerns raised in the dissent in *Alappat*) – in so holding, the Board found the "printed matter" nonfunctional, even though the applicant had recited a specific function evoked in the computer by the instructions; thus, the Board wholly ignored the functional language built into the claims – when the applicant appealed to the CAFC, the Commissioner of the USPTO vociferously requested remand to the Board for reconsideration, admitting that the Board's opinion had "no relevance" to the invention at bar – the CAFC remanded for an opinion "in accordance with the Commissioner's concessions," and instructed it to examine the claims "under 35 USC Sections 102 and 103" – thus, the CAFC tacitly affirmed the patentability of the "article of manufacture" claim style, but the court could not address the core question of whether a "program product" constituted patentable subject matter under 35 USC §101

**§4.07 Refinement of Use of Paragraph 6 in Section 101 Determinations**

- Software disclosure: *In re Trovato* (1994): This case involved a novel data model for a pathfinding algorithm that represented the environment as a grid containing "goal-to-cost" values and optimal routing directions for each step – given an empty data structure of this type, the pathfinding algorithm calculated cost/direction values for each step budding outward from the goal – the inventor claimed this method as "a method for determining motion of an object," specifying this process as two steps, and also as an apparatus by claiming "means for" performing each step – the examiner rejected the claims for this invention as nonstatutory – the CAFC affirmed; applying the Walter-Freeman-Abele test: the claims recited an algorithm, and this process was applicable to "any number of different aspects" that could be abstractly represented and conducted – the CAFC concluded that the invention constituted "nothing more than the process of performing a numerical calculation," disclosing no "underlying physical process" despite the tangential connection to a robot controlled by this method – also, the applicant failed to disclose any method of connecting the robot or another physical device to the pathfinding algorithm – apart from this Freeman-Walter-Abele evaluation, the court reached the same conclusion after applying a Warmerdam test, characterizing the algorithm as "nothing more than the manipulation of abstract ideas" that failed to satisfy the statutory classes of §101 – the court also rejected the apparatus claims: since the specification did not disclose any embodiments for fulfilling either means, the apparatus claims were "precisely the sort of 'guise' recognized in *Alappat*," and thus were "of no patentable significance" – while the court recognized that the invention dealt with a data structure, it did not explain why a data structure was statutory in *In re Lowry* but nonstatutory here – also, the application in this case disclosed and claimed "a memory" for holding the data structure, which satisfied the statutory class requirement of §101 – moreover, this invention inherently required a processor for carrying out the steps, whereas the *Lowry* invention was solely an inactive data structure – thus, it is difficult to reconcile *In re Lowry* and *In re*

*Trovato*; but this opinion illustrates the court's continued reliance on physical components or processes as a criterion for patentability of software inventions

- Hardware and software disclosure: *In re Fraenkel* (1995): This case involved a circuit for performing some mathematical transformations (forward and inverse discrete cosine transform) – the applicant claimed this device most broadly in means-plus-function form, with a circuit diagram correlating each means to a structure in the circuit, as advocated by *In re Iwahashi* – the examiner rejected the claims as disclosing an invention operating on mere numbers, and the BPAI affirmed – on appeal to the CAFC, the applicant asserted that the invention performed transformations on electric signals by using a physical apparatus, and thus qualified for patentability – the USPTO responded that the claims recited only mathematical method steps – also, the claims lacked a preamble field of use and an indication of the relevant art; applying the Freeman-Walter-Abele test, the USPTO argued that these claims recited a mathematical algorithm and wholly preempted it – following the issuance of *In re Alappat*, the applicant here filed a supplemental brief relying on *Alappat*, characterizing as error the BPAI's assertion that each means could be satisfied by "any and every means for performing the function" – the USPTO also filed a supplemental brief, arguing (as suggested in *Alappat*) that the apparatus means-plus-function claims failed to recite structure, and thus should be treated as "method claims in disguise" – the CAFC vacated the BPAI decision, holding that it had incorrectly applied 35 USC §112 ¶6 in failing to read the means claims in light of the specification

**§4.08 PTO Guidelines: Expansion of Statutory Computer-Related Inventions Based on *Alappat* and Its Progeny**

- Purpose and impact of the Guidelines: The decisions heretofore discussed created confusion in the USPTO as to the proper process for examining applications for computer-related inventions – in 1995, the USPTO issued Proposed Examination Guidelines for Computer-Related Inventions, followed in 1996 by a final set of guidelines – the central focus of these guidelines was a flowchart for examining computer-related inventions, taking into account the considerations of 35 USC §101, §112 ¶6, the "natural phenomena" doctrine, *In re Beauregard*, and other factors – each inquiry in this flowchart was supplemented with examples of claims that would and would not meet the statutory requirements, and also boilerplate explanations as to why certain inventions were non-statutory – the Guidelines have had a strongly positive impact on the quality of software patent examination, vastly decreasing untenable 35 USC §101 rejections (and are even under-diagnosing §101 problems); some patent classes have been more improved than others, but all examining corps exhibit more skillful examination
- Reliance on primary authorities: The Guidelines encouraged reliance on primary authorities like 35 USC, and the Freeman-Walter-Abele test was reserved as a supplemental test for clearly mathematical algorithms – the Guidelines also stressed consideration of the real-world value of the application, with reliance on the criteria specified in *Diehr*
- Functional and nonfunctional descriptive material: The Guidelines also encourage examiners to differentiate claims into those describing "functional descriptive material," including data structures ("a physical or logical relationship among

data elements") and computer programs, and those describing "non-functional descriptive material," such as music, literary works, and compilations of data – examiners were instructed to reject all forms of descriptive material when claimed *per se* as falling outside the statutory classes; to allow claims for "functional" descriptive material where claimed on a computer-readable medium as per *In re Beauregard* and *In re Lowry*; and to reject all "non-functional" descriptive material as not useful under 35 USC §101 – some questions remain whether the latter rejection is contrary to *In re Lowry*, and this will have to be resolved in future cases; however, this distinction strengthens the presumption of patent eligibility for programs and data structures embedded on a computer-readable medium – the Guidelines also provide sample statutory and non-statutory claims of each type, with reasons for their allowability or unallowability

- Apparatus claims for specific machines and articles of manufacture: For claims to apparatuses or articles of manufacture, the Guidelines instructed examiners to focus on whether the invention recited structure for a specific machine or article, or whether it could encompass any computer or article for fulfilling the process – in the former case, the invention is inherently statutory, and the examiner moves on to a novelty/nonobviousness assessment – in the latter case, if the applicant cannot overcome the presumption that the invention is not bound to a specific apparatus or article, then the claim is examined as a method claim – apparatuses or articles specified in means-plus-function form are to be read in light of the specification, to see if corresponding structures disclosed in the specification limit the invention to a specific apparatus/article or a class thereof
- Practical applications of the underlying process: For claimed processes, and for claimed apparatuses and articles that recited no structure and were analyzed like processes, the Guidelines instructed examiners to focus on whether the process conducted a physical transformation with a practical application, or was limited to a practical application within the technical arts – either affirmative finding would render the claim statutory as a process, but negative findings in both categories leads to a 35 USC §101 rejection for lack of utility – a valid "physical transformation" required either postcomputer process activity (physical steps "independent of and following the steps to be performed by a programmed computer") or precomputer process activity (requiring one or more physical steps performed outside of the computer, e.g., collecting data by hand) – the Guidelines cite *Diehr* for support on both points, and reference *Abele* as an example of a process with outside-the-computer utility – if the method presents out-of-computer utility, it falls within a "safe harbor" for utility; but the activity must be more than those actions needed to carry out the algorithm (data-gathering not dictated by the algorithm will qualify, but merely "outputting the answer" is insufficient) – if no out-of-computer utility exists, the examiner must consider the in-computer activity for utility: the examiner should reject a process that "merely manipulates an abstract idea or performs a purely mathematical algorithm," and continue examining a process that is "limited to a practical application of the abstract idea or mathematical algorithm" (e.g., a mathematical model of sound is nonstatutory, but an algorithm for a noise-reducing filter based on a mathematical model of sound is statutory) – in making this determination, the examiner will

consider whether a contextual statement in a preamble is an effective limitation, or a non-limiting "field of use" statement

- Examination of inventions under §§102, 103, and 112, ¶¶1, 2, and 6: The foregoing analysis determines patent eligibility under §101, but even if ineligible, the invention must still be evaluated by the other statutory requirements – if unclear or claim-deficient, the application will be rejected under §112 ¶2 as indefinite for failing to "particularly point out and distinctly claim" the invention – claims containing means-plus-function clauses unsupported by express, implied, or inherent structure will be rejected under §112 ¶6, and under §112 ¶2 as indefinite – if failing to provide an adequate written description or best mode, the invention is rejected under §112 ¶1 – finally, §102 and §103 will be cited respectively for anticipation and obviounesness rejections

**§4.09 *State Street*: Statutory Financial Construct**

- Financial construct/investment structure protected by the Signature patent: *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* (1998) involved a claim to a computerized business-related method, involving a "hub and spoke" model of tracking the pooling of mutual funds into an investment portfolio – the CAFC viewed the technology thus: "this system provides means for a daily allocation of assets for two or more spokes that are invested in the same hub [by] determining the percentage share that each spoke maintains in the hub, while taking into consideration daily changes both in the value of the hub's investment securities and in the concomitant amount of each spoke's assets"
- Signature's claims held statutory: The CAFC held the technology patentable over several lower court rejections – for the means-plus-function claims, the lower court had found no structure to support an apparatus claim, and thus had characterized the invention as a computerized "process" with a higher threshold of patentability (see Guidelines); the CAFC reversed, finding a machine claim supported by corresponding structure in the specification for each means: "computer processor means" = "personal computer," "storage means" = "a data disk," and five logical "means" = various "arithmetic logic circuits" – furthermore, the CAFC held that casting the invention as a "machine" or "process" should not trigger different thresholds of patentability – whereas the lower court had rejected the claims as either a nonstatutory mathematical algorithm or a nonstatutory business method, the CAFC reversed on both grounds – on this point, the CAFC stressed that only 35 USC §101, *Diehr*, *Flook*, and *Benson* controlled patent eligibility; the mathematical algorithm exception had "little use," and the business method exception had "no use," in §101 analyses – the CAFC limited the mathematical algorithm exception to algorithms with "nothing more than abstract ideas," i.e., no utility; moreover, the threshold of utility is very low: an algorithm is statutory if (1) it produces a "useful, concrete, and tangible result," (2) if it is applied in a useful way, or (3) if it is reduced to a practical application – the CAFC abandoned the Freeman-Walter-Abele test as an inaccurate test of utility, noting that the "mere processing of numbers" was not a good indicator of the presence or absence of utility – finally, the CAFC abandoned the "business method" exception as both unnecessary and confusing: "Since the 1952 Patent Act, business methods have been, and should have been,

subject to the same legal requirements for patentability as applied to any other process or method"

- *Schrader* revisited: As a point of confusion, *State Street Bank* upheld the finding of unpatentability in *In re Schrader* (1994) for an automated method of conducting an auction – the primary reason for this discrepancy: the Signature Financial Group claims for an apparatus described in means-plus-function form (with supporting structure in the specification) triggered a different analysis than the Schrader claims were for a bare method, which, despite the applicant's argument that it could be carried out by computer, was unsupported by any such indication in the specification, and which was depicted in the drawings as being carried out on a chalkboard – the majority in *State Street* also tried to distinguish *Schrader* as not involving a transformation related to a physical object; however, persuasive weight must be given to Newman's dissent in *Schrader*, which commented that the bidding invention involved the "transformation of data" just like *Alappat* and *Diehr* – the only reconciling theory here is that *Schrader* did not turn on whether or not the bids represented a "physical entity" (they did not), but on whether or not the manipulation of these nonphysical objects constituted a "transformation" sufficient to confer patentability – by contrast, the *State Street* court clearly recognized that the allocation of investment shares among mutual funds in an investment portfolio were sufficiently "transformative"
- Different rationales of the Guidelines and the *State Street* court: The Guidelines provide a process for examining computer-related claims, and for amending claims from nonstatutory matter to statutory matter – by following this tutorial and adding structural components, the nonstatutory method claim of *In re Schrader* could have been repaired; this addition would have led the examiner down a different analytic path, particularly because it might have recited out-of-computer activity and a limited purpose– these principles will also be supplemented to reflect the rationale of *State Street*

**§4.10 Lessons of *Alappat* (and Its Progeny) and the Guidelines**

- New touchstones for defining statutory computer-related inventions: Careful drafting of the application can characterize virtually any computer-related invention as statutory subject matter; it is much more difficult to recharacterize the application later, and almost impossible after issuance – thus, the key to a valid computer-related invention lies in how the invention is described in the specification and drawings – the Guidelines focus on four criteria: (a) structural limitations that limit an apparatus claim to a specific machine, (2) postcomputer process activity that physically transforms an object, (3) precomputer process activity that operates on data indicative of physical activity or a measure of a physical object, or (4) in-computer process activity that manipulates an idea or solves a problem for a particular application – most computer-related technologies worthy of patenting satisfy one or several of these criteria
- Effect of Paragraph 6 on claim and specification preparation: Means- or step-plus-function claims must be clearly linked to specific elements described in the specification – *Iwahashi*, *Alappat*, *Abele*, and *State Street* all succeeded in patentability by having satisfied this requirement; e.g., *Alappat*'s affirming opinion cited the applicant's correlation of claimed means to an arithmetic logic

unit, a barrel shift register, and a ROM – claims to the physical transformation of signal should feature a name for the signal that is representative of a physical object (contrasting example: *Walter*'s "partial product signals," although related to a characteristic of an X-ray image, simply sound too mathematical) – relating the invention clearly to a well-known field and a practical problem will mitigate against an inference of the algorithm as a mathematical concept (*Alappat* is illustrative here) – while limiting the claim to a specific machine may help pass §112 ¶2, it may also narrow claim scope; conversely, the standard disclaimer that the claims are not limited to the disclosed embodiments may undermine an argument that the claim is rendered statutory by limitation to a specific machine

- New claim formats: *Lowry* and *Beauregard* illustrate new claim styles for computer-related inventions – the question remains open whether "nonfunctional descriptive matter" stored on disk as a data structure will be patentable

## Chapter Five: Drafting the Specification

### §5.01 Introduction

- Introduction: Software inventions are often claimed in means-plus-function or other functional language, and according to current practice, these clauses are interpreted in light of the specification – thus, in addition to meeting the requirements of 35 USC §101 and §112, the specification of a software patent application affects the scope of the patent, and so must be carefully drafted

### §5.02 Enablement

- Enablement: §112 requires the specification to teach the invention in sufficient detail to allow one of ordinary skill in the art to use the invention without undue experimentation (*In re Vaeck* (1991)) – this requirement only extends to the claimed invention, so other parts of the specification need not be taught in exacting detail (e.g., an algorithm need not teach how to hook it up to a user interface) – the practitioner should be familiar with the average "skill in the art"; if an ordinary engineer would understand how to implement a quick-sort step, the details can be omitted – the inventor may be able to state what the average practitioner would know – similarly, the practitioner should know how much experimentation would be needed to implement the invention (*In re Wands* (1988): relevant factors include the quantity of experimentation needed, the amount of guidance provided by the specification, the availability of working examines, the nature of the art, the state of the prior art, the relative skill of those in the art, the predictability of the art, and the breadth of the claims) – accordingly, an invention developed over many person-years will require a very detailed specification – source code can be included as an appendix, which clearly satisfies §112, but may give away more than is necessary for an enforceable patent – at the other end of the spectrum, a binary listing of opcodes derived from the compiled code may serve neither purpose – a good intermediate step may be to disclose pseudocode; might be generated by deleting all functional code and submitting only the source code comments – however, many foreign patent offices do not accept exhibits, so these should not be relied upon for patentability – one problematic issue for enablement: Application Specific Integrated Circuits

(ASICs) that implement an algorithm in hardware; this can be "enabled" by illustrating the hardware as a finite-state automaton

**§5.03 Best Mode**

- Best mode: §112 requires the inventor to disclose the best way of using the invention that he knows at the time of filing – the subjectivity of this requirement diminishes frequency of use, but it may be cited in the case of an intentional or accidental concealment (*In re Sherwood* (1980)) – alternatives can be provided, and the "best" example need not be identified so long as it is disclosed (and not intentionally buried in many alternatives) – a working example is not needed, but disclosure of integral data sets, software components, or hardware devices may be necessary – of course, consulting with the inventor is required to meet this requirement

**§5.04 Written Description**

- Written description: §112 requires that the specification "must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed" (*Vas-Cath v. Mahurkar* (1991)) – of course, the "writing" includes the figures – the specification as filed usually meets this requirement, but it may be insufficient where the claims are subsequently broadened

**§5.05 Preparing the Specification**

- Understanding the invention: If the invention is beyond the skill set of the practitioner, the inventor may be able to recommend treatises particularly suited for filling in the gaps; this also aligns the practitioner's understanding of the subject matter with the inventor's – other patents in the same technical area may also be educational, and technical journal articles may feature the right degree of detail for understanding the technology enough to patent it – of course, the best description of the invention will come from the inventor, as well as its placement in (and against) the prior art; some practitioners even record this interview and draft the claims based on the description
- Describing the invention: The specification only needs to describe the invention as claimed, so other parts can be omitted; however, the specification must still fulfill the enablement requirement, so components that must be used with the invention must be disclosed (though in less detail (*Fonar Corp. v. General Elec. Corp.*)) – more detail should be provided if the features of these external components are important, e.g., if the invention interacts with them in a new way – describing complicated systems can be difficult to organize; the practitioner might first write an outline and fill in each section with a few layers of detail (the outline might be available from the program flow diagram or object-oriented organization)
- Alternative embodiments: Because of the broad use of functional language in software patents, the specification should describe a broad range of alternative embodiments, in case the USPTO or CAFC decides to limit its scope as per §112 ¶6 language – however, this should be kept within reason, because disclosing more embodiments can broaden the scope of the patent past the §112-satisfying specification, or may ensnare prior art
- Diagrams: Functional block diagrams are useful for demonstrating the layout and interaction of different software components (algorithms, threads, resources,

objects, and data stores) – these can also be drawn with varying levels of detail – flowchart diagrams are helpful in describing a method claim; can depict an array of steps, the resources used by each, and the state transition diagram (this is the USPTO's preferred diagram style for process inventions); again, these can be drawn in varying levels of detail – however, flowcharts have trouble depicting recursive processes – alternatively, a software invention can be demonstrated by depicting the movement of data through the process, much like an article moving through a machine – for software inventions with many interoperating parts, a state diagram can show the internal mechanics of the invention, but as in ordinary state diagrams, the inputs and outputs (e.g., parameter values) at each stage need to be carefully mapped

## Chapter Six: Crafting the Claims

### §6.01 Introduction

- Introduction: Since the claims define the scope of the invention, they are the most important part of a patent – this chapter discusses the statutory rules of claim drafting and some strategies for achieving broad claim scope, as well as some sample claims

### §6.02 Preparing to Draft Claims

- Interview: Patent drafting begins with conversations about the invention with various agents of the client, including portfolio managers, licensing agents, and product managers – the interview with the inventor has three goals: (1) isolate the innovative concepts in the invention and the nearby prior art, (2) determine the maximal scope of the invention (different contexts, other uses), and (3) identify the intended uses of the patent: assertion against known infringers, grab of market share, defensive, licensing, protection of an industry standard, recognition of a technical contribution to the field; these factors determine how the specification is written
- The claim-drafting process: Once the invention has been identified, the claims should be drafted, which will set the framework for the rest of the patent application – first, write the broadest claim, using as few elements and descriptive words as possible, and the broadest terms for element interactions; it's better to err on the side of encompassing prior art, since the claims can later be narrowed more easily than broadened – next, outline the dependent claim structure; each should add some significant inventive content, and should have a specific purpose (e.g., claim differentiation, or coverage of embodiments likely to be recited) – next, outline additional independent and dependent claims, directed toward different aspects of the invention (apparatus, method, etc.), different inventions (e.g., subcombinations), uses of the inventions in different contexts (interfaces with other technologies), and the specific embodiment that the patentee wishes to sell or license; generally, the number and level of detail should match the scope of the invention, and should roughly be proportional to the length of the specification – next, critically examine the claim outline for removable elements, particularly for independent claims; the legal test is whether the claim would still be allowable under the statutory and substantive patent rules, and the practical test is whether the claims as a whole meet all of the goals proposed in the interviews –

finally, convert the outline into actual claims, using consistent terminology, verb tense, proper antecedent basis ("a" vs. "the"), etc.

- Additional claim drafting considerations: Whenever applicable, claim the invention as both an apparatus and a method: the apparatus claims may be more enforceable in other countries, but the method claims are needed to support assertion of the patent against overseas infringers – means-plus-function claims should never be worded so that a human can carry it out; such claims are unenforceable – also, no claim should consist of a single means; these claims might now be allowable, but have historically been rejected under the "single means claim" doctrine (*In re Hyatt* (1983)) – generally, Jepson claims should be avoided due to the admission of the preamble as prior art, and multiple dependent claims should be avoided because of the undue cost and reduced readability – it may be wise to include an "examiner-friendly" claim: a narrow, independent claim embodying most or all of the novel features; this allows the USPTO to classify the invention correctly, facilitates the examiner's prior art search, and provides the option of early allowance in case infringement arises that needs immediate litigation – working with the USPTO toward an allowance can be a frustrating battle, but on the whole, the examining corps are qualified, competent, and conscientious, and can be persuaded by patient, clear, and logical arguments

**§6.03 Rules of Claim Drafting**

- Claim overview: The claims define the metes and bounds of the patent, and must "particularly point out and distinctly claim" the invention (35 USC §112 ¶2) – this section also requires that the patent specification contain (a) a written description of the invention in sufficient detail to demonstrate possession of the inventive concept, (b) an teaching of the invention sufficiently detailed to enable those of ordinary skill in the art to make and use the invention without undue experimentation, and (c) a description of the best mode of making and using the invention known to the inventor at the time of filing – the claims should stand on their own, but must be consistent with the specification and drawings, which may be relied upon to resolve disputes over claim scope – this is particularly true of elements claimed in means-plus-function form, which are defined by referring to the embodiments described in the specification – in drafting the claims, the applicant may serve as his own lexicographer, so long as new or unusual uses of terminology are adequately defined and explained in the specification – the claims are also read in light of the prosecution history, and prosecution arguments distinguishing the invention from the prior art may preclude an expansive argument of claim scope in that regard – finally, every claimed element must be shown in the drawings (37 CFR §1.83(a))
- Claim structure and preamble: Claims are written as a preamble, a transitional phrase, and a body – the preamble defines the context of the invention, including environmental factors with which the elements of the claim interact – the most important question with a preamble is whether or not it serves as a claim limitation; the rule is that it is a limitation when it "gives life and meaning" to the rest of the claim (*Kropa v. Robie* (1951), e.g., where the claim body refers to the preamble – where the claim is written in Jepson form for an improvement invention, written as "an improved [description of prior art], where the

improvement comprises [the improved elements]"; here, the preamble is always regarded as a limitation, and as an intentional admission of prior art (*Pentec, Inc. v. Graphic Controls Corp.* (1985)) – Jepson claims are often required for foreign applications, but run the risk of granting prior-art status to references that should not be so regarded

- Claim transition: The transitional clause represents the bridge between the preamble and the body of the claim – the term "comprising" is most often used for claims to electrical, mechanical, and software inventions; this "open" transitional phrase allows the claim to be read on any invention including the recited elements, either in isolation or with other elements – claims for biotechnology and chemistry inventions often use "consisting of," a "closed" transitional phrase, to state that the invention consists of only the recited elements, and nothing else; e.g., a composition "consisting of" certain components covers any compositions including non-functional trace elements of other components, but nothing else – a middle-ground phrase, "consisting essentially of," covers any use of the invention in isolation or in the presence of other, non-functional components
- Claim body: The claim body lists the material elements of the invention – each element is first introduced abstractly by "a" or "an" (except for plurals and "means" elements), and can later be referenced definitely by "the" or "said," to signify the backward reference; claim elements not so described will be rejected as ambiguous – under 35 USC §112 ¶6, an element can be claimed as a "means for" or "step for" performing a function, but this tactic should be firmly supported by a description in the specification of every known way (structure) for satisfying that function – this style is particularly effective where one element performs two functions; while such a element can't be recited twice, it's valid to recite two means that are both satisfied by one structural element – the claim body may end with a "whereby" clause, which will be considered limiting if it further defines the claim elements (*Rajchman v. Herbert* (1963)), but will not be considered limiting if it describing the function necessarily performed by the recited elements (*In re Certain Personal Computers* (1984))
- Basic claim types: Method claims define the invention as a set of acts; these may be the easiest to write, but since they can't rely on drawings to the same extent as apparatuses, the specification must provide clear support – method claims are often the broadest kinds of claims for electronic and software inventions, because they cut to the core novelty of the invention – apparatus claims describe the invention as a series of interacting physical components; nevertheless, the elements may be alternatively written as a structure, using functional language, or in means-plus-function form – software inventions are often claimed as an apparatus comprising a general-purpose computer and some form of memory containing the inventor's program – finally, article-of-manufacture software claims describe the invention as media containing a program that can be used to achieve a particular result (*In re Beauregard* (1995))
- Mathematical algorithms: In order to be patentable, an invention, including a software invention, must apparently achieve "a useful, concrete, and tangible result" (*State Street Bank & Trust Co. v. Signature Financial Group, Inc.* (1998))

– by contrast, abstract ideas, including unapplied mathematical algorithms, are not eligible for patents under 35 USC §101 – in order to avoid the rejection of a claim to a software algorithm on the grounds that it is merely a "mathematical process," the claims should not simply claim an algorithm comprising mathematical operations, but in some statutory context – some examples: (a) a processor coupled with a memory chip containing a specific program, (b) a system comprising means for performing specific steps; (c) a "computer-implemented" method containing steps for performing certain functions; (d) a method for performing a function, involving use of a computer to carry out certain steps; (e) an article of manufacture containing a specific program or useful data structure, or means to perform a set of steps

- Claim differentiation: This concept is used to achieve broader claim construction (*D.M.I., Inc. v. Deere & Co.* (1985)) – the doctrine holds that, where possible, different claims should be read to have different claim scopes – this is achieved, e.g., by drafting an independent claim, and a dependent claim reciting an additional element; under the doctrine of claim differentiation, the independent claim must have a different (i.e., broader) scope than the dependent claim; i.e., this implies that the independent claim covers other embodiments other than the one specifically addressed by the dependent claim

**§6.04 Sample Electronic Circuit and Hardware Claims**

- Types of electronic circuit claims: The broadest electronic circuit claim should describe the invention at a high level of abstraction, e.g., as a process, a set of means, or a "signal processing system" – the narrowest, most specific claims will essentially constitute a "picture claim," describing the circuit in precise structural details: a specific kind of DC filter, an integrator, and an amplifier – another type of claim can be achieved by considering how the "workpiece," in this case an electric signal, moves through the circuit and is functionally manipulated
- Sample apparatus claim without means-plus-function language: "A signal processing system, comprising: a DC blocking filter…, an integrator…, and an amplifier…" – this claim describes a workpiece (a signal) and the parts that it encounters as it moves through the circuit, with language to connect the elements
- Sample apparatus claim with means-plus-function language: "A signal processing system, comprising: filter mans for blocking the DC portion of a signal…, integrator means for receiving the second signal…, and amplifier means for receiving the third signal…" – this claim is probably narrower than the claim without means-plus-function language, since its scope rests upon the disclosed alternative elements; but where a generic term for describing an element or function doesn't exist, the practitioner must resort to this style – in this case, the specification can achieve similar scope by suggesting each of the structures in the previous claim for each of the means in this claim, but this is often difficult to accomplish in more complex inventions
- Sample method claim: "A method for processing a signal, comprising: filtering the signal to block DC components…, integrating the filtered signal…, and amplifying the integrated signal" – this is the easiest type of claim to draft, and can be very strong and broad, but also runs a greater risk of encompassing prior art – even more clearly than the prior claims, this claim focuses on the progress of

the input signal through the circuit – the elements are connected by suggesting that each step produces a new signal that the next step receives

- Sample hardware apparatus claim without means-plus-function language: "A multiprocessor system, comprising: a plurality of processors…; and a shared memory…" – as with the circuit, this claim focuses on the structure of the device, and the memory elements connect to the multiprocessor system by backwardly referencing it (thus satisfying the antecedent basis rule)
- Sample hardware apparatus claim with means-plus-function language: "A multiprocessor system, comprising: a plurality of processor means for processing data…, and memory means for storing data…" – again, each means is identified by a unique name, and of course the specification must suggest specific hardware for filling each means
- Sample hardware method claim: "A method of interconnecting a plurality of processors and a memory, comprising: connecting at least one memory port of each of the processors to a corresponding port of the memory" – this one-step method claim is very broad, and isn't limited to a permanent or temporary connection of memory to processors – a narrower claim: "a method of communicating between processors in a multiprocessing system having a plurality of processors and a memory, comprising: connecting a port of each processor to the memory; and passing data between processors through the memory" – this claim is more limited by requiring data exchange: the infringer must both connect the elements and pass data

**§6.05 Sample Software Claims**

- Software method claim: "A computerized method for identifying matches between real estate buyers and sellers, comprising: maintaining a database…; scanning on a periodic basis…; and controlling printing device…" – method claims like this are routinely the broadest kinds of claims for software inventions, and because they require somewhat less reliance on the specification; also, these are the easiest claims to write, because they can closely follow the logic of the software method
- Software apparatus claim: Apparatus claims should always be included for software inventions, and optimally of two kinds: one for maximizing claim breadth (reciting only the critical software elements), and one for maximizing the royalty base (reciting also the parts of the larger computer on which they operate) – maximum-breadth claim: "A system for identifying matches between real estate buyers an sellers, comprising: a database component…, a scanner component…, and a printer component…" – maximum-royalty-base claim: "A system… comprising: a storage device; a printer; and a processor programmed to: maintain a database…, scan on a periodic basis…, and print on the printer…"
- Computer-readable medium claim: "A computer-readable medium having computer-executable instructions for performing a method comprising:…" – as affirmed in *In re Beauregard* (1995), a software invention can be claimed as an electronic medium containing a particular program – the specification should broadly define "computer-readable medium" to include all known kinds of media: floppy, CD-ROMs, hard drives, flash ROM, RAM, etc.

- Data structure claim: "A computer-readable medium having stored thereon a data structure comprising: a first field containing data representing…, a second field containing data representing…, and a third field containing data representing…" – these claims were held statutorily valid in *In re Lowry* (1994) (that patent application was rejected, but in light of obviating prior art) – no method or process steps need to occur here; the novelty resides in the selection, formatting, and organization of data – however, every part of the claimed data structure must have a common purpose, or else it may be rejected as an "aggregation" of non-cooperating elements
- API and protocol claim: "A set of application program interfaces embodied on a computer-readable medium for execution on a computer in conjunction with an application program that identifies real estate of interest to a buyer, comprising: a first interface.., a second interface…, and a third interface…" – this style of claim can be used to cover an API or a protocol, e.g., between a software application and a database library, and can be used to block interoperability of third-party software with a proprietary component
- User interface claim: "In a computer system having a graphical user interface including a display and a selection device, the method of providing and selecting from a menu on the display, the method comprising: retrieving a set of menu entries…, displaying the set of menu entries on the display, receiving a menu entry selection signal.., and in response to the signal, performing a search of a database for a match…" – this claim covers the "look and feel" of the application from copying by competitors – this type of claim can be tricky to claim broadly, e.g., this claim would probably not cover the use of an audio input and speech-recognition device for selecting a menu item

## Chapter Seven: Crafting the Patent Application to Achieve Broad Claim Interpretation

### §7.01 Introduction

- Introduction: Claim scope is a central issue in patent litigation – claim construction is decided by the judge, since it is analogized to the interpretation of a law (*Markman v. Westview Instruments, Inc.* (1996)); this step usually controls the comparison of the patent to the accused device, and hence heavily determines the outcome of the dispute – because patent litigants aggressively pursue claim interpretations to suit their positions, patent prosecutors must push for broad but enforceable claims that read on any future invention or embodiment that incorporates the same inventive concept

### §7.02 Rules Governing Claim Interpretation by the Courts

- The rules of claim construction: *Markman v. Westview Instruments* (1996) shifted the full responsibility of claim interpretation to the judge as a question of law, rather than a fact question to be decided by the jury – in hearings with the judge involving claim construction ("*Markman* hearings"), each party relies on different sets of evidence to support their arguments; thus, *Vitronics Corp. v. Conceptronics, Inc.* (1996) discussed in detail the relative weight of intrinsic evidence (claims, specification, and prosecution history) and extrinsic evidence (expert testimony); this decision held that intrinsic evidence clearly holds more

evidentiary weight than extrinsic evidence, and that most claim construction disputes should be resolved solely on intrinsic evidence (the specification is "always highly relevant and usually dispositive," and is "the single best guide to the meaning of a disputed term"; and prosecution history is "often of critical significance") – furthermore, in *Cybor Corp. v. FAS Technologies, Inc.* (1998), the CAFC refused to grant deference to any trial court regarding any "factual underpinning" about an issue of claim interpretation – together, these cases create a unified procedural framework for resolving claim construction issues

**§7.03 Language of the Claims**

- Ordinary meaning: First and foremost, claim terms are defined as per "their ordinary meaning to persons skilled in the relevant art" (*Hoechst Celanese Corp. v. BP Chems. Ltd.* (1996)) – in theory, the claims should be interpreted exactly according to the words chosen by the patent practitioner to define the invention; however, in litigation, the terminology must be construed in relation to the accused device (which was unknown to the practitioner when drafting the claims) – this creates an overlap in the claim interpretation and comparison steps (*General Mills Inc. v. Hunt & Wesson* (1997)) – in anticipation of this litigation setting, patent prosecutors strive to use terms that have specific meanings, but also adequate breadth to encompass those unforeseeable infringing devices
- Example of the use of intrinsic evidence: As noted, this is usually the central and dispositive issue in litigation – the interpretation should ordinarily derive from the totality of the intrinsic and (secondarily) extrinsic evidence – example of claim interpretation: *Virginia Panel Corp. v. MAC Panel Co.* (1997): does the motion of "'reciprocating' slide plates" cover rotating plates in an infringing device, or simply linear movement? – the court first looked to the claim language and found no limitation for purely linear movement – next, the court looked to the specification, and found that although the disclosed embodiments relied on linear motion, the claims were not solely limited to this embodiment, and did not foreclose the possibility of rotational movement – next, the court considered the prosecution history, and again found nothing to foreclose rotational movement – thus, the court ended its inquiry here with a determination of "reciprocating" as motion where "a point traverses the same path and reverses its motion at the ends of such paths," which encompasses rotation
- Primacy of specification over prosecution history and other intrinsic evidence: *Multiform Desiccants, Inc. v. Medzam Ltd.* (1998): this case involved a claim reciting "a packet for absorbing and immobilizing a liquid comprising an envelope which is degradable in said liquid" – a dispute arose as to whether "degradable" encompassed the competitor's product, which involved a porous packet that could absorbed liquid to the point of bursting open – the patentee relied on prosecution history arguments defining "degradable" as "to deprive of standing or true function" or "to impair in respect of some physical property"; the accused infringer noted that neither definition was included in the specification, and conflicted with the ordinary meaning of the term as "at least partially dissolved or disintegrated" – the judge found the patentee's "special" use of the term in conflict with the ordinary meaning asserted by the accused infringer, and refused to apply the special meaning since it was not included in the specification

– thus, the court declined a reference to the prosecution history in light of the ordinary meaning of the terms (but also refused to rely on a technical dictionary definition, offered by the accused infringer, because the plain meaning was sufficient to avoid reliance on this outside source)

- Specification as dictionary: *Vitronics* and other cases clearly state that the applicant may ascribe special meanings to claim and specification terms – however, the special meaning should be explicitly defined in the specification, and cannot be misleading; if either principle is violated, the ordinary meaning will be given weight over the special definition (even if recited in detail in the prosecution history) – this is a primary reason for the importance of consistent use of terminology among the specification, claims, and drawings
- Functional claim language describing structural features: While applicants are permitted to describe the elements of their invention in functional language, this tactic risks the unintended triggering of 35 USC §112 ¶6 and a narrower construction – *Personalized Media Communications, LLC v. International Trade Commission* (1998): This case involved a "digital detector" for locating and receiving television broadcast signals; the parties disputed whether this constituted means-plus-function language – the court held that in the absence of the term "means," a presumption existed against the applicability of 35 USC §112 ¶6, and that this presumption was supported in this case by the use of the structural term "detector": "even though the term 'detector' does not specifically evoke a particular structure, it does convey to one knowledgeable in the art a variety of structures known as 'detectors'" – this case demonstrates the need for clear reliance or avoidance on 35 USC §112 ¶6, e.g., by defining functional descriptors like "detector"
- Claim construction in light of the complexity of the art: The following cases illustrate the effect of technical complexity on claim construction: *Digital Biometrics, Inc. v. Identix, Inc.* (1998) involved a dispute over the term "array" in a digitizer; while the patentee's embodiment involved a set of registers comprising a two-dimensional array of pixels in an image, while the competitor's device comprised a single register processing a stream of pixel data – the judge gave "array" a narrow meaning, because the specification would not necessarily enable the use of the invention for a one-dimensional stream of pixel data through a single register – thus, this case involved claim construction in light of whether the specification would or would not enable the accused embodiment; hence, the claim term "array" was narrowly interpreted in light of the disclosure – contrasting case: *Johnson Worldwide Associates v. Zebco Corp.* (1999) involved a dispute over the term "heading signal" in a boat motor as either the direction of the motor, or the direction of the boat – the judge held that the term "heading" had a plain and general meaning in the art for the direction of the boat, and was not defined in the specification "with reasonable clarity, deliberateness, and precision" to warrant a more specialized meaning – in conjunction, these cases demonstrate the tendency of judges to define more technical terms narrowly than plain terms, and the need for practitioners to define even well-known technical terms broadly in the specification, in anticipation of claim construction by a non-technical judge

- Patentee as lexicographer: An applicant is free to use the specification to give a claim term either a new meaning, or a broader meaning than is ordinarily ascribed to it (*Markman v. Westview Instruments, Inc.* (1996)) – however, sometimes this attempt works against the applicant (*Hoechst Celanese Corp. v. BP Chemicals Ltd.* (1996): the patentee defined the term "stable" in a composition patent as "will not chemically decompose, or change more than about 50 percent of its dry physical dimension upon being exposed to the organic medium"; a dispute arose whether the term "dimension" in this definition included "volume," and the court held that it did not, because this interpretation would not include the disclosed embodiment) – even implying a particular use in the specification may urge the judge toward a definition of an unclear claim term (*Vitronics Corp. v. Conceptronic, Inc.* (1996) involved a dispute over whether "solder reflow temperature" meant the "liquidus temperature" at which the solder begins to melt, or the higher "peak reflow temperature" at which the circuit board degraded; the judge reached the latter conclusion, based on a single instance of the term "peak reflow temperature" found in the specification)
- Use of genericized terms may be inadequate to broaden element scope: *DSC Communications Corp. v. Pulse Communications, Inc.* (1999): This case involved a dispute over whether the term "subscriber telephone instrument" meant a conventional device with a hook, speaker, microphone, and keypad, or (noting the use of the term "telephone *instrument*") a broader set of devices that also encompassed equipment used by a PBX system – the court found no support for the broader definition in the specification, and chose the ordinary meaning of a "telephone" – this case demonstrates that a practitioner should not simply genericize a claim term with "instrument" or "device" to secure claim breadth, but should explicitly define the broader term in the specification
- Limitations of examples may be imported into the claims: *General Mills, Inc. v. Hunt-Wesson, Inc.* (1997): This case involved a dispute over a food package featuring a semiconducting layer that helped cook the contained "food items" – the specification disclosed several examples, all of which showed the layer in contact with the "food item" throughout the cooking process – the judge interpreted this as a claim limitation, and refused to enforce the patent against an accused infringement involving a microwave popcorn bag, where the popcorn kernels moved away from the semiconducting surface after popping – thus, the judge imported a limitation inherent in all suggested embodiments into the undefined term "food item"
- Numerical ranges: Patentees often cite a numeric range of environmental conditions in order to broaden claim scope – of course, this may create ambiguities over the range: *J.T. Eaton & Co. v. Atlantic Paste & Glue Co.* (1997) involved a dispute over a mousetrap adhesive substance, described as having "a plastic flow temperature above 120 degrees F," but where the specification did not describe how the quality of "plastic flow temperature" was to be measured; however, during reexamination, the practitioner attempted to distinguish prior art by proposing a test for "plastic flow" that the prior art embodiment would not have passed – the patentee sued a competitor for infringement, and the CAFC found no infringement because the competitor's product did not pass the test

proposed by the patentee for defining "plastic flow," and thus did not fall within the defined numeric scope for this term – thus, the patentee's use of a numeric range to distinguish prior art complicated prosecution and created an enforcement hole

- Linking terms: These terms describe interaction between claim elements, either functional, physical, or temporal – while this may not be a critical feature of a claim or invention, every element must be linked to at least one other element in order to avoid an "aggregation" rejection (MPEP §2173.05(k)) – linking words can have special meanings in the art, and should be chosen appropriately rather than generically ("coupled with", "cooperating with") – broad linking terms: *Johnson Worldwide Associates* (1999) involved a dispute whether the term "coupled" in "heading lock coupled to a trolling motor" was limited to a physical or mechanical interaction; the court refused to give this linking term such a narrow interpretation – also, *Cybor Corp. v. FAS Technologies, Inc.* (1998) involved a dispute whether the term "to" in "through said filtering means to said second pumping means" implied a direct flow and physical connection, or merely a functional relationship; the court expansively interpreted the term in the absence of an indication for a narrower meaning – narrow linking terms: *Renishaw PLC v. Marposs Societá per Anzioni* (1998) involved a dispute whether the term "when" in the phrase "generating a trigger signal when said sending tip contacts an object" meant "at or after that time," or "as soon as possible after contact"; the court acknowledged that the term "when" was ambiguous and not defined, but applied the latter and narrower meaning in view of the "overwhelming" use of the term in the specification to mean "immediately upon," and declined enforcement against an accused device featuring a short but definite delay – also, *Athletic Alternatives, Inc. v. Prince Mfg., Inc.* (1996) involved a dispute over an arrangement of strings in a tennis racquet where the distances between the strings "varies between" minimum and maximum values, and whether this included an arrangement having strings spaced only at the minimum and maximum distances (i.e., whether "varies between" requires at least one item of intermediate value); the court found both definitions plausible, and chose the narrower meaning, faulting the patentee for failing to "distinctly claim" the invention as required by 35 USC §112 ¶2

**§7.04 The Specification**

- Purpose: As illustrated above, the specification is always relevant to the scope of the invention and the definitions of claim terms, and so should be drafted to attain maximum breadth – the specification can also describe the advantages of the invention over the prior art and the objectives that it achieves, in order to demonstrate utility
- Definition of claim term implicitly by reciting its function: *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.* (1987) involved a dispute over the degree of "smoothness" needed to meet the term "smooth" in a claim for a contact lens material, where the accused infringer used a material that did not appear "smooth" when viewed under an electron microscope – the judge relied on the inventor's purpose in calling for a "smooth" surface, and borrowed specification language to define the term as "smooth enough not to inflame or irritate the eyelid of the

wearer" – thus, the judge denied that this term means "absolutely ridge-free," and affirmed infringement – similarly, *Ekchian v. Home Depot, Inc.* (1997) involved a dispute over the term "conductive" in the claim element "conductive liquid-like medium" positioned between two solid walls – the patentee pointed to a specification passage suggesting "materials of whatever kind whether liquid or not, meeting the foregoing requirements of flowability, conformity, horizontal surface retention, and conductivity"; the accused infringer referenced the disclosed embodiments, which showed a very "liquid" material of high conductivity – the CAFC sided with the patentee, based on the reference to "foregoing requirements" that broadly defined the properties of the material, and defined this term as "conductivity relative to the adjacent dielectric solid sufficient for the liquid to act as a capacitor"

- Statement of advantage: *Laitram Corp. v. Morehouse Industries, Inc.* (1998) involved a dispute over a conveyor belt with "sprocket recesses" for engaging the teeth of a wheel, comprised of two walls that extended "downwardly," and whether this required that each wall must be flat (the accused infringer's engaging surface was curved) – the CAFC found this limitation to be effective against the claims, because the inventor had described the advantages of a flat surface in the specification, and because the applicant had distinguished against a prior art reference with curved surface walls (even though the examiner did not rely on this statement) – the patentee criticized this holding as importing a limitation from the specification into the claims, but the CAFC stated that it was reading an indefinite claim term in light of the specification (and prosecution history) – this case is also noteworthy because the court gave little effect to the boilerplate equivalency disclaimer at the end of the specification ("the invention is not to be limited by what has been particularly shown and described")
- Statement of purpose: *Fromson v. Anitec Printing Plates, Inc.* (1998) involved a dispute over whether a method of "anodizing" aluminum covered an accused process forming only a thin oxide layer – the CAFC affirmed the lower court's judgment that "anodizing" meant forming "a thicker layer of porous oxide as distinguished from the thin, non-porous oxide layer that is formed in the accused process" – the court based its opinion on a statement of purpose in the specification describing the purpose of this step as protecting the aluminum from burning, which required a porous oxide layer; this contrasted with the presence of the thin layer in the accused infringing product, which actually exacerbated the burning problem – thus, the court utilized the statement of purpose as a limitation against a competing embodiment that included the same element, but did not achieve the same purpose
- Claim-drafting lessons from *Laitram* and *Fromson*: Practitioners should specifically suggest varying every element in order to broaden claim scope, in order to prevent a judge from limiting the claim to the disclosed embodiments – also, these descriptions should be disclaimed as one of many embodiments; a generic, boilerplate disclaimer at the end of the specification will not be enough to secure broad claim interpretation
- Describing the invention through embodiments: The CAFC pays close attention to whether an inventor describes an example as "the invention" or merely as "an

embodiment" (*Karlin Technology Inc. v. Surgical Dynamics* (1999): the court very narrowly declined to limit the patent scope to the confines of a drawing labeled as "the invention," and only because other drawings of the invention were labeled "preferred embodiment") – *Gentry Gallery, Inc. v. Berkline Corp.* (1998) involved a recliner sofa design with a control mechanism, which was claimed to be mounted anywhere on the sofa, but which the specification and embodiments showed only as "mounted on top or side surfaces rather than front wall" – the applicant later added another claim specifically claiming the placement of the mechanism "on the double reclining seat sofa section" – the CAFC invalidated this claim as failing to satisfy the written description requirement in light of the specification and drawings as first filed, because they only showed the controls located on the console; the court referenced the specification statement that "one of the objects of the present invention is to provide a console positioned between the seats that accommodates the controls" – thus, the court relied on the embodiments and statement of purpose to limit the claimable positioning of the controls – contrasting case: *Enercon, GmbH v. International Trade Commission* (1998) involved a method of converting wind-generated power to alternating current involving "rotating" a reference waveform to match the waveform of the generated electricity; the parties asserted competing definitions of "the general process of phase shifting a waveform" vs. the specific transformation disclosed as an embodiment – the court opted for the broader construction, because the specification generically used "rotate" and "shift" to mean any transformation, and only focused on a specific transformation as part of the preferred embodiment

- Claim-drafting lessons about embodiments: At least one embodiment must be disclosed to meet the "best mode" requirement, but the applicant should disclose others to suggest variations – of course, none should be referenced as "the invention" – also, the practitioner should maintain the use of generic terminology throughout the specification, and should only use narrower terms to describe a specific embodiment

**§7.05 Prosecution History**

- Careful use of statements distinguishing prior art: Attempts to distinguish prior art should focus on the narrowest possible distinctions that will overcome the prior art reference – *Cybor Corp. v. FAS Technologies, Inc.* (1998): in this dispute over whether one element connected "to" another element required a direct physical connection or merely a functional cooperation, the accused infringer relied on a prior art reference distinguished during prosecution that showed the first element containing the second element – if the practitioner had distinguished this art as not containing distinct elements that attached to each other, the argument would have allowed the accused infringer to escape infringement on the same grounds – rather, the practitioner had cited other advantages from its embodiment (enhanced user control of the second pump that wasn't possible with the prior art version), and managed to retain broad claim scope to ensnare an infringer
- Importance of precision in amendments in light of prior art: Claim amendments in light of prior art usually sacrifice some breadth (under *Festo*), but amendments that clarify the claim language can help solidify the claim breadth – *Bell & Howard Document Management Products Co. v. Altek Systems* (1998) involved a

jacket for holding microfiche strips that included "*in situ* ribs" that, according to claim 1, were "integrally bonded to form a unitary structure" – the examiner cited a prior art reference featuring ribs attached by adhesive strips; the applicant then amended his claims to append the phrase "free of adhesive" – in an infringement suit over the patent, the parties contested the validity of the patent over prior art featuring adhesive attachments, and the court specifically relied on the "free of adhesive" to define the claim scope as valid and encompassing the accused product – thus, the CAFC held that this addition merely "clarified the claims," and did not trigger a limitation in light of the prior art

- Effect of claim amendments ascribing a narrower-than-ordinary meaning on a claim term: *Southwall Technologies, Inc. v. Cardinal IG Co.* (1995) involved a claim for an invention including a "sputter-deposited metal oxide layer" – the examiner referenced a prior art technique involving sputter-depositing a metal oxide, and then oxiding it; in response, the applicant limited the claim to a "sputter-deposited inorganic metal oxide, compound, or salt," and noted that the specification involved "layers laid down directly by reactive sputtering processes, and directly converted to the oxide, compound or salt by presence of a suitable gaseous reactant" – the CAFC seized on this statement to limit the claim to a one-step technique, even though the claim language did not explicitly state it as such, and even though the ordinary meaning of the term would have encompassed other processes
- Use of patentee's statements for prosecution history estoppel: *CVI / Beta Ventures v. Tura, LP* (1997) involved a patent for an eyeglass frame made of material having "a minimum of 3% heat-recoverable shape memory… and at least 3% elasticity" – the patentee asserted, and the trial ct held, that the elasticity only referred to a bounce back to 3% of the original length of the frame – the CAFC reversed, siding with the infringer's definition as requiring full return to its original shape – in so holding, the CAFC relied on a drawing labeled 2H that showed full elastic recovery, and a prosecution statement during reexamination that distinguished a prior art reference (having more than 3% recovery) on the grounds that it "does not exhibit the properties shown in Figure 2H" – even though the examiner did not focus on the meaning of the term "elasticity" in the reexamination proceeding, the applicant's statement served as sufficient evidence of the "desired properties" of the invention and the scope of the claims
- Effect of comments in information disclosure statements: The decision in *Gentry Gallery v. Berkline Corp.* (1998) hinged on whether the term "console" included a center seat with a fold-down table top, which would have mitigated toward an expanded range of control placement – in denying this expansion, the CAFC considered the statement of the applicant in an IDS submitted with a petition to make special, which distinguished a prior art reference as featuring a retractable structure that was "not per se consoles, nor do they join the pair of reclining seats" – this statement was sufficient to equate the retractable structure of the distinguished prior art and the retractable console of the accused device, and so deny an infringement verdict

**§7.06 Extrinsic Evidence**

- Extrinsic evidence: Evidence like expert testimony is only admissible if claim ambiguity cannot be adequately resolved by the entire body of intrinsic evidence (*Vitronics Corp. v. Conceptronic, Inc.* (1996)) – however, reliance on this evidence is of last resort, due to its malleability for any litigation position
- Expert testimony: *Eastman Kodak Co. v. Goodyear Tire & Rubber Co.* (1997) involve a claim reciting a process for crystallizing a granulate component "at a temperature of 220 C to 260 C"; the parties disagreed as to whether the temperature range was for the granulate, or merely for the surrounding environment – trial ct found contradictory statements in the other claims, the specification, and the prosecution history – thus, the court resorted to extrinsic evidence, referring to dictionary definitions for terms like "at," and accepted expert testimony before granting an expansive interpretation applying the term to the surrounding environment – the CAFC affirmed this process, and even granted deference to its finding for this term in light of its thorough consideration
- Extrinsic evidence supplementing intrinsic evidence: Courts have broader latitude for consulting educational forms of extrinsic evidence in order to apprise itself of technical issues – it may even rely on such materials when the issue might have been resolved solely by intrinsic evidence, where the extrinsic evidence does not contradict intrinsic evidence (*Fromson v. Anitec* (1997)) – this use is permitted where the court is attempting to "ensure that his or her understanding of the technical aspects of the patent is not entirely at variance with the understanding of one skilled in the art" (*Vitronics Corp. v. Conceptronic, Inc.* (1996)) – thus, dictionaries and technical references enjoy favored status as compared with other forms of extrinsic evidence, and even the CAFC spontaneously references such materials

## Chapter Eight: Functional Language and Means Expressions

### §8.01 Introduction

- Introduction: The means-plus-function claim style is of growing importance for software practitioners; for some inventions, this may be the only way to claim the invention – this chapter covers the history of 35 USC §112 ¶6, the functional operation of these clauses according to the CAFC, and the application of these rules for software patents (focusing on *In re Alappat* (1994))

### §8.02 A Primer on Means-Plus-Function Claims and Their History

- The Patent Act of 1952: This act introduced means-plus-function claiming to U.S. patent law: "An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof" – this kind of claim recites no structure, but suggests any structure that satisfies the recited function; this fundamentally differs from ordinary claim style, e.g., replacing "a computer keyboard" with "means for accepting text input from a user" – functional claims are usually more concise and more incisive as to the claim element – of course, a competing device can only infringe if the functional limitations read on its elements, either literally or as an

equivalent; equivalency requires that the element functions "identically" to the function disclosed in the claim (*D.M.I., Inc. v. Deere & Co.* (1985))

- Congressional intent: The recognition of means-plus-function language to the 1952 Act was a reaction to a controversial Supreme Ct case – in the preceding years, patent practitioners had invented and refined this claim style – this prompted *Halliburton Oil Well Cementing Co. v. Walker* (1946), where the Supreme Ct invalidated such a claim for failing to provide a "full, clear, concise, and exact" description of the invention, particularly at the "exact point of novelty" in the subject invention – the decision was motivated by concerns of "broadness, ambiguity, and overhanging threat" in functional claim styles, which, according to the Court, threatened a chilling effect on inventiveness – Congress expressly sanctioned the use of means-plus-function language by adding ¶6 to 35 USC §112; however, Congress recognized the Court's concerns by limiting the claim scope to elements suggested in the specification and equivalents thereof – thus, means-plus-function element scope is broad, but not overbroad or undeservedly expansive

**§8.03 Prosecuting Means-Plus-Function Claims: The *Donaldson* Approach**

- The *Donaldson* approach: *In re Donaldson Co.* (1994): This case (details discussed in next chapter) compelled the USPTO to follow 35 USC §112 ¶6 when interpreting patent claims – this order was needed because the USPTO had skirted the plain language of this section by characterizing it as an infringement issue, not a prosecution issue – thus, the USPTO had asserted a more expansive interpretation of means-plus-function language, citing cases like *In re Lundberg* (1957) for the principle that claim limitations cannot be imported from the specification – the CAFC condemned this practice in *In re Iwahashi* (1989) ("section 112 para 6 cannot be ignored when a claim is before the PTO any more than when it is before the courts in an issued patent"), but the USPTO did not change its practice – the CAFC reiterated this principle in *In re Donaldson*, and the USPTO finally complied, issuing examiner guidelines in 1994 that ordered compliance with §112 ¶6
- Means-plus-function practice: While no "magic language" is needed to invoke this section ("adding means for [function]" should be acceptable), almost everyone invokes it as simply "means for [function]" – this claim style can also be used in method claims by reciting "step for" elements – however, the inclusion of structural language may carry the element outside of §112 ¶6 – some practitioners write claims that straddle the line (reciting "means for" and a little bit of structure) in order to create ambiguity, but the guidelines allow examiners to reject such §112 ¶6 ambiguity as a violation of §112 ¶2

**§8.04 Means-Plus-Function Claims in the Special Context of Computer Software Inventions**

- §112 ¶6 approval for software inventions: *In re Alappat* (1994): The applicant in this case claimed a rasterizer device for anti-aliasing the output of an oscilloscope – the patent application claimed the invention as a series of means, with dependent claims reciting hardware elements to satisfy each means – the CAFC approved this claim style, noting that each means element could be satisfied with a device well-known in the electrical arts – the CAFC followed the logic of *In re*

*Donaldson Co.* to authorize the applicant's use of means-plus-function elements, in light of the enabled embodiments described in the specification – the CAFC also approved of the dependent claims, which set forth a very ordinary machine invention comprised of a few specific electric components – as is common in this field, the applicant had claimed the software not as a novel method, but as a novel apparatus comprising a general-purpose computer loaded with the anti-aliasing function – again, the CAFC approved this tactic: "a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software"

- §112 ¶6 in practice: Naturally, this claim element must be sufficiently described (in the claim and the specification) to satisfy the written description and enablement requirements – most software inventions can rely on only a minimal description of the underlying hardware ("The present invention is not limited as to the type of computer on which it runs. The computer typically includes a keyboard, a display device such as a monitor, and a pointing device such as a mouse. The computer also typically comprises a random access memory…") – the specification should recite at least *some* hardware, or else it may be held indefinite or non-enabled – as per *Alappat*, means-plus-function language is always interpreted with corresponding hardware means – this can be difficult for software inventions to satisfy, since not every software step has easily describable apparatus structure; this is why software inventions specify "structure" by resorting to 35 USC §112 ¶6

**§8.05 Litigation of Means-Plus-Function Claims**

- Claim differentiation: The doctrine of claim differentiation requires that claims be read differently where possible – thus, the meaning of a claim can be pushed in one direction by writing a similar claim positioned in the opposite direction – e.g.: an independent claim may suggest a "means of user input," but the practitioner doesn't want this means limited to a keyboard; by writing a dependent claim "wherein the means of user input is a keyboard," the practitioner can rely on the doctrine of claim differentiation to argue that the independent claim means something *other than* just a keyboard – this pairing of independent and dependent claims is a useful tactic for improved patent scope – it might even appear that the independent claim now has a more open-ended scope than the structural elements recited in the specification and equivalents thereof, which would exceed the rules of 35 USC §112 ¶6 – however, *Laitram Corp. v. Rexnord, Inc.*(1991) foreclosed this use of the doctrine of claim differentiation by holding it subservient to 35 USC §112 ¶6 – this case dealt with squarely with this doctrinal conflict: the patentee claimed a means and suggested in the specification an H-shaped structure, and then dependently claimed an H-shaped structure – in addressing the accused infringer's V-shaped structure, the applicant argued that the independent claim had to be broader than simply H-shaped structures in order to differentiate it from the dependent claim – the CAFC disagreed: "claim differentiation is a guide, not a rigid rule; if a claim will bear only one interpretation, similarity will have to be tolerated"
- Drafting means-plus-function claims: Some practitioners conclude from *Laitram* that means-plus-function claims are inherently narrower than non-means-plus-

function claims, but this conclusion is not warranted; the CAFC appears intent on giving means-plus-function claims the broadest interpretation allowed by the boundaries of 35 USC §112 ¶6 – thus, the claims and specification should be drafted together, and the specification should recommend specific structures corresponding to each means-plus-function element – the specification can also state that the claims are not flatly limited to the described structure, in order to support a litigator's reliance on the doctrine of equivalents ("those of ordinary skill in the art will readily acknowledge that changes and modifications can be made to the described computer keyboard without departing or diverting from the scope of the intended invention" – of course, this disclaimer shouldn't be drafted too expansively, since this would run afoul of 35 USC §112 ¶2

## Chapter Nine: Functional Claim Drafting in the Electronics, Computer, and Software Arts

### §9.01 Introduction

- Introduction: This chapter covers the use of means-plus-function language in computer-related inventions in light of the CAFC's holding in *In re Donaldson* (1994)

### §9.02 Applicability of Section 112, Paragraph 6, to Determinations of Patentability Under 35 U.S.C.

- 35 USC §112 ¶6: Patent claims serve two purposes: defining the invention in order to determine patentability and patent eligibility, and defining the scope of the invention that can be asserted against infringers – 35 USC §112 ¶6 states that the applicants can satisfy these goals by reciting claim elements in means-plus-function language, as long as the elements are properly supported by the specification – this concept has two results: although claim elements are interpreted in light of the embodiments disclosed in the specification, they also cover all equivalents thereof, but within these confines, the statute affords the patentee the broadest possible interpretation (the "broadest reasonable interpretation rule": see *In re Reuter* (1981)) – thus, the exact elements substituted do not need to be expressly disclosed in the application in order to infringe the patent, as long as they are foreseeable in light of the suggested that were disclosed in the specification – in cases where the claim recites an apparatus as a set of means, and the specification describes every imaginable equivalent for performing that means, the CAFC has construed such a claim as "indistinguishable from a method claim" (*In re Maucorps* (1979)); at the other end of the spectrum, a means that is supported as only the embodiment of the apparatus may tightly limit the claim to the disclosed embodiment

### §9.03 *In re Donaldson* and Its Impact

- *In re Donaldson* (1994): Prior to this case, the USPTO relied on the language of 35 USC §112 ¶6 to construe means-plus-function claim elements as broadly encompassing any functional substitute in the art, whether or not suggested in the specification (*In re Zletz* (1989)), but the CAFC applied it as it does today – the USPTO had sidestepped the CAFC's criticism of its interpretation of this section by citing the different contexts in which the bodies operated (prosecution vs. litigation) – this issue came to a head in *Donaldson*, which involved an improved

industrial dust collector device: whereas the hard-walled designs of known collectors tended to build up dust, the applicant suggested making at least one wall flexible, so that changing air pressure caused it to vibrate like a diaphragm and break up dust accumulation – the applicant's claim 1 included "means responsive to pressure increases in said chamber caused by said cleansing means for moving particulate matter in a downward direction," and recited in the specification that the "means" involved the flexion of a flexible-walled material – the examiner rejected this claim in light of firm-walled prior art embodiments; the applicant argued that the means was limited to the flexion mechanism recited in the specification, but the examiner stated (and the BPAI affirmed) that the specification was of "no moment" because "particular features or limitations appearing in the specification are *not* to be read into the claims of an application" – the CAFC reversed: "the PTO's allegedly sweeping practice of interpreting means-plus-function language as reading on each and every means for performing that function" was contradicted by the clear language of 35 USC §112 ¶6 – the CAFC vociferously denied that this section should be interpreted differently in different contexts (characterizing it as "imaginative" but wholly unsupported), and expressly overruled all prior decisions supporting that conclusion – as for the USPTO's assumed responsibility of reviewing patent claims with "the broadest reasonable interpretation," the CAFC held that any interpretation beyond that authorized by 35 USC §112 ¶6 was not "reasonable" – thus, the CAFC upheld the allowability of this invention over implicitly disclaimed prior art

- Effect of *In re Donaldson*: This case harmonizes the interpretation of patent scope between prosecution and litigation, conferring more predictability upon the field – this case also improves the usefulness of the means-plus-function claim style as a means of achieving broad claim scope but avoiding prior art – however, the presumption of validity may be slightly weakened, because an examiner might leave a reference unexamined that he did not view as an equivalent, but the CAFC might disagree and invalidate the patent – also, this ruling clearly breaks the concept of examining claims as standalone lexical devices; e.g., it's possible for two identically-worded claims to issue without interference, because each specifies a means that includes patentably distinct sets of embodiments – also, the question remains whether arguments made during prosecution about covered embodiments of a means-plus-function element are effective limitations – thus, the new application of 35 USC §112 ¶6 raises real concerns over the validity of issued patents and the consistency of infringement analysis

**§9.04 PTO and Practitioner Implementation of *In re Donaldson* under the USPTO Guidelines**

- The equivalency problem: Though *In re Donaldson* informed the USPTO of proper claim scope interpretation: the examiner clearly bears the burden of making a *prima facie* case of equivalency, and that equivalency must suggest a prior art element having "functional identity" with a means-plus-function embodiment in the specification, coupled with "structural equivalency" – however, the CAFC did not describe the equivalency standard or test that examiners should apply, and this remains an important and open question

- "When is a means or step for performing a specified function within Section 112, Paragraph 6?": First, the USPTO must determine whether a claim element is recited in means-plus-function language – the USPTO's guidelines suggest several alternatives that trigger §112 ¶6 ("printing means", "means for printing," "a device so constructed and located as to [function]", "force generating means adapted to provide [function]", the step of "reducing the coefficient of friction," etc.) – clearly, the USPTO intends many expressions of function to trigger §112 ¶6, but it's not clear if the CAFC will reach the same interpretation for these indeterminate clauses
- "How does equivalency affect the scope of the search and the prior art that may be cited by an examiner?": As per the USPTO's guidelines, "the *Donaldson* decision does not substantially alter examination practice and procedure relative to the scope of the search" – however, this step is limited to the examiner's selection of prior art references to consider, not to their use in an obviousness rejection argument
- "How is a *prima facie* case made (or rebutted) as to whether prior art is equivalent?": According to the USPTO's guidelines, the examiner must show that the prior art reference suggests an equivalent to an embodiment described in the specification for a means-plus-function claim element; as long as the examiner reasonably concludes that the specification does not exclude the prior art element, the *prima facie* case has been satisfied – the applicant's response can amend the claims by adding a limitation to avoid the prior art equivalent, or may dispute the finding of equivalency, e.g., by showing that the prior art shows or taught away a conclusion of equivalency; the inventor may also submit a Rule 132 affidavit averring technical non-equivalency (though this creates a weak spot for litigating the patent) – the examiner's rebuttal to such a response may maintain equivalency by citing additional evidence from the prior art – thus, a prosecution dispute over equivalency resembles a prosecution dispute over obviousness
- Other guideline suggestions: The USPTO's guidelines conclude by advising examiners to reject a claim if it recites a means but lacks any suggested embodiment in the specification – also, the guidelines distinguish means-plus-function equivalency from the doctrine of equivalents as "entirely different tests"; however, the concepts are used in the same basic context, so the tests are very similar

**§9.05 Developments Subsequent to *Donaldson* and the USPTO Guidelines**

- Importance of selecting proper claim terminology: The linguistic methods of triggering or avoiding 35 USC §112 ¶6 are not clear – while "use of the word 'means' triggers a presumption that the inventor used this term advisably to invoke the statutory mandates for means-plus-function clauses" (*York Prods. Inc. v. Central Tractor Farm & Family Ctr, Inc.* (1996)); however, "merely because a named element of a patent claim is followed by the words 'means,' however, does not automatically make that element a 'means-plus-function' element under 35 U.S.C. § 112, ¶ 6" (*Cole v. Kimberly-Clark Corp.* (1996)) – this statute can also be avoided by reciting an element as a "means" but then suggesting a structure in the same claim – e.g., *Greenberg v. Ethicon Endo-Surgery, Inc.* (1996): "detent mechanism defining the conjoin rotation of said shaft" was held by the district ct

to specify function with the term "detent," but reversed by the CAFC, denying means-plus-function interpretation because "many devices take their names from the function they perform" – thus, the practitioner should be clear about whether or not he is invoking this clause; either use "means for" and functional language, or stay away from any functional descriptors and exclusively use structural terms

- 35 USC §112 ¶6 in method claims: Step-plus-function elements are even harder to interpret with reliability than means-plus-function claims – the CAFC has drawn a distinction between a "step-plus-function" and the corresponding act: "section 112 ¶ 6 is implicated only when means *plus function* without definite structure are present, and that is similarly true with respect to steps, that the paragraph is implicated only when steps *plus function* without acts are present" (*O.I. Corp. v. Tekmar Corp.* (1997)) – in this context, the action for the step equates to structure in an apparatus means claim – however, as this case illustrated, specifying "means for" a function satisfied by an action triggered 35 USC §112 ¶6, but specifying "act for" this same function may avoid it due to the described action
- Importance of identifying corresponding material, acts, or structure in the specification: As noted, means- and step-plus-function elements are always read in light of the embodiments disclosed in the specification – this concept can be used negatively, i.e., to avoid prior art by reciting an element in means-plus-function form but reciting only embodiments that do not literally or equivalently resemble the prior art element – on the other hand, the specification should affirmatively link a means- or step-plus-function claim element to its disclosed embodiments (*B. Braun Medical, Inc. v. Abbott Laboratories* (1997))

### §9.06 Conclusion

- Conclusion: In considering the effect of *Donaldson* on patent prosecution practice, the CAFC expressly noted that this practice might make claim drafting and interpretation more difficult, and even more costly, but also expressed a preference for this cost rather than "imposing the cost of foreclosed business activity on the public at large" (*Sage Products Inc. v. Devon Industries* (1997))

## Chapter Ten: Prosecution of Electronic and Software Patents

### §10.01 Introduction

- Introduction: Patents serve as documentation of a technology and provide structure to unstructured innovation – however, many who are involved in patenting have been slow to accept this beneficial effect for the field of software – this chapter is intended to demonstrate how software patent examination typically occurs for software-related inventions, and to suggest tactics for handling different kinds of USPTO responses

### §10.02 Examiner Pressure: Outrage Rolls Downhill

- USPTO guidelines for software patents: Software developers like Intel and Microsoft have been acquiring software patents since the early 1980's, but public attention only adhered to the practice in the late 1980's with the growth of the software industry – the outcry over software patents prompted the USPTO in 1990 to write a "Total Quality Management Memo" to the examiners of Group 230, which handled software patents, encouraging them to improve the quality of

software patents with several recommendations: 1) construe claim language broadly during prosecution (but consistently with the specification), 2) regard preamble clauses as effective only when they "breathe life and meaning into the claim", 3) diagram claims to elucidate the claim structure, 4) state all rejections based on a "reasonable" claim interpretation, 5) aggressively pursue §101 rejections, especially for software patents that seem independent of any kind of apparatus, and 6) dispose of difficult cases by consulting a SPE – in response to this memo, examiners rejected and restricted most software patents, and developed examination styles compatible with that goal

**§10.03 Production Quotas: Guidance from the Hand That Feeds**

- Production quotas: Examiner workload is measured by estimating that software patent applications require 31.6 hours on average for disposal, modified by examiner experience and pay grade – examiner productivity is measured in "beans": one "bean" is awarded for a first office action, an allowance, an abandonment, or an answer to an appellate brief – this places considerable pressure on examiners to limit their efforts to producing these office actions, and discourages them from spending time on others, like nonfinal office actions, while avoiding politically risky moves like too many first-action allowances – additionally, the software groups appear to be striving for a 50% rejection rate – these facts can guide strategy for reviewing and handling office actions

**§10.04 Prosecution Types**

- Overview: In addition to considering the statutory basis of the rejection, patent attorneys are well-served by considering the examiner's motivation and tactic in issuing the action – this section discusses the various kinds of rejections and effective responses
- "Textbook" response: This scenario results from a typical examination of a range of claims and a typical patentability search – the examiner issues a first office action rejecting the broadest independent claim and some of the dependent claims, citing either §103 + a few references or §112 ¶2 and some claim language, and indicating that some narrow claims are allowable; the practitioner amends or cancels the rejected claims in light of the cited prior art, and the examiner allows the amended claims – this kind of prosecution occurs in many fields of art, but is now rare in the computer arts for political reasons – this scenario often involves a teleconference with the examiner to discuss patentability, but compromises offered by the examiner should be considered for a while before responding; reasonable counterproposals are acceptable
- "Dead on arrival" response: This rejection involves a terse rejection citing a number of anticipatory or obviating prior art references that cannot be avoided, after which the applicant abandons the application – this scenario rarely arises in good practice, and is indicative of an inadequate prior art search during patent drafting; a patent practitioner should be able to locate and avoid such on-point references before filing the application – the examiner in this case is either experienced or lucky to have found highly relevant prior art, or where the practitioner is inexperienced – naturally, this scenario can be avoided by conducting a reliable patentability search for "killer" prior art, and by drafting a broad set of claims so that the narrowest are likely allowable – if such a rejection

is received, the references should be considered for even minor differences with the claimed invention; the claims can then be narrowed by amendment, which creates a prosecution history estoppel issue but may put the application in an allowable state

- "White flag" response: This scenario is the opposite of DOA prosecution, wherein the examiner "surrenders" and issues a terse first-action allowance – this usually involves narrow claims with little or no prior art, but may signify that the practitioner has crafted the claims too narrowly, or adhere too heavily to the preferred embodiment; at least some claims should tread close to the prior art and necessitate a first office action and response – the examiner's "statement on reasons for allowance" may explicitly indicate that the claims are narrow in some respect – a practitioner who receives this response should consider filing broader claims; if the opportunity exists, the examiner will have to file a continuation or divisional application (can't amend a claim that has been allowed) – also, the practitioner should conduct an additional prior art search, and if any prior art is found to be relevant and not cited by the examiner, the applicant should file an Invention Disclosure Statement (IDS) to strengthen its enforcement strength
- "Quota buster" response: This scenario indicates an interest in disposing of the application with little examiner effort, but making a superficial showing of diligence – the practitioner may have conducted a competent search and filed an acceptable set of claims, but the examiner cites at least one technical vagueness/indefiniteness/enablement problem under §112 ¶2, and allows the application when the prosecutor corrects the deficiency – the problem is that the application hasn't really been examined, and prior art that undercuts enforcement may exist but hasn't been found – as with "white flag" prosecution, the practitioner should reexamine the application for claim breadth or prior art; even if this follow-up effort defeats a notice of allowance, it's in the best interest of the client
- "Algorithm blues" response: This scenario arises when the examiner has not followed the resolution of software patenting, and rejects the invention as a non-statutory algorithm under §101, citing cases like *Gottshcalk* and *Flook* – this type of response is more rare than is commonly believed, and is easily defeated by citing the USPTO's Examination Guidelines for Computer-Implemented Inventions (1995) and pointing out the utility of the claimed invention – the USPTO's legal analysis succinctly affirms this rationale: "Specific or practical utility is simply a shorthand way of attributing 'real world' value to the claimed subject matter, i.e., assuring there is some benefit to the public; an invention that has some practical application satisfies the utility requirement." – this type of response is usually prevented by filing claims and a specification that clearly indicate the utility of the invention, but if this response issues anyway, the practitioner should call the examiner to resolve, and failing that should prepare for difficult prosecution and likely an appeal to the BPAI and CAFC
- "Vague and disabling" response: This response cites several claim terms as unclear, even if well-known in the art or clearly defined in the specification, and hence is known as a "bogus 112-second rejection" – practitioners usually respond by citing specification line numbers or referring to a well-known technical

dictionary, and hence the USPTO has opted to stop wasting time with this kind of rejection – however, a more recent variant has arisen involving a statement that the inventor has not properly taught how to implement the computer-related invention, e.g., what software to use, how to program it, and how to interface with hardware elements – this indicates a rise in the §112 ¶1 enablement threshold – the practitioner can defeat this by filing an affidavit asserting that one of ordinary skill in the art could implement the invention; while the examiner often responds by allowing the application, an infringer might challenge the affidavit in order to avoid enforcement – alternatively, the practitioner can attempt to traverse the rejection, but the subjectivity of this determination allows the examiner to reject the argument as unpersuasive; extensive appeals may follow – since the incidence of this rejection type is expected to grow, practitioners should expound on the implementation details in the specification

- "Clueless" response: This response includes boilerplate MPEP language only remotely (or not at all) related to the application, irrelevant prior art references, a rejection of all claims, and/or a poor response style – the cause of this rejection is often an examiner with poor understanding of the technology, or simply poor English skills; such examiners are common in the software examining corps, which must compete with much higher-paying opportunities and has a high attrition rate – the practitioner should attempt one response with a straightforward explanation, but should prepare for either a quick appeal or a long prosecution path; alternatively, the practitioner may contact the primary examiner
- "Rolling 103" response: This response begins like a textbook prosecution, and the practitioner may argue around the cited art; but the examiner keeps responding with additional nonfinal rejections, citing new prior art that can be easily traversed – the cause of this response is that the examiner believes that relevant prior art exists, but can't easily find it, and yet can't reject the application since the applicant successfully defeats any prior art; as a result, prosecution continues until the client's budget is exhausted, the examiner finally cites unassailable prior art, or the case is transferred – this response is rare, since it undercuts the examiner's productivity metrics, but harms the client's interests by delaying allowance; unfortunately, the practitioner's skill may prompt this set of circumstances by including an independent claim that is not amended, can't be properly rejected, and can't be allowed for political reasons – the positive result is that if the patent is eventually allowed, the bulk of the file wrapper will strengthen the validity of the patent
- "Close call" response: This circumstances occurs where the practitioner and examiner have a good-faith and reasonable disagreement about the law or prior art – the parties may simply disagree, or may affirmatively recognize that the issue needs to be addressed; thus, the case is prosecuted quickly through final rejection with an eye toward an appeal to the BPAI – the software examining corps reported a 20% appeal rate in 1990, and this figure has risen; the examining corps wins the appeal 50% of the time, but much more commonly in §102/103 cases than §101/112 cases – an inexperienced practitioner may hesitate to file an appeal; this is often much more effective than continued prosecution, but it does prolong resolution to an average of five years – an appeal begins with the filing of a

Notice of Appeal in the case, which grants the practitioner two months to file an appellate brief; the examiner then files an answer, and the practitioner may file a reply brief and/or a request for an oral hearing – if the appeal is lost, the practitioner may file a continuation that takes the board's opinion into account, or of course may appeal to the CAFC

- "Triple play" response: This occurs where the examiner files a first office action, the applicant amends the claims, and the examiner issues a "final" office action citing new prior art and characterizing the applicant's response as nonpersuasive – the applicant usually files a continuation application with additional amendments, which the examiner quickly allows; or the examiner may try to repeat the cycle – alternatively, the examiner may issue a restriction requirement, allowing one set of claims but requiring the applicant to re-file on the rest – examiners can safely bulk up their productivity metrics with this tactic, while the client loses time, money, and claim scope – the practitioner should try to avoid this scenario by hesitating to amend claims, and by appealing unsupported decisions rather than filing a continuation application

## Chapter Eleven: Foreign Patent Prosecution

- Overview: This chapter presents detailed information about patent prosecution in many foreign regions, and serves as a useful reference for the patentability of software in other countries

## Chapter Twelve: Patent Portfolio Development

### §12.01 Introduction

- Introduction: Companies might acquire patents to lock down a business advantage, to keep competitors out of a market, to create a new niche in an established market, to build strategic alliances, or simply as a source of revenue – this requires identifying assets to patent and assessing value in light of market conditions and product streams – it can be difficult to synchronize the daily needs of the business with the slow-moving patent process; a portfolio will not have a short-term impact on product success, but a long-term strategy is necessary for maintaining market share and business options

### §12.02 Establish Strategic Objectives for the Patent Portfolio

- Examples of long-term objectives for patent strategies: A product-oriented strategy can prevent copying of innovative products by competitors – a strategy for entering new markets can involve patenting the company's core technologies and emerging features that are likely to be incorporated into future products, with the goal of securing ideas just beginning to develop – this tactic can also be used to enter an established market: if dominant competitors are likely to assert their patent portfolios against the arriving company, it can develop blocking patents around theirs in anticipation of a cross-licensing scheme – a company focusing on research can use patents defensively to secure its innovative freedom (this should focus on developing clusters of patents over their key research areas and techniques, instead of constantly pursuing exotic ideas)

### §12.03 Organizing, Educating, and Motivating the Team

- Training of inventors and managers: Patent counsel must undertake two different training programs: a management program to apprise executives of the value, costs, strategies, and tactics of patent portfolio management, including goals and metrics; and an engineer program to educate inventors about the concepts of patents, inventorship, public disclosure, etc. – training must be an ongoing program to refresh skills and inform new employees
- Building an effective reward program: Most large technology companies have a program for encouraging engineers to create and disclose potentially valuable technologies, e.g., $100 per accepted disclosure, $500 per application filed, and $2,000 per issued patent – managers should also be encouraged and incentivized to participate – a royalty sharing plan can also motivate employees for inventions that are amenable to licensing – some companies also have an annual inventor recognition ceremony for inventors, their spouses, and their managers, or even a vacation lottery with tickets earned by invention disclosures

**§12.04 Choosing Among Inventions to Patent**

- Patent review committee: Once disclosures begin arriving, the intellectual property team should create a triage group for selecting inventions for further review – this process can efficiently happen online, e.g., intranet distribution of invention disclosures and a restricted-access forum for comments
- Database of technical literature and patents: Reviewing and documenting the state of the art should not be limited to novelty searches; a small group should be commissioned to maintain a technical database of market trends, patents (especially those of competitors), and emerging technologies in the company's key areas – engineers should be encouraged to tap and contribute to this database
- Industry standards groups: Engineers should be encouraged to participate in organizations that create technology standards – however, the company should separate its inventions related to an industry standard from those that engage those standards in a proprietary way – although the temptation to file submarine patents on industry-standard technologies must be avoided, the company can use the efforts of standards bodies to keep tabs on the future directions of the field, and may be able to gain a lead in developing and patenting next-generation technologies
- Quality vs. volume: The goals of portfolio breadth and portfolio value may be at odds, especially for patent prosecution and maintenance resources – emphasizing quality may cause the review committee to miss a key disclosure, while emphasizing quantity may produce an expensive array of weak or flawed patents – in planning to develop a patent portfolio, the company should set a target number of patents appropriate for the size and value of the product line, and should allocate sufficient budget to produce effective patents (forecasts should plan for $3,000-$20,000 for preparing each application, and $1,500-$5,000 for prosecution, issuance, and maintenance) – techniques for limiting outside patent counsel costs: bidding (ask different law firms to bid on work for new patent applications), binning (establish fixed prices for easy/narrow, medium, and hard/broad cases), and block billing (pay the firm a certain up-front amount of money for prosecuting a certain number of patents, with the goal of establishing an economy of scale)

**§12.05 Eliciting the Disclosure**

- Streamline the procedures: It's important for the disclosure process to be easy for employees, who may be encouraged by extensive writing requirements – disclosure forms, either paper or online, can help ease the disclosure process, and can provide a structured communications tool for a patent attorney or business manager to choose disclosures for patenting
- Software-based inventions: The culture of software development presents unique challenges: programmers are often more artistic than scientific, and may not understand or support the business interests of the company or the patent process; their short product development schedules may prevent them from participating (even minimally) in disclosure and patenting; and team-based brainstorming sessions may raise difficult questions of inventorship – also, the software market is difficult to manage with patents, due to very short product cycles – thus, patent counsel for software companies should minimize time required of inventors, and should be well-educated in order to avoid education sessions – also, the practitioner should offload as much patent work as possible (instead of asking the software engineer to create a flowchart, create a sketch while reviewing the disclosure and bring it to the first meeting with the inventor)
- Hardware-system-based inventions: A common strategy for patenting hardware systems is to integrate patent counsel in the early system design process – this allows patenting to run parallel with hardware testing and fabrication; system specifications may even help frame the patent application, and alternatives discussed in the session can be used as alternative embodiments to expand patent breadth – patent liaisons should keep tabs on the engineering process, so that offshoot developments can be protected with CIP patents (but the engineering team may not appreciate the presence of an attorney in their design sessions)

**§12.06 Strategic Patent Applications for Start-Ups and Emerging Growth Companies**

- Start-up business strategies: Start-ups must balance the goals of raising capital, developing technologies and products, developing a market niche, making deals, and brokering a liquidation event – these stresses can complicate or preclude ordinary corporate patenting procedures – conversely, "typical" patents may be inefficiently aligned with the particular interests of the start-up; a highly technical patent specification cannot be understood by technical business partners or licensees – this can be ameliorated by using ordinary and business terms alongside (or in lieu of) technical jargon for claim elements – claims oriented more toward the company's products than abstract statutory classes can be more understandable, and will support a higher royalty base – the abstract should also be written more like a sales pitch than a dry, technical description – in general, patent selection should be directed more to physical objects than technologies, since many executives place value on the number of patents rather than total patent value

**§12.07 Anticipating Litigation**

- Litigation strategies: For patents likely to be litigated, claims should be directed to protect separately each component of an invention; this streamlines the process of proving infringement of any one claim by any one party in the chain of

infringement – even better, patenting each component separately reduces the risk that litigating one of them will protect against an invalidity finding that eliminates all product coverage – also, claims drawn to an entire system (disclosing several generic parts and one novel component) yield higher royalties than one directed solely to a small component – if resources exist to analyze the future market for the patented goods, it may be possible to direct claims to the products and services of likely infringers, which may prompt quicker settlements and even the avoidance of competition

### §12.08 Polishing the Patent Portfolio

- "Polishing": When it seems likely that a patent will be asserted, the patentee should consult litigation counsel to identify likely defenses to the patent (prior art, ambiguity, inadequate or overreaching claim breadth) – some problems may be addressed by filing a reexamination application to resolve any substantial new questions of patentability

### §12.09 Budgets, Cost Control, and Accounting

- Establish corporatewide patent budget: Even large companies must pay close attention to the ratio of value provided and prosecution costs – if prosecution budgets are allocated to individual departments, they may use them for discretionary spending; thus, establishing a separate corporate budget may help control resource diversion
- Costs vs. accounting predictability: As with any corporate accounting task, patent budget control depends closely on expectations: large overruns may suggest that patent counsel are draining funds, while large underruns may lead to future budget cuts – thus, accounting predictability must be aligned with cost predictability; the budget for each year should be geared toward costs for the near future, with cautionary statements that unexpected expenses (litigation) may arise that require the allocation of special budgets

## Chapter Thirteen: Noninfringement, Invalidity, and Unenforceability Opinions

### §13.01 Introduction

- Introduction: Clients often require legal opinions about patents: whether activity infringes a patent, or whether a patent is valid or enforceable; these opinions guide business strategy in order to avoid (or provoke) litigation – also, obtaining a legal opinion of noninfringement can prevent the client from being found *willfully* infringing, which otherwise justifies punitive damages – this chapter reviews the context of any such opinion, the skills required to prepare one and the process for doing so, the contents and form of the opinion, and the need for follow-up activities

### §13.02 Background

- Historical context: Before 1983, very few court cases involved a claim of willful infringement, probably because these cases were heard by an administrative judge; the issue of damages was tried separately from a guilty verdict, and the parties usually settled prior to that hearing, and of course the issue of the prior advice of counsel was rarely relevant to the factual issue of infringement – also, the courts required the patentee to prove a bad-faith state of mind and the absence

of a good-faith defense, thereby discouraging the few cases where this issue might arise – thus, although the "advice of counsel" defense to willful infringement existed, but was rarely raised – in 1983, the CAFC modified this standard to encourage willful infringement claims: "Where a potential infringer has actual notice of another's patent rights, he has an affirmative duty to exercise due care to determine whether or not he is infringing, including, *inter alia*, the duty to seek and obtain competent legal advice from counsel before the initiation of any possible infringing activity" (*Underwater Devices, Inc. v. Morrison-Knudsen Co.* (1983)) – the lowered burden of proof requires the patentee to show that (1) the infringer knew of the patent, (2) the infringer knew or should have known the patent's relationship to its activities, and (3) the infringer nevertheless commenced or continued to infringe (*Great Northern Corp. v. Davis Core & Pad Co.* (1986)) – if the patentee makes this *prima facie* case, the infringer can defend with evidence of non-willfulness, particularly evidence of a reasonable, good-faith belief that its activity was non-infringing – this evidence is reviewed by the court as part of "the totality of the circumstances" in issuing a ruling

- Legal opinions for avoiding liability: The strongest motivation for a client to obtain a legal opinion is to avoid an infringement verdict by modifying the company's business activities – this is particularly needed where a company attempts to design around a competitor's patent; this is a perfectly valid business action (*State Indus., Inc,. v. A.O. Smith Corp.* (1985)) – however, some design changes seen as necessary by patent counsel may be unfeasible for the company; any design-modifying recommendation should be informally (orally) discussed with the client before committing to it in a written opinion – also, the company should consider obtaining a freedom-to-operate opinion before any new research project, both to avoid infringement and to benefit from teachings of the state of the art – an updated search and opinion should be completed after the research concludes and a product is manufactured, both to verify freedom to operate and to decide whether to patent the research results or product design – while this kind of opinion is not required to satisfy a legal duty, it is necessary to avoid bad business ventures – none of these opinions operates as a guarantee, since exhaustive searches are impossible; any written opinion should clearly stress this point
- Grounds for punitive damages: Infringement always justifies "damages adequate to compensate for the infringement" (35 USC §284), but willful infringement or bad faith can result in an award of attorney's fees (35 USC §285) or punitive, up to treble, damages (35 USC §284) – this penalty is exacerbated by the CAFC's tendency to measure damages not by reasonable royalties, but by lost profits, including lost collateral sales on related products, and also "price erosion" (lost opportunity to set patent monopoly prices); i.e., any profit that the patentee would have earned "but for" the infringement – "bad faith" focuses on unfair and wasteful trial conduct, including unjustified suits, unreasonable defenses, discovery misconduct, or prolonged delay – furthermore, courts are granting attorney's-fee awards in "exceptional" cases – the punitive damages award is affected by the following evidence: (1) deliberate copying; (2) the effort or failure to form a good-faith belief of noninfringement, invalidity, or unenforceability; (3) poor litigation behavior; (4) the size and financial strength of the defendant; (5)

the closeness of the dispositive issue in the case; (6) the duration of the infringement or misconduct; (7) remedial actions taken by the defendant; (8) the defendant's motivation for infringing; and (9) attempts to conceal misconduct – the trial judge is given latitude in this decision, and may weigh both tangible and intangible factors; accordingly, infringement damages now routinely exceed $1MM, and lawyers' fees are more often awarded – thus, while infringement damages may be catastrophic, enhancement for willful infringement, bad-faith conduct, or "exceptional" circumstances can be ruinous – the CAFC finds willfulness "when, upon consideration of the totality of the circumstances, clear and convincing evidence establishes that the infringer acted in disregard of the patent, that the infringer had no reasonable basis for believing it had a right to engage in the infringing acts" (*Electro Medical Sys., S.A. v. Cooper Life Sciences, Inc.* (1994)) – thus, willfulness is both a subjective state-of-mind issue, but involves an objective reasonableness determination for asserted good-faith belief

- Legal opinions for avoiding a finding of willful infringement: In order to avoid enhanced infringement damages, companies who have actual notice of another's patent rights should fulfill a duty of due care to avoid infringement – as long as the infringer can mount a good-faith and substantial challenge to infringement or patent validity, it will have met its duty, and its potential liability is limited to compensatory damages – however, the CAFC has more recently opined that willfulness is shown where the company failed to get an opinion in a case where "a reasonably prudent person would have obtained a written opinion of counsel for the inevitable day in court" (*Paper Converting Mack Co. v. Magna-Graphics Corp.* (1986)) – the client bears a right to withhold any opinion under attorney-client privilege (or to waive the privilege and provide the opinion), but the CAFC has permitted an adverse inference from the failure to provide an exculpatory opinion (*Fromson v. Western Litho Plate & Supply Co.* (1988)) – along these lines, there is no *per se* rule as to when a client must obtain a written opinion, but there is also no *per se* rule that any written opinion will avoid a finding of willfulness; the key is (a) the soundness of the attorney's advice in the context of the infringement, and (b) the efforts exerted by the company to comply with infringement-avoidance suggestions of counsel

**§13.03 Preparation of Opinions**

- The practical details of legal opinions: This section covers the circumstances of obtaining and preparing a legal opinion – the key question: what does the client need to avoid a finding of willful infringement? – complicating factors include the client's inability to convey every fact of potential relevance, the client's inability to recognize the need for a written opinion, the client's failure to understand and follow the advice of counsel, and (worst of all) the client's decision not to seek or follow advice in light of time or resource constraints – of course, the strength and reasonableness of the opinion are also important factors for avoiding a willful infringement verdict; factors indicating reasonableness include (a) the experience of the patent counsel preparing the opinion, (b) the role of patent counsel as in-house or outside counsel, (c) the clarity and detail of explanations on which legal conclusions are based, (d) whether the opinion was written or oral, (e) whether the

advice was unequivocal or ambiguous, and (f) how strongly the infringer adhered to the advice of the opinion

- When to obtain an opinion: A company bears no affirmative duty to obtain an opinion unless it actually knows of a patent that may be relevant to its activities – this includes knowledge of a product marking of "patent pending" where the applicant has no indication whether or not any patent ever issued – conversely, a company that does have such knowledge is basically required to obtain a legal opinion before initiating or continuing any potentially infringing activity – the notice need not come from the patentee; as long as the company knows that the patent exists and may be relevant, the "notice" requirement is satisfied – such notice may arise by in-house monitoring of the weekly *Official Gazette* of the USPTO, or of knowledge by any employee of the company who knows of the potentially infringing activity; thus, employees should be involved in the patent monitoring function of the company – actual notice may also arise through a licensing offer by the patentee, and are especially present where licensing negotiations fall through and the company continues its potentially infringing activity – if the company is directly notified by a patentee's cease-and-desist letter, it should respond to the patentee in writing that it will investigate; otherwise, it may be viewed as disregarding the notice – in any event, the company should seek a legal opinion as soon as possible after learning of the competitor's patent – for patents discovered after the company has commenced potentially infringing activity, the company isn't required to cease operations immediately, but must very promptly obtain a legal opinion about infringement (again, a reasonable determination is involved, but waiting until a complaint is filed is not reasonable)
- Who should provide the opinion: A legal opinion is not sufficient to avoid liability unless prepared well, and by a sufficiently skilled patent expert; the key factor should be the credibility of the opinion at trial – opinions by non-attorneys are given very little weight, and opinions by attorneys practicing in other areas of law are not much more reliable – the experience of the patent attorney also counts: opinions by attorneys who only prosecute patents may be given less weight than litigators – according to the CAFC, an in-house attorney can be very credible, as long as he has a reasonable level of independence from the management of the company; however, reliance on outside patent counsel will avoid the inference of bias borne by in-house counsel, especially where the in-house counsel was involved in potentially infringing activities or misconduct (*Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.* (1992)) – as indicated, a key factor of credibility is independence: whether the attorney monitors patents in a particular field; whether he discovered and proceeded to study the patent; evidence that the attorney was pressured to reach a certain conclusion; and whether the attorney justified his conclusion with significant, objective, technical facts
- The process of preparing the opinion: The most important characteristic of an opinion is its reliability: it should lay out a careful and broad analysis of the relevant law, and should not skip any facet or step – this reliability is even more

important than the actual conclusion, since an adverse but credible opinion is much preferred to a positive but faulty opinion

- Preparing the opinion – investigation: The opinion preparer should begin by conducting a full factual investigation of the circumstances – this process should be documented, because the court may consider the adequacy of the factual investigation in determining the credibility of the opinion – the investigation should also consider pre-patent conduct, particularly if it might appear to be in bad faith (*Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.* (1992)) – also, the opinion preparer should warn the client that candor is necessary, because withholding information during the internal investigation may undermine the effort to fulfill the duty of due care – of course, neither the opinion preparer nor the client can rely on information that is known to be false or wrong, or that is objectively incredible
- Preparing the opinion – review of patent and prior art: The opinion preparer should thoroughly review the patent, along with the prosecution history and the prior art, to determine validity – the patent should be fully "shepardized" to trace its filing, history, related foreign and U.S. patent applications, and priority claims – opinions from foreign examiners or foreign patent counsel may provide useful information – license agreements may also be relevant; a potential defense is that the company had a good-faith belief that its activity was permitted under a license from the patentee or a competitor
- Preparing the opinion – form and tone: Written opinions are strongly preferred for defenses of willful infringement, because the opinions may be needed years later, when memories of oral opinions may have degraded (*American Medical Systems, Inc. v. Medical Engineering Corp.* (1993)) – written opinions also suggest greater competency, and are more clearly amenable to protection as an attorney work product – oral opinions can still be given, but should be confirmed in writing – the tone of the letter should be an objective overview of the "totality of the circumstances," and should be sufficiently persuasive and thorough to convey a good-faith belief in its conclusion – however, the conclusion should be clear: words like "arguably outside the scope" and "less likely to infringe" may be inadequate to give the client a good-faith belief of infringement or noninfringement (*Central Soya Co. v. Geo. A. Hormel & Co.* (1983): the opinion must provide "full confidence that the patent is invalid, or that precautions recommended will suffice to avoid infringement") – however, more recent cases have relaxed the requirement of an absolute statement (*Read Corp. v. Portec, Inc.* (1992): "An honest opinion is more likely to speak of probabilities than certainties") – statements like "70% likely to not infringe" can be reversed at trial as "the client proceeded with a 30% chance of infringing" – thus, it's better to make an assertive statement and then qualify it: "In my opinion, the patent is not infringed. However, juries may differ…")
- Preparing the opinion – contents: The primary audience for the opinion is the client, but the secondary audience is the judge or jury, so it should be written accordingly – a legal opinion offering a defense to infringement must be well-reasoned, i.e., must explain in detail the reasons why infringement does not occur; "conclusory" legal opinions have little weight for questions of willful

infringement (*Kori Corp. v. Wilco Marsh Buggies & Draglines, Inc.* (1985)) – the opinion should review the merits of each defense (invalidity, unenforceability, and noninfringement), and should at least passingly discuss each, but only one needs to be credibly supported to avoid a willful infringement verdict

- Preparing the opinion – introduction: As with any legal opinion, an infringement defense opinion should analyze the legal problem, express a set of options, and recommend a course of action – the contents should be framed positively for the client (headings should read "invalidity" and "noninfringement," not "validity" and "infringement") – first, identify the context of the opinion, restate the question asked by the client, and lay out the facts directly related to the context (notification by the patentee, discovery of the patent, or notice raised in a novelty search) – next, summarize the conclusion that will be supported by the rest of the opinion
- Preparing the opinion – facts: After the introduction, set forth all of the facts discovered in the investigation and all assumptions, emphasizing the facts relied upon in the conclusion, and including all functionally related factors (licensing negotiations, opinions of other counsel); also describe obstacles to the investigation, but always indicate that the investigation is adequate to reach a conclusion – this section should summarize the components of the patented invention, and the components of the company's system that may correspond to each component (these descriptions should be included in different document sections that don't refer to each other, to avoid implied admissions of equivalency) – this section should include a table of patents considered, categorized by primary, secondary, and background interest
- Preparing the opinion – analysis: This section is the heart of the infringement defense opinion – the analysis should first clearly set forth the substantive and procedural rules of the analytic tests, e.g., the meaning of equivalency and factors contributing to its determination – the preparer should then recite arguments both for and against the client's position, but should avoid admissions of validity, enforceability, or infringement; rather, all of the facts contributing to any conclusion should be recited – every infringement defense analysis must contain an analysis of prosecution history of the patent (*Underwater Devices Inc. v. Morrison-Knudsen Co.* (1983)) – supporting exhibits should be included to support the analysis
- Preparing the opinion – invalidity analysis: An invalidity conclusion should heavily reference the prior art, including that beyond that cited by the patentee and reviewed by the USPTO – a claim alleged to be invalid must be arguably nonstatutory (based on §101 or some part of §112); anticipated (all elements disclosed in a single prior reference); obvious (based on the scope and content of the prior art, the differences between the patent and the prior art, the level of ordinary skill in the art, and secondary criteria of nonobviousness (*Ex parte Kranz* (1990))), though arguments based solely on prior art considered and distinguished by the examiner may have limited credibility
- Preparing the opinion – unenforceability analysis: An unenforceability conclusion must heavily reference evidence of materiality and intent – evidence of inequitable conduct during prosecution might render the patent unenforceable

(*Kingsdown Medical Consultants Ltd. v. Holister Inc.* (1988)), but the comparative lack of cases involving an unenforceability argument demonstrate the difficulty of proving this defense – however, unenforceability grounds apply to the entire patent, so a claim-by-claim analysis is not necessary

- Preparing the opinion – noninfringement analysis: A conclusion of noninfringement must recite similarities and differences between the patent claims and the potentially infringing device or activity – the opinion should perform literal and equivalent infringement tests: not just function, way, and result of similar elements, but whether one of ordinary skill in the art would recognize the elements as interchangeable, evidence of copying or imitation, evidence of designing-around attempts, and evidence of independent development – the potential infringer's own patents may support a good-faith belief of noninfringement – the opinion should discuss claim scope based on the prosecution history – of course, if none of the independent claims are infringed, the opinion need not address any dependent claims – conversely, if an invalid claim is arguably invalid, the opinion should discuss which claims that depend on it are valid
- Preparing the opinion – recommendations: The opinion should conclude with a reiteration of the conclusion, provide a list of options, and a recommendation for a course of action – as noted above, the conclusion should be a clear and specific opinion of noninfringement if certain changes are made, but can be qualified as only the preparer's opinion ("It should be noted that the question of infringement is one of fact, not law. Thus, the question presented is one on which reasonable minds might differ.") – similarly, one option should be recommended, but the opinion should offer a range of options with advantages and drawbacks, both legal (evidentiary weight, danger of infringement) and practical (estimated costs, impact on market share)
- Follow-up: A written opinion is worthless, even damaging, if not followed by the client – the company must demonstrate at least "reasonable good faith adherence to the analysis and advice therein" to claim nonwillful infringement (*Central Soya Co. v. Geo. A. Hormel & Co.* (1983)) – good practice requires counsel to follow up with the client to verify compliance and to provide supplemental guidance in light of new developments; if a subsequent event or discovery materially changes the analysis, the practitioner should provide a revised opinion
- Conclusion: Infringement is a question of fact, so the actual conclusions asserted in the opinion are not as important as whether the opinion was adequately prepared and followed – the goal is not to predict the outcome of events, but to prevent the client from being found a willful infringer – the patentee is likely to cite flaws in the competency or objectivity of counsel, the analytic proficiency of the opinion, the timing of the opinion relative to the infringer's notice of the patent, the adherence of the infringer to the opinion, or the infringer's trial conduct; avoiding these flaws should be a central goal of the opinion preparer

**§13.04 Noninfringement Analysis**

- Overview: Direct infringement is "the unauthorized making, using, importing, offering to sell, or selling of a patented method or system in the United States during the term of the patent" (35 USC §271(a)) – patents can also be enforced

against actions constitution inducement of infringement (35 USC §271(b)) or contributory infringement (35 USC §271(c)) – primary defenses include patent noninfringement, patent invalidity, and patent unenforceability; affirmative defenses include experimental use (*Chesterfield v. U.S.* (1958)), medical method use, etc. – the claims define the scope of the invention, and each element of a claim is material and essential to a finding of infringement; but only a single claim must be infringed to infringe the patent (*Panduit Corp. v. Dennison Mfg. Co.* (1987)) – noninfringement analysis focuses on two steps: (1) the construction of the patent and declaration of patent scope, and (2) a comparison of the patent to an accused object or practice

- Factual basis: The factual basis of an opinion essentially provides antecedent basis for the rest of the discussion – it also demonstrates the preparer's thorough understanding of both the patented and the accused technologies, thereby promoting a finding that the opinion was competently prepared – by the same token, preparing this section will put the preparer in a good position to compare the inventions in the rest of the opinion – this understanding is so important that the practitioner should review the facts section with the inventor or client before drafting the rest of the opinion
- Claim construction: Litigation disputes almost always hinge on the construction of the claims – this is a question of law, evaluated *de novo* at every level with no deference to the lower court's holding – thus, the opinion should focus very carefully on reaching a well-supported and persuasive claim construction – the evidence cited in support of the construction can be intrinsic or extrinsic – one helpful tool, especially for means-plus-function claims, is a two-column table that matches claim language to the range of equivalents disclosed in the specification and drawings – the procedural setting for claim construction is solely as a matter of law (*Markman v. Westview Instruments, Inc.* (1995)), and is not appropriate grounds for a fact-based jury inquiry; this case would have benefited from a two-column table for defining the disputed claim term "inventory"
- Claim interpretation – intrinsic evidence: Intrinsic evidence includes the claims, the specification, the drawings, and the prosecution history (*Vitronics Corp. v. Conceptronic Inc.* (1996)), and should be the first resort for claim construction issues –claims should be interpreted with different scope according to the doctrine of claim differentiation, but only within the confines of other claim construction rules, like 35 USC §112 ¶6 (*Laitram Corp. v. Rexnord, Inc.* (1991)) – a claim preamble may serve as a limitation if it "gives life and meaning to the claim" and is "essential to define the invention" (*Diversitech Corp. v. Century Steps, Inc.* (1988)), or may not serve as a limitation if it is only a statement of purpose, and if the body does not depend on it for completeness (*Kropa v. Robie* (1951)) – this standard is not clear, and must be decided on a case-by-case basis (*Corning Glass Works v. Sumitomo Electric U.S.A.* (1989)) – the specification is always relevant for claim construction; specification and claim terms are to be given their ordinary meaning, unless the patentee has chosen to serve as his own lexicographer by using novel terms, or by ascribing particular meanings to known terms – although claims should stand on their own merits, an ambiguous claim can be interpreted by referencing the specification for terminology and usage (*Vitronics Corp. v.*

*Conceptronic Inc.* (1996)); however, extraneous limitations cannot be imported into the claim from the specification, and the claims are not to be limited to the disclosed and drawn embodiments (*Ekchian v. Home Depot Inc.* (1997)) – elements recited in means-plus-function form always require reference to the specification; this can be a difficult question to answer, and may even involve a question whether 35 USC §112 ¶6 even applies, e.g., when the claim includes a "means of" some task – the prosecution history is also relevant; a narrowing claim amendment creates a presumption that the amendment was made to avoid prior art, and unless the patentee demonstrates another reason for the amendment, the court must refrain from applying the doctrine of equivalents to recapture surrendered claim scope (*Warner-Jenkinson Co. v. Hilton Davis Chemical Co.* (1997); see also *Alpex Computer Corp. v. Nintendo Company Ltd.* (1996), involving surrendered claim scope related to a method of producing video display signals; the patentee had distinguished a prior art device streaming the bitmap signal through some registers, and thus could not assert its patent against Nintendo for following essentially the same process in its console)

- Claim interpretation – extrinsic evidence: Extrinsic evidence includes expert and inventor testimony, dictionaries, treatises, and technical articles – a court may only rely on extrinsic evidence where a claim construction issue cannot be resolved solely by intrinsic evidence (*Vitronics Corp. v. Conceptronic Inc.* (1996)); however, the court may accept reliable extrinsic evidence, particularly dictionaries and treatises, to educate itself as to the technical field, so long as the extrinsic evidence does not contradict the intrinsic evidence (*Vitronics Corp. v. Conceptronic Inc.* (1996))
- Claim application: Infringement is determined by comparing construed claims to an accused object or process – literal infringement is determined according to an "all elements" test (*Lemelson v. United States* (1985)), and counsel for both the patentee and the accused infringer should conduct comparative analyses of literal infringement before filing or answering a complaint
- §112 ¶6 equivalency: A "combination" claim may be written in means-plus-function form, as long as the specification discloses a number of equivalents for the means – thus, an infringing device or method must include a suggested element, or its equivalent, in order to infringe the claim – this area of law needs clarification (e.g., whether the issue is resolved by a judge or jury); either way, the patentee bears the burden of showing literal or equivalent infringement of the means-plus-function claim by a component in the accused infringer's product or process – this equivalency analysis differs from the doctrine of equivalents (*Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n* (1986)); some consider it narrower, since §112 equivalency requires both equivalent structure and identity, or at most insubstantial differences, of function between the accused device element and the claim element (*Johnson v. IVAC Corp.* (1989)) – on the other hand, §112 equivalency is characterized as literal infringement of the means-plus-function claim element – in general, structural "equivalency" here is defined as "an insubstantial change which adds nothing of significance to the structure, material, or acts disclosed in the patent specification" (*Valmont Indus., Inc. v. Reinke Mfg. Co.* (1993)), and the standard asserted is "whether persons of ordinary skill in the

art would have known of the interchangeability of the disclosed and accused devices" (*Texas Instruments, inc. v. U.S. Int'l Trade Comm'n* (1986)) – expert testimony may be received to resolve this issue (*In re Hayes Microcomputer Prods., Inc.* (1992)) – prior art is almost always irrelevant to §112 ¶6 equivalency determinations, and the "tripartite test" used in the doctrine of equivalents is inapplicable here

- Reverse doctrine of equivalents: This doctrine can be asserted where an accused object or process literally infringes a claim, but "is so far changed in principle that it performs the function of the claimed invention in a substantially different way" (*SRI Int'l v. Matsushita Elec. Corp. of America* (1985)) – this doctrine is rarely applied, but may become useful in new software inventions
- The doctrine of equivalents: The doctrine of equivalents allows enforcement of the patent where a claim does not literally read on an accused device or process, but where the differences are so insubstantial that infringement essentially exists (*Hlton Davis Chem. Co. v. Warner-Jenkinson Co.* (1995)) – this principle is invoked to avoid "subordinating substance to form" in infringement determinations (*Graver Tank & Mfg. Co. v. Linde Air Prods. Co.* (1950)), and to prohibit copyists from making small changes to carry the invention outside the literal scope of the claims, while still borrowing the inventive concept – unlike literal infringement, application of the doctrine of equivalents is a factual inquiry performed by the jury (*Thomas & Betts Corp. v. Litton Sys., Inc.* (1983)) – the key determinant is that one of ordinary skill in the art would view the changes as insubstantial – technically, the doctrine does not expand the scope of any claim, which is firmly defined by its text, but expands the enforcement right of the patentee beyond the bounds of the claims to exclude insubstantially different embodiments
- Traditional application of the doctrine of equivalents: The doctrine of equivalents can be applied by asserting a "tripartite test": does an element "perform substantially the same function in substantially the same way to obtain the same result as the claimed invention?" (*Graver Tank & Mfg. Co. v. Linde Air Prods,. Co.* (1950)) – as per the "all elements rule," the accused object or process must have a literal or equivalent substitute for every element of the patented invention – infringement does not exist where an element is omitted (*Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.* (1989)); the substitute need not be in the same location, order, or context, and it can be performed by a combination of elements instead of a single component (*Dolly, Inc. v. Spalding & Evenflo Cos.* (1994)), but the patentee must show more than simply that the accused object or process "as a whole" satisfies the same function as an element, and every claim limitation must be respected (the doctrine cannot be used to "embrace a structure that is specifically excluded from the scope of the claims")
- Other factors that may affect the doctrine of equivalents: An invention that has attained "pioneer" status will receive broad expansion under the doctrine of equivalents (*Perkin-Elmer Corp. v. Westinghouse Elec. Corp.* (1987)), while an invention in a crowded field may be limited in expansion – interchangeability of two elements that is well-known in the art is strong evidence for applying the doctrine of equivalents for such a substitution – evidence of copying creates an

inference that any changes are insubstantial, but this can be controverted by evidence of independent development; and evidence of a genuine "designing around" attempt weighs against expansion under the doctrine of equivalents – if the accused infringer received a patent on his accused object or process, and this patent was obtained in light of the asserted patent, an inference exists that the change was nonobvious (*Zygo Corp. v. Wyko Corp.* (1996)) – where changes in the technology are so extensive that the totality of the change is too substantial to constitute infringement, the doctrine of equivalents is unavailable (*Texas Instruments v. U.s. Int'l Trade Comm'n* (1986))

- Effect of prior art: A key limitation on he doctrine of equivalents is that it cannot be used to expand the patent where this would encompass invalidating prior art (*Key Mfg. Group. Inc. v. Microdot, Inc.* (1991)) – a key method of performing this test is to create a hypothetical claim expanded as asserted under the doctrine of equivalents, and then decide whether or not that claim would have been allowable under 35 USC §102 or §103 (*Wilson Sporting Goods Co. v. David Geoffrey Assocs.* (1990)) – this hypothetical claim analysis is much preferred to simply comparing a claim element to the prior art and concluding it can't be so expanded
- Prosecution history estoppel: The doctrine of equivalents is unavailable for expanding a claim to cover what was surrendered during prosecution (*Warner-Jenkinson Co. v. Hilton Davis Chemical Co.* (1997)) – for any claim amended during prosecution, a rebuttable presumption exists that the purpose of the amendment was to avoid prior art – prosecution history applies to remarks made during prosecution, as well as to actual amendments; but remarks that merely highlight a distinction, rather than retreat from the prior art, should not create an estoppel – this doctrine also applies where a related claim is canceled or amendment to call an issue into question (*Builders Concrete, Inc. v. Bremerton Concrete Products, Inc.* (1985)) – for continuation/continuation-in-part/divisional patent applications, the prosecution history of the parent claims is relevant for creating prosecution history estoppel (*Mark I Marketing Corp. v. R.R. Donnelly & Sons Co.* (1995))

**§13.05 Invalidity and Unenforceability Analysis**

- Overview: Attacks on invalidity and enforceability usually arise from §101, §102, §103, or several sections of §112 (best mode, enablement, written description, etc.), or on any of the grounds of misconduct that create a basis for patent unenforceability (*Gardco Mfg., Inc. v. Herst Lighting Co.* (1987)) – an issued patent enjoys a rebuttable presumption of validity (35 USC §282) – this shifts the burden of persuasion to the accused infringer, not only for presenting prior art, but for persuasively arguing its anticipating or obviating effect – this burden of persuasion is elevated when the prior art raised by the accused infringer was reviewed by the examiner during prosecution – the two-column tabular comparison technique may be useful for this analysis, especially where the claim includes means-plus-function elements
- Anticipation: If a single prior art reference provides an enabling description of the invention that has "complete identity" with the patented invention, then the patent is invalid by anticipation under §102 – to constitute "prior art" for this purpose, the reference must fit one of the seven classes of prior art set forth in §102 (public

disclosure, public use, on-sale bar, publications by another, prior invention by another without abandonment, etc.) – an anticipation argument can reference other prior art for clarifying claim terms in the anticipating prior art source, but not to augment its scope

- Obviousness: Under §103, references can be combined to show that the invention was "obvious" in light of (1) the scope and content of the prior art, (2) the differences between the claimed subject matter and the prior art, (3) the level of ordinary skill in the art, and (4) other indicators of nonobviousness (*Graham v. John Deere Co.* (1966)) – this is a difficult legal standard to apply, so the opinion preparer should consider all of the evidence in the objective view of one of ordinary skill in the art – not only must every feature of the patented invention be shown in the prior art, but there must be some suggestion to combine them for a desirable and likely successful purpose (i.e., the prior art must have suggested the combination for solving the problem at bar); this motivation must be more than simple hindsight or "Monday morning quarterbacking" (*Orthopedic Equipment co. v. U.S.* (1983)) – the scope of prior art that may be combined varies with the average skill in the claimed art and the complexity of the invention – while there is no limit to the number of references that can be combined, each additional reference makes the argument more complex – in the absence of clear evidence of strong evidence of obviousness, the patentee may contest an obviousness argument by showing secondary factors: commercial success of the product, prior art references teaching away from the combination, expert skepticism that the combination would work, unexpectedly positive results, long-felt need, evidence of subsequent copying of the patented combination by an infringer, failure of others in the art, a large time gap between the prior art references and the patented combination, and licenses taken by other companies – the burden falls on the patentee to demonstrate these factors, and it's difficult to cite them negatively
- Non-enablement: A patent must adequately teach one of ordinary skill in the art how to make and use the invention without undue experimentation (35 USC §112) – non-enablement can be shown by actual test results demonstrating that the invention as taught is inoperative, or the absence of a necessary component or step that requires undue experimentation to fix – of course, the amount of experimentation tolerated for software inventions depends on "the nature of the invention, the role of the program in carrying it out, and the complexity of the contemplated programming, all from the viewpoint of the skilled programmer" (*Northern Telecom, Inc. v. Datapoint Corp.* (1990))
- Failure of best mode: A patent must describe the best method of making and using the invention known to the inventor at the time of filing (35 USC §112) – two-step analysis: (1) determine whether the inventor know of a better mode than that disclosed at the time of filing, and (2) determine if the inventor failed to make an adequate and enabled disclose of it – this is a very difficult argument, as it requires evidence of the mental state of the inventor
- Failure of written description: A patent must describe the invention in sufficient detail to convey to one of ordinary skill in the art that he had possession of the invention at the time of filing (35 USC §112) – this is related to enablement; if the

inventor can't sufficiently teach how to make and use the invention, he probably wasn't in possession of it

- Failure of §101: A patent must claim an invention as one of the statutory classes (process, machine, manufacture, composition of matter, or improvement or combination thereof), and to demonstrate that the invention is useful (35 USC §101) – these classes have been interpreted very expansively by the Supreme Court; while "laws of nature, natural phenomena, and abstract ideas" are still not patentable, almost any suggestion of usefulness attached to a statutory class will suffice
- Addition of new matter: An inventor may not add "new matter" to a patent application by subsequent amendment (35 USC §132) – however, because an issued patent enjoys a presumption of validity under 35 USC §282, a very strong presumption exists that an amendment accepted by the examiner did not contain "new matter" – e.g., an amendment adding an introductory statement of intended use or purpose is probably only "embellishment" with no patentable effect, and thus is not "new matter"
- Enforceability: Patent misuse or inequitable conduct may compel a court to refrain from enforcing it – inequitable conduct can have existed in the procurement of a patent, e.g., affirmative misrepresentation of material facts or failure to disclose material information, coupled with an intent to deceive (a gross negligence standard of conduct is sufficient to prove intent to deceive) – patent misuse arises from an attempt to violate antitrust laws by relying on a patent, e.g., a typing or price-fixing restriction; however, normal use of the patent to enforce a monopoly on the invention is not misuse (35 USC §154 and §271(d))

**§13.06 Attorney-Client Privilege**

- Confidentiality of opinion letters: Opinion letters are subject to the attorney-client privilege, but since asserting them as a defense to willful infringement operates as a waiver of the privilege, it isn't helpful unless the company doesn't want to rely on the opinion – the scope of the waiver isn't limited to the opinion, since "it is unfair to allow a party to choose among its privileged communications and produce only those favorable to the party's case" – if the disclosure is voluntary, then the privilege is waived for all communications pertaining to the subject matter, including all opinions by all counsel about the subject matter (*Mushroom Associates v. Monterey Mushrooms, Inc.* (1992)) – thus, disclosure of an opinion by in-house counsel will waive the privilege for any opinions and communication with outside counsel about the same matter – a voluntary waiver can be made by the recipient of the opinion, including one valid recipient against the interest of another recipient; but if individuals are joined as co-defendants or through the common-interest doctrine, they must all agree to waive the privilege as it pertains to all of them – if the disclosure was involuntary or inadvertent, the court may construe a "limited waiver," or may simply consider the privilege revoked; some courts apply a balancing test, considering (1) the reasonableness of precautions taken to prevent disclosure, (2) the time taken to rectify the error, (3) the scope of discovery and the extent of the disclosure, and (4) any existing issues of fairness – if a party fails to disclose a exculpatory opinion, the judge can create an inference that no such opinion exists, or that it was contrary to the client's asserted position

- Work product immunity: Documents prepared in anticipation of litigation are protected at an even higher level than the attorney-client privilege – waiver of the privilege may allow an adverse party to request all documents related to the disclosed opinion letter, but cannot request work-product documents – however, if the requesting party has "substantial need" for the work-product material and cannot produce it without "undue hardship," then disclosure can be compelled (FRCP 26(b)(3)) – some limit must be drawn as to how "related" the work product must be to the litigation in order to trigger work-product immunity – some courts have opted to have the evidence reviewed in camera for a judicial determination of privilege, or to bifurcate the trial, with a separate hearing for willfulness before a separate jury

## Chapter Fourteen: Design-Around Techniques

### §14.01 Introduction

- Introduction: Patent law has always striven to balance the rewards of invention against the freedom of public knowledge – thus, a patent applicant must provide a clear and enabling written description, disclose the best mode of using the invention, and "particularly point out and distinctly claim" the breadth of his invention – errors in satisfying the latter requirement allow competitors to exploit the invention without infringing it by "designing around" the claim limitations; this practice is actively encouraged (*Slimfold Manufacturing Co. v. Kinkead Industries, Inc.* (1991): "'designing around' the claims of a patent is not by itself a wrong… but is one of the ways in which the patent system works to the advantage of the public in promoting progress in the useful arts") – the willful or good-faith motivation of an accused infringer does not affect the actual question of infringement (*Warner-Jenkinson Co. v. Hilton Davis Chemical Co.* (1997) vacated a statement in *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.* (1950) limiting the expansive doctrine to cases of intentional copying) – however, a legitimate and credible effort to design around a patent allows a competitor found guilty of infringement to avoid a finding of "willful" infringement and accompanying awards of enhanced damages and attorney's fees (35 USC §§284-285)
- "Design-around" tests: *Warner-Jenkinson* and *Pennwalt Corp. v. Durand-Wayland, Inc.* (1987) advocate an "all-elements" infringement test, looking for a literal or equivalent component in the accused device for each claim limitation – however, the traditional test (*Graver Tank v. Linde Air Products Co.* (1950)) is also applicable: infringement occurs where the accused device performs "substantially the same function in substantially the same way to achieve substantially the same result" – this test attempts to prevent competitors from perpetrating "fraud on the patent," while preventing the patent from extending far beyond its claim limitations – despite these tests, infringement determinations remain unpredictable; "one cannot know for certain that changes are sufficient to avoid infringement until a judge or jury has made that determination" (*Read Corp. v. Portec, Inc.* (1854))
- The design-around process: A successful design-around attempt involves completely omitting a claim element, or substituting a completely different

component for a claim element – first, identify the broadest valid claim, based on a search of the prior art and prosecution history; then consider any element omission or substitution that might preserve the operation of the invention; finally, obtain (or draft) a competent noninfringement opinion to document the legitimate design-around effort – if the designed-around product is marketed, the user manual should distinguish it from patented products

**§14.02 Omitting a Claimed Element from the Designed-Around Product**

- Omitting a claimed element: The elements should be assessed to determine which is least necessary for the claim – the prosecution history may indicate a broader claim with fewer limitations that was canceled due to prior art; or, it may indicate a claim limitation later added to the broader claim that may be necessary for patentability but not for operation – when drafting a design-around product schematic, the whole invention should be reviewed to ensure that no other element serves the purpose of the omitted element (*Corning Glass Works v. Sumitomo Electric U.S.A., Inc.* (1989): waveguide design for reducing refractive index between cladding and core layers was considered equivalent between the patented technique of increasing the refractivity of the core, and the design-around attempt of reducing the refractivity of the cladding) – this relocation-of-function assessment is particularly important for omitting an element claimed in means-plus-function style, since the presence of any component that performs "substantially" the same function may support an infringement finding

**§14.03 Substituting a Component in the Designed-Around Product**

- Substituting a component in the designed-around product with a non-equivalent: This technique is viable, but more risky than an outright omission – nonequivalent substitutions might perform the same function (which has been deemed necessary) in a fundamentally different way (*Slimfold Mfg. Co. v. Kinkead Industries, Inc.* (1991): accused infringer escaped liability by replacing a "releasable latch means" with a in a folding metal door with a Styrofoam wedge, which the CAFC regarded as a "different mode of operation") – this tactic may be difficult where the functional mechanism of the component is not known – also, the substitution might pass the per-element infringement test, but the overall invention may still be seen as equivalent under a *Graver Tank* analysis; while *Warner-Jenkinson* advocated an all-elements approach, it also condoned the continued use of *Graver Tank*, and asserted that "the function-way-result test may not invariably suffice to show the substantiality of the differences"
- Substituting a component in the designed-around product with an equivalent that the patent does not reach: Another good technique is to substitute a claim element with an admitted equivalent that is precluded from the claim scope – this may arise where the patentee expressly disclaimed during prosecution, either expressly or by narrowing amendment (*Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n* (1993): TI held a patent for an integrated circuit featuring an "opposite-side gating process," and was estopped from asserting it against the ITC for a similar circuit incorporating a "same-side gating process," because their patent expressly taught away from the latter design as a non-working alternative) – this can also arise where the substitution renders the whole invention anticipated or obvious in light

of the prior art (*We Care, Inc. v. Ultra-Mark Int'l Corp.* (1991)); this can be supported by the examiner's rationale in rejecting broad claims

- Substituting a means-plus-function element: Means-plus-function claim language invoking 35 USC §112 ¶6 imports into the claim all of the alternatives suggested in the specification (and equivalents thereof) – however, the scope of equivalency in this context is difficult to assess, except for the fact that it's different from the scope of equivalency ascribed to the doctrine of equivalents: recent cases suggest that §112 ¶6 is more limited than the traditional "substantially the same function in substantially the same way to product substantially the same result" test (*Valmont Indus., Inc. v. Reinke Mfg. Co.* (1993)) – to be safe, the scope of equivalency should be construed according to the doctrine of equivalents (which will be asserted against the designing-around competitor in an infringement suit), and a substitution should be considered a non-equivalent only if it operates "in a very different way" (*Valmont*)

## Chapter Fifteen: Litigation of Patents Involving Software Technology

### §15.01 Introduction

- Introduction: Software patent litigation resembles other kinds of patent litigation, but the particulars of the industry create some novel considerations

### §15.02 General Comments

- Software technology issues: Software technologies can be produced and commercialized more quickly, and with many fewer resources – however, the value of a software invention usually disappears well before the end of the patent term, so dispute resolution must be quick and effective – intellectual property issues are much complicated by the inevitable intertwining of an invention with the technologies of other companies, often involving formal or informal communications standards
- Software technology developer issues: Because software is less costly to produce, the industry is more heavily populated with many small or sole developers than other technology industries (e.g., pharmaceuticals) – this critically impacts dispute resolution, especially since most software patent litigation is brought by small developers (the big developers have cross-licensing arrangements) – the industry is also characterized by wide variety (medicine, banking, machine design, etc.) – also, infringers of software patents are often the patentee's customers or business partners, making disputes and litigation unattractive options
- Software patent features: Most software patents claim the subject invention with method claims – many patents also claim elements written in means-plus-function language under 35 USC §112 ¶6, requiring reference to the specification for ranges of equivalency – recent decisions permit claims to software inventions via article-of-manufacture claims, which are strong and allow the patentee to sue infringing competitors directly rather than contributorily

### §15.03 Specific Issues and Strategies

- Determining infringement: Because access to source code is heavily restricted, it's difficult to verify infringement by a competing product – moreover, reverse-engineering a competing product often requires violating the potential infringer's copyright, and it's not clear that courts are willing to excuse this violation in view

of a patent infringement investigation – instead, patentees can rely on competitors' public material: technical publications, user manuals, advertising materials, doctoral theses by competitors' employees, and foreign and U.S. patents and published patent applications – the competitor may have sent a functional description of the invention to a third-party developer that may be enlightening – a patentee may also contact a competitor's customers to ask how they use the software, but the accuracy of the information should be confirmed – most directly, the patentee may send a letter to the potential infringer – if this letter accuses the competitor of infringement, it may support a declaratory judgment action on the validity of the patent; instead, the patentee may simply note that the patent may be of interest and asking the competitor to explain the noninfringing operation of its product, but this may not constitute valid notice (*Minnesota Min. & Mfg. Co. v. Norton Co.* (1991))

- Prosecuting infringement: The prosecution begins with a judicial determination of the scope of the claims – if this is favorable, the patentee must show that the defendant's product infringes based on the court's claim construction – the patentee may wish to rely on flowcharts for illustrating method claims, and may find similar material in the competitor's documents; also, the competitor's sales literature may provide a less technical description invention that plainly explains the patent – in addition to the documents mentioned above, the patentee should investigate the competitor's email system for damaging communications, including alternative approaches considered by competitors (which might support a willful infringement verdict)
- Defending against infringement: Accused infringers should also seek claim construction as early as possible, especially before discovery begins (this request should be allowed because claim construction should be independent of the allegedly infringing product) – the accused infringer should also perform a prior art search early on that may reveal invalidating prior art – the inventors of the patented device should be deposed, since they often view the patents overly narrowly – key differences between the patented invention and the accused infringing product should be heavily emphasized
- Statutory eligibility: *State Street Bank & Trust Co. v. Signature Financial Group* (1998) explicitly affirmed the patent eligibility of software; in contrast with prior decisions charactering software as an "abstract idea or mathematical concept," the *State Street Bank* court authorized patents for software that achieved "a useful, concrete, and tangible result" – this rationale also applies to business patents, including methods of doing business over the Internet – this finding was further strengthened by *AT&T Corp. v. Excel Comunications, Inc.* (1999): "we consider the scope of §101 to be the same regardless of the form – machine or process – in which a particular claim is drafted" – this decision also negated the requirement that software cooperate in carrying out a "physical transformation"; this case focused solely on whether the invention produced a "useful and nonabstract result"
- Prior art: Because software patents are quite new, most relevant prior art will exist outside the patent system – thus, accused infringers must look far and wide for prior art, including speaking with developers and reviewing product catalogs and

textbooks – Internet searches are increasingly useful, and cooperative defensive efforts may be effective (*Wang Laboratories, Inc. v. America Online, Inc.* (1998): Netscape, charged with patent infringement, asked members of the Mozilla Foundation to find prior art, and received 200 responses within two days; but see *In re Hayes Microcomputer* (1992): joint defense effort to find invalidating prior art failed, and even provided the patentee with internal documents to demonstrate willful infringement)

- Prior sale: Software patentees also run afoul of their own marketing efforts by soliciting sales for unwritten software (though this invalidation tactic hinges on the patentee's public communications about the invention, rather than their subjective intent) – the point of conception has been affected by *Pfaff v. Wells* (1998), in which the Supreme Ct held that the "on sale" bar occurs when (1) the patentee makes a commercial offer of the software, and (2) the invention is "ready for patenting" (reduction to practice, or preparation of descriptions and drawings sufficient to enable one of ordinary skill in the art) – this definition of "ready for patenting" raised the enablement and best-mode standards of 35 USC §112, since the CAFC had previously not required drawings or proof of reduction to practice – the applicant must also safeguard against public use (including the creation of products by a private use of the invention in a manner that "achieves the intended commercial purpose of the product" (*Metallizing Engineering Co. v. Kenyon Bearing & Auto-Parts Co.* (1946)), but excluding uses for secret or personal purposes (*Xerox Corp. v. 3COM Corp.* (1998))
- Experimental use: "Experimental" uses include those primarily directed toward testing the efficacy of the invention for its intended purpose; this determination is made in light of the "totality of the circumstances" (*Manville Sales Corp. v. Paramount Systems* (1990)) – the most important factor is the degree of control retained by the inventor over the invention – for software, alpha testing (internal to the company) is almost always experimental, but beta tests (particularly public and uncontrolled, or involving presales) is almost never experimental unless the company required outside beta testers to sign nondisclosure agreements
- Prior publication and knowledge: Prior public knowledge can be an invalidating factor – two requirements: (1) the prior publication must be "sufficiently available to the public so that people concerned with the subject art, exercising reasonable diligence, could have retrieved the publication" (*In re Wyer* (1981)), but "availability" is broadly interpreted (*In re Hall* (1986)) – Internet publications are almost *de facto* publicly available, including newsgroups and websites – however, any such publication must predate the patent filing by more than one year (proof of the date should include an affidavit by the poster attesting to the veracity of the HTML timestamp); also, the publication must describe the claimed invention sufficient to prove enablement – proof of prior invention of the patented technology may invalidate the patent, but this is more difficult to show; the other party must have reduced to practice before the patentee, and must not have concealed, suppressed, or abandoned it in the interim – however, this defense practically requires convincing written evidence, and software developers are notoriously poor at maintaining adequate documents of inventive processes

- Enablement: Software patents need not disclose source code, as long as the description is sufficiently enabling – too much detail can give competitors the means to infringe it – however, too little detail requires the patentee to demonstrate enablement by asserting a high level of skill in the art, which may then work against the inventor in an obviousness assertion – also, patents requiring the use of outside software must identify that software in order to satisfy enablement (*White Consolidated v. Vega* (1983))
- Best mode: The "best mode" requirement (virtually unique to U.S. patent law) is difficult to satisfy with certainty for very fluid software inventions – fortunately, the CAFC has lowered the "best mode" standard and made the defense of undisclosed "best mode" more difficult (*Robotic Vision Systems, Inc. v. View Engineering, Inc.* (1997): a patent not even mentioning "software" nevertheless satisfied the "best mode" requirement by implicitly recommending a software implementation)
- Damages: Lost profits for software inventions can be surprisingly large, because the incremental cost of each unit is very low and the profit very large; the patentee can claim lost profits by showing that (1) the infringer sold the infringing products and (2) absence of noninfringing alternatives (*Radio Steel & Mfg. Co. v. MTD Prod., Inc.* (1986)) – where lost profits can't be claimed, the patentee may seek a reasonable royalty rate, based on an implied license; however, this analysis requires an absence of noninfringing alternatives (*State Industries v. Mor-Flo Industries* (1989)) – both claims require proof of notice to the infringer of the patent, either actual (cease-and-desist letter) or constructive (the patentee's marking of its product with a patent number) – this is particularly true for contributory infringement claims – thus, infringers can greatly mitigate damages by redesigning their products in response to a cease-and-desist letter
- Estoppel issues: Software patentees can be estopped from patent enforcement if they encourage adoption of a standard for which they have secretly filed a patent application (*Stambler v. Diebold, Inc.* (1988): patentee was actually a member of the ANSI committee choosing a standard for bank ATM communications) – this is especially true where the patentee has committed laches (*Potter Instrument Co. v. Storage Technology Co.* (1980)) or made affirmative misrepresentations about the patent status of a proposed standard (*In re Dell Computer Corp.* (1996))

## Chapter Sixteen: Miscellaneous Practice Areas

### §16.01 Patenting Software for Implementing Business Systems

- Early rejection of business method patents: Early attempts to patent business methods as novel processes were rejected (*Hotel Security Checking Co. v. Lorraine Co.* (1908): patent invalidated for a method of preventing restaurant waiter graft, involving the use of sales receipts; the CCPA relied on this decision in *In re Patton* (1942) while rejecting a similar business patent) – early software products for business methods were also rejected on the same grounds (*In re Johnson* (1974): CCPA upheld a patent for an apparatus, in part because it was "not drawn to cover either a method of doing business"; *In re Deutsch* (1977): patent upheld for software for controlling industrial plants, in part because it did not "merely facilitate business dealings")

- Gradual acceptance of business method patents: First indication of changing precedent: *Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith, Inc.* (1983): software ("system") patent upheld because it "effectuates a highly useful business method and would be unpatentable if done by hand" – through the 1980's, the CAFC's analysis of such patents under the Freeman-Walter-Abele test focused on whether the claimed method was an "algorithm," but acknowledged that the merger of business methods and technology had weakened the statutory rejection of business methods – full approval of business method patents arrived with *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* (1998): "the 'business method' exception has merely represented the application of some general, but no longer applicable legal principle… whether the claims are directed to subject matter within §101 should not turn on whether the claimed subject matter does 'business' instead of something else" – future decisions will clarify the standards of business method patents

**§16.02 Design Patents for Computer Software**

- Design patent law: Applications and patents for novel ornamental designs have gradually grown since their creation in the 1970's – 35 USC §171 permits patents for "new, original and ornamental designs for articles of manufacture" – design patents have a 14-year term, and are drafted toward one claim for the depicted design and equivalents – infringement is based on the test of "whether, in the eye of an ordinary observer, giving such attention as purchaser usually givers, two designs are substantially the same, if the resemblance is such as to deceive such an observer, inducing him to purchase one supposing it to be the other"; infringed patentees may claim minimum statutory damages of $250 per incident
- Software design patents: Patentable software designs include icons and other decorative features associated with a software technology – Xerox's design patent applications 1988 (claiming icons for a floppy disk, wastebasket, telephone, etc.) were rejected for inadequate specifications, but Xerox's appeals affirmed design patent eligibility for software icons (*Ex parte Strijland et al.* (1992): a picture standing alone is not a patentable design, but a design embedded in a monitor can be eligible)
- USPTO guidelines for design patent eligibility for computer icons: The USPTO issued guidelines in 1996 instructing examiners to allow design patents "if an application claims a computer-generated icon shown on a computer screen, monitor, other display panel, or portion thereof" – accordingly, the application drawings must show a monitor or other display device "article" in broken lines – the examiner will examine the design for formal compliance with design patent practice (omnibus claim, adequate drawings, descriptive title (not just "Computer Icon" but "Computer Screen with Icon Image")), and also substantively based on "the disclosure as a whole"
- Design patent considerations: Since the infringing act for a design patent is the display of the design on the article of manufacturer, design patents are only directly infringed by end users – the extent of infringement by an copying manufacturer or distributor is not yet clear – direct infringement might be bolstered by claiming the icon embedded in the actual software, or on a computer-

readable medium – while the USPTO had not allowed any design patents so embedded by 1998, cases like *In re Beauregard* (1995) strengthen the likely allowability and enforceability of such design patents – *In re Hruby* (1967): in upholding design patent for a pattern of water in a fountain, the CCPA stated that "we do not see that the dependence of a design on something outside itself is a reason for holding that it is not a design 'for an article of manufacture'" – similarly encouraging are cases allowing design patents for fonts – thus, design patent practitioners should try claiming such designs thus: "a computer-displayable icon design as shown and embodied in the contents of a computer-readable storage medium," or even as embedded in a (generic) graphical user interface element – of course, protection for designs is also available under copyright