

Patenting Inventions Related to Non-Impact Printing in Light of the Recent U.S. Supreme Court Case: *Alice Corp. v. CLS Bank*

Scott M. Slomowitz, Gary A. Greene and Nicholas M. Tinari, Jr; Caesar Rivise, PC; Philadelphia, PA, United States

Abstract

Patent law is a vital aspect of research and development in all areas of technology. The field of non-impact printing is no exception. In 2014, the U.S. Supreme Court dramatically changed the landscape of what is considered patentable subject matter, with broad-ranging effect on technologies that rely on software and mathematical algorithms. The ruling, in a case titled *Alice Corp. v. CLS Bank*, prevents inventors from obtaining patents on what the court termed “abstract ideas” and went even further by stating that the use of a generic computer to implement an “abstract idea” is also not patentable [1].

While practitioners in high tech fields may not consider algorithms they create to be “abstract,” the *Alice* case and its interpretation by the U.S. Patent and Trademark Office (“PTO”) place potential roadblocks to patentability that require careful navigation based on the most recent case law decided in relevant lower federal courts across the country. For example, one court in New Hampshire rejected a CAD/CAM patent for mapping a ventilation system into digital form and processing the imported data into 3D drawings using standard parts.¹ The rationale was that this was an “abstract” process that could be performed manually and that the use of a computer did not make the process patentable. Across the country, a California court² upheld a Caltech patent on an error correction code algorithm. That court took issue with *Alice* in that it provided no clear dividing line between the patentable and the unpatentable: “Although software is patentable generally, neither *Alice* nor any other Supreme Court precedent defines when software is patentable . . . this has proved detrimental to the patent system.” Ultimately, the Cal Tech court found the error correction algorithm patentable because it “provided a specific computing solution for a computing problem.”

The uncertainty that the *Alice* ruling has created for high-tech fields can be unnerving for engineering professionals who are trained to rely on physical rules that are unwavering regardless of the geographic state where they are applied. This paper aims to unravel some of the uncertainty by surveying relevant post-*Alice* court decisions and identifying common themes to help guide inventors whose products involve software-implemented algorithms. The paper concludes with a set of basic guidelines for patent claims in high tech fields based on the most recent law and on cases involving products related to non-impact printing.

Patenting Inventions in Light of *Alice*

Scientists and engineers in advanced technology fields are frequently involved in the patenting process and are generally aware of the basic threshold standards of novelty and non-obviousness for patenting an invention.³ There is, however, an equally fundamental requirement that rarely arose in patenting high tech inventions, but which has now taken center stage, at least in inventions that include software. This is the requirement that the invention be directed to patent eligible-subject matter. While the Patent Act states only that a patent may be obtained for “any new and useful process, machine, manufacture or composition of matter,”⁴ the U.S. Supreme Court has interpreted those terms such that “laws of nature, natural phenomena and abstract ideas” are excluded from patent eligible subject matter.⁵ The last of these areas, the prohibition against patenting abstract ideas, which has come to include mathematical formulae, is the basis for the far-ranging 2014 Supreme Court ruling *Alice Corp. v. CLS Bank*. That ruling, overnight, effectively invalidated thousands of patents and has already been the basis for dozens of court cases and motions to invalidate previously-granted patents. Meanwhile, patent practitioners have seen rejections of applications involving software skyrocket with the “abstract idea” concept applied even to inventions that do not mention software.

This paper reviews the evolution of the present case law as to what constitutes patentable subject matter, discusses typical cases decided in the courts and the recent wave of patent invalidity rulings in the early stages of litigation and, lastly, sets out some guidelines for drafting patent claims to avoid rejections for non-patentable subject matter.

Evolution of Subject Matter Case Law

In the United States, patent law stems directly from the Constitution, which empowers Congress: “To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive rights to their respective Writings and Discoveries.” This clause resulted in various laws over the years that granted patent rights and generated rules for patentability.

In the beginning, to borrow a phrase, there was the Constitution, which begat the patent statutes. For a long time, the issue of subject matter was largely a non-issue as the inventions that propelled the industrialization of the nation and the world were

¹ *East Coast Sheet Metal Fabricating Corp. v. Autodesk, Inc.*, 2015 U.S. Dist. Lexis 5535 (D.N.H., Jan. 15, 2015).

² *Cal. Inst. of Tech. v. Hughes Comms, Inc.*, 2014 U.S. Dist. Lexis 156763 (C.D. Cal. Nov. 3, 2014).

³ 35 U.S.C. §§ 102-103.

⁴ 35 U.S.C. § 101.

⁵ *Gottschalk v. Benson*, 409 U.S. 63 (1972).

almost exclusively directed to machines and their parts, compositions of matter and novel processes for producing products and chemicals. All of these fit neatly into the terms of Section 101 of the Patent statute.

With the advent of computing, the problem arose of how to treat machines or processes that involved computers and the use of algorithms and seminal instances found their way to the Supreme Court. In an early such case, *Gottschalk v. Benson*, the Supreme Court in 1972 rejected a patent for a computer-based process for converting binary coded decimal numbers to pure binary numbers as non-patentable subject matter [4]. In doing so, the Court explained that while a mathematical formula is not non-patentable subject matter per se, when it is integral to a novel process involving other steps or components, here the formula was so fundamental to any computer program that to allow a patent on its use in a computer would be to preclude virtually all computer programs in the future. The Court left open whether any computer program could be patentable, suggesting that Congress might have to change the patent statutes to address the issue, but also stated that an algorithm, “which is a procedure for solving a given type of mathematical formula” could not by itself be patented.

Important issues in all areas often move slowly through the court system, so it was not until the eve of the personal computing revolution did the Supreme Court in a case called *Diamond v. Diehr* finally declare to be patentable subject matter a claim to the use of a computer program, in this instance, for a process for curing rubber [5]. The process involved a well-known equation implemented in the program, but because the computer’s ability to actively monitor the variables used in the equation and thus track the rubber curing process in a way that could not be done without the speed and computing power of the claimed process. The takeaway from *Diamond* was that “when a [patent] claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g. transforming or reducing an article to a different state or thing) then the claim satisfies the requirements of §101.”⁶

Not excluding from patentable subject matter every invention simply because it uses a computer or applies a formula makes sense, and is arguably still the law, but after *Diamond* the pendulum of allowable subject matter swung widely towards allowance in a 1998 case and it now appears to have swung far back and the extent of that reversal is not yet known. In 1998 the United States Court of Appeals for the Federal Circuit, which hears all patent appeals and is superseded only by the Supreme Court, unleashed a torrent of patents on so-called business methods. These types of patents often involved formulas and computers and after the ruling in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, a great many patents issued in the area of finance and computerized methods of trading and setting and predicting asset valuation [6]. The patent in *State Street* was directed to “a data processing system for managing a financial services configuration of a portfolio established as a partnership,

each partner being one of a plurality of funds.” The way the Federal Circuit addressed patentable subject matter was the source of the host of business method patents that followed *State Street*. “The transformation of data representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price constitutes a practical application of a mathematical algorithm, formula or calculation, because it produces a ‘useful, concrete and tangible result’ – a final share price momentarily fixed for recording and reporting purposes.”

The 1998 *State Street* ruling and its broadly inclusive rule granting subject matter validity to any invention with a “useful, concrete and tangible result” (“UCTR”) came just in time for the Internet and the explosion of new ways of conducting business and exchanging money and goods via computers, not to mention ever more complex financial instruments, some of which led up to the financial market disaster of 2008. The effect of the ruling was immense. Individual inventors minted new wealth devising business methods and Internet-based commerce concepts, with their inventions often being bought by larger entities who could afford to litigate patents against heavyweights in Fortune 500 companies. The impact of UCTR was so startling that the rule lasted only ten years before the Federal Circuit reversed itself. In *In re Bilski* the Federal Circuit dropped the “useful, concrete and tangible result” criterion in favor of a far more restrictive “machine or transformation” test [7]. In doing so, the appeals court found invalid a commodity hedging method patent that would have likely been allowed under the 1998 test. The new test required that a method claim either be tied to a particular machine or effect a transformation of matter—a harking back to the pre-computer age where the patent system dealt exclusively with comfortable subject matter like milling machines and recipes for petroleum byproducts. The U.S. Supreme Court upheld the appeals court in *Bilski*, but in typically confusing fashion stated that the machine or transformation test should not be the only test for subject matter patentability, while providing little real guidance as to what the alleged other tests should be. Examiners largely relied on the machine or transformation test to make rejections in the years leading up to *Alice*[8].

Alice v. CLS Bank

While *Bilski* did end the open season on “pure” business methods, inventors argued in its wake that computer programs—including the fertile ground of applications for smart phones and other portable devices and Internet-based methods were “tied to a particular machine” namely the computer, smart phone or server that ran the program sought to be patented. This “backdoor” was quickly closed in 2014 by the Supreme Court over a patent claim for a four step computer-implemented method of mitigating settlement risk in *Alice Corp. v. CLS Bank Int’l.*⁷ Whereas *Bilski* focused on whether a method was performed by a machine, the *Alice* ruling went beyond that to state that a claim based on an abstract idea must have additional elements that transform the abstract idea into something patent eligible. While this vague criterion is unsettling—just what does it take to make that transformation—the Court was very clear about one thing: “the

⁶ *Diamond v. Diehr*, 450 U.S. at 191.

⁷ 134 S.Ct. 2347 (2014).

mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.” Thus, all the post-*Bilski* hopefuls with patent applications on IOS and Android apps were about to hit a brick wall with the PTO, while inventors and investors holding patents on e-commerce methods would see their asserted patents bounced out of court at an early stage usually seen only in borderline frivolous lawsuits. Now, if your claim recites a computer or microprocessor and any steps performed by same, chances are good that you will receive a 35 U.S.C § 101 rejection for non-patentable subject matter. At present, the PTO examination guidelines also require examiners to make rejections based on prior art (earlier examples of the claimed invention or a combination that makes the invention obvious). The applicant, however, must argue against both the Section 101 rejection and any prior art rejection.

In *Alice*, the Supreme Court relied on a test it had previously established in a medical diagnostic test patent. [9]. The test in the case titled *Mayo Collaborative Services v. Prometheus Labs* was a two-part test—multi-part tests being the favorites of courts. Step one: does the claim recite an abstract idea. Step two: if yes to step one, do the elements of the patent claim as a whole contain an “inventive concept” sufficient to transform the abstract idea into a patent-eligible application. One might be inclined to add a step three: define what is meant by “abstract idea” and even step four, what criterion should be applied for this “transformation” into patent eligibility. In the law, there are often no bright line rules and what we rely on are subsequent decisions in the courts to eke out the boundaries of what one commentator called a “vacuous and circular” standard [Brian Dunne, Where Do We Stand One Year After *Alice*, Law360.com.] Fortunately, there is no shortage of cases decided under *Alice*, although it is not so clear that any standard has emerged, as one might expect when even the Federal Circuit admits that “distinguishing between claims that recite a patent-eligible invention and claims that add too little to a patent-ineligible abstract concept can be difficult.”

The effect of *Alice* on patent prosecution of business method patents has been profound. Prior to *Alice*, patent applicants overcame Section 101 rejections about 62% of the time prior to receiving a final rejection. After *Alice*, 90% of business method applications have received final rejections [10].

Post *Alice* Decisions

A full survey of the dozens of lower court rulings is beyond the scope of this paper. We present here some representative examples, including two cases decided on appeal, one where claims were found patentable under *Alice* and one where, as is more typically the result in the lower courts, the claims were found to be directed to non-patentable subject matter.

Ultramercial v. Hulu

Ultramercial owns a patent on an eleven step method for distributing copyrighted material over the Internet, where the consumer receives the copyrighted material in exchange for viewing an advertisement [11]. The claim involves the consumer interacting with the provider web site, agreeing to view the

advertisement, actually viewing the advertisement and then the provider supplying the copyrighted material. The Federal Circuit ruling stated:

This ordered combination of steps recites an abstraction—an idea, having no particular concrete or tangible form. The process of receiving copyrighted media, selecting an ad, offering the media in exchange for watching the selected ad, displaying the ad, allowing the consumer access to the media, and receiving payment from the sponsor of the ad all describe an abstract idea, devoid of a concrete or tangible application. Although certain additional limitations, such as consulting an activity log, add a degree of particularity, the concept embodied by the majority of the limitations describes only the abstract idea of showing an advertisement before delivering free content.

The majority of those steps comprise the abstract concept of offering media content in exchange for viewing an advertisement. Adding routine additional steps such as updating an activity log, requiring a request from the consumer to view the ad, restrictions on public access, and use of the Internet does not transform an otherwise abstract idea into patent-eligible subject matter. Instead, the claimed sequence of steps comprises only conventional steps, specified at a high level of generality, which is insufficient to supply an inventive concept.⁸

The *Ultramercial* decision is not surprising and consistent with what appears to be the ostensible aims of cases like *Bilski* and *Alice*: namely, to stem the tide of what the courts may view, without saying so outright, to be non-technological inventions. The following Federal Circuit case, however, is difficult to reconcile with that rationale, and while the court supplies what it deems the distinguishing features of a patent claim it allowed, the distinctions still may feel arbitrary to many readers.

DDR Holdings v. Hotels.com

DDR Holdings is the owner of patents on systems and methods of generating a composite web page that combines elements of a host web-site with content from a third party merchant [12]. The aim of the claims was to keep the user at the host web site even while viewing the third party’s merchandise instead of the user being redirected off the host site to the third party site. The DDR patent claim that the court analyzed is long, but its allowance is instructive and so is reprinted here:

19. A system useful in an outsource provider serving web pages offering commercial opportunities, the system comprising:
 - (a) a computer store containing data, for each of a plurality of first web pages, defining a plurality of

⁸ *Ultramercial v. Hulu*, 772 F.3d 709, 715-16.

visually perceptible elements, which visually perceptible elements correspond to the plurality of first web pages;

(i) wherein each of the first web pages belongs to one of a plurality of web page owners;

(ii) wherein each of the first web pages displays at least one active link associated with a commerce object associated with a buying opportunity of a selected one of a plurality of merchants; and

(iii) wherein the selected merchant, the outsource provider, and the owner of the first web page displaying the associated link are each third parties with respect to one other;

(b) a computer server at the outsource provider, which computer server is coupled to the computer store and programmed to:

(i) receive from the web browser of a computer user a signal indicating activation of one of the links displayed by one of the first web pages;

(ii) automatically identify as the source page the one of the first web pages on which the link has been activated;

(iii) in response to identification of the source page, automatically retrieve the stored data corresponding to the source page; and

(iv) using the data retrieved, automatically generate and transmit to the web browser a second web page that displays: (A) information associated with the commerce object associated with the link that has been activated, and (B) the plurality of visually perceptible elements visually corresponding to the source page.

One might be tempted here to say this is no more than a computer-implemented abstract idea of a new way of using hyperlinks to display web pages, but the Federal Circuit saw the claim differently: “it is true that the claims here are similar to the claims in the cases discussed above in the sense that the claims involve both a computer and the Internet. But these claims stand apart because they do not merely recite the performance of some business practice known from the pre-Internet world along with the requirement to perform it on the Internet. Instead, *the claimed solution is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks*.”⁹

The ’399 patent’s claims are different enough in substance from those in *Ultramercial* because they do not broadly and generically claim use of the Internet to perform an abstract business practice (with insignificant added activity). Unlike the claims in *Ultramercial*, the claims at issue here specify how interactions with the Internet are manipulated to yield a desired result—a result that overrides the routine and conventional sequence of events ordinarily triggered by the click of a hyperlink. Instead of the computer network operating in its normal, expected manner by sending the website visitor to the third-party website that appears to be connected with the clicked

advertisement, the claimed system generates and directs the visitor to the above-described hybrid web page that presents product information from the third-party and visual look and feel elements from the host website. When the limitations of the ’399 patent’s asserted claims are taken together as an ordered combination, the claims recite an invention that is not merely the routine or conventional use of the Internet.

East Coast Sheet Metal Fabricating v. Autodesk

The following case illustrates how far lower federal district courts have extended *Alice* in rejecting claims as non-patentable subject matter. East Coast Sheet Metal has a patent for computer aided design of a ventilation system that maps ventilation components to standard fittings. A representative patent claim is as follows.

A computer readable medium having computer executable instructions for designing a ventilation system that when executed by a processor performs the following steps comprising

obtaining a visual representation of one or more components of the ventilation system,

assigning one or more property values to each of the components of said ventilation system using a first program code,

utilizing geometrical information representing said visual representation and said property values of each component for mapping all components of the imported geometrical information to a plurality of standard fittings as a function of (1) standards information including (1A) information specific to each of the plurality of standard fittings and (1B) fabrication information of each of the plurality of specific standard fittings, (2) the imported geometrical information, and (3) the assigned property values, and

generating a manufacturing blueprint comprising the standard fittings, the fabrication information, and a three-dimensional representation of the visual representation, whereby each of the one or more components of the visual representation have been mapped to standard fittings and include fabrication information in the manufacturing blueprint, thus, eliminating a need to redraw every component of an architectural drawing before coordination, fabrication, and installation of the system.¹⁰

The court stated that the claim was directed to the “abstract concept of mapping” and failed to find the necessary elements that “might transform the claim into something more.” In doing so, it quoted prior case law, albeit unconvincingly: “we must distinguish between patents that claim the ‘building blocks’ of human ingenuity and those that integrate the building blocks into something more.” The court may have stretched the “building

⁹ *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1247.

¹⁰ *East Coast Sheet Metal Fabricating Corp. v. Autodesk, Inc.* 215 U.S. Dist. LEXIS 5536, D. NH, Jan. 15, 2015.

block of human ingenuity” concept past any reasonable limit here. The claim arguably meets the *DDR* rationale of solving a particular problem specific to the field of computer-aided design tools and it is hard to imagine how mapping sheet metal parts to standard fittings is at the core of human ingenuity.

McRO v. Sony

McRO v. Sony, decided in a California district court, is instructive for two reasons: first, because it shows how far courts will go to invalidate a patent under *Alice* and second, because the court’s analysis confused the issue of allowable subject matter with novelty—a technique not unique to this case [13]. McRO has patents in the field of synchronizing animated characters’ lip movements to speech tracks. A representative one rejected by the court states:

A method for automatically animating lip synchronization and facial expression of three-dimensional characters comprising:
obtaining a first set of rules that define output morph weight set stream as a function of phoneme sequence and time of said phoneme sequence;
generating an intermediate stream of output morph weight sets and a plurality of transition parameters between two adjacent morph weight sets by evaluating said plurality of sub-sequences against said first set of rules;
generating a final stream of output morph weight sets at a desired frame rate from said intermediate stream of output morph weight sets and said plurality of transition parameters; and
applying said final stream of output morph weight sets to a sequence of animated characters to produce lip synchronization and facial expression control of said animated characters.¹¹

At this point, the reader may be asking how could a claim to such a technically narrow field involving terms like “output morph weight sets” have run into a roadblock set up to eliminate patents on hedge fund schemes. Indeed, the court even admits: “At first blush . . . it is difficult to see how the claims might implicate the basic underlying concern that [McRO’s] patents tie up too much future use of any abstract idea they apply.”¹² Further, this claim is a novel solution to a technological problem rooted in the computerized animation field—a far more convincing example than the hyperlink concept allowed on appeal in *DDR*.

Where the court went wrong is in its analysis of the McRO claims where it misstated and incorrectly applied a concept stated in the earlier Supreme Court ruling in *Mayo* that: “‘well understood, routine conventional activity’ *previously used in the field* ‘is normally not sufficient to transform an unpatentable law of nature [or abstract idea] into a patent eligible application.’” (italicized terms were added by the *McRO* court). The court used

this flawed understanding of *Mayo* and further misstated the rule in *Alice* to read “where a claim recites tangible steps, but the only new part of the claim is an abstract idea, that may constitute a claim to an abstract idea.”

The fundamental mistake the court made was that it did not consider the “claims as a whole” as required by *Alice* and instead dissected the McRO claim to remove all elements that were found in the prior art and then ruled that the remaining elements standing alone were abstract, thus rendering the claim invalid: “The point of novelty here is the idea of using rules, including timing rules, to automate the process of generating keyframes. . . . While the patents do not preempt the field of automatic lip synchronization for computer-generated 3D animation, they do preempt the field of such lip synchronization using a rules-based morph target approach.” Even this argument strains credulity. The field of lip synchronization using a rules-based morph target approach can not in any serious analysis be considered one of the “building blocks of human ingenuity.” The *Alice* court issued a rule regarding abstract ideas implemented only on a generic computer, it did not instruct courts to analyze claims piecemeal by removing elements found in the prior art regardless of whether the elements were akin to a generic computer.

Patenting Software-based Inventions Post-Alice

After *Alice*, patent examiners invariably reject claims that include steps performed by a computer and defendants sued for infringement of such patent claims will be seeking swift dismissal along the lines described above. In light of these conditions, there are some key points to keep in mind. First, the *Alice* court stated that not all patent claims that refer to software are invalid under 35 U.S.C. § 101 and neither are all claims that state an abstract idea: “at some level all inventions embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.”¹³ Second, presently the best example of a software-based patent that survived an *Alice* challenge is that in the *DDR* case, where the penultimate court in the land (i.e. the Federal Circuit) declared the patent to be valid because it addressed a technical computer-based solution to a particular problem rooted in the realm of computer networks. Patent claims having method steps performed by a computer that are drafted to include *non-generic* hardware or that are framed such that they place the invention in the light of a problem to be solved that is necessarily rooted in technology related to the computer will likely fare better than those that merely state steps to be performed by a computer without that elusive “something more.”

References

- [1] *Alice Corp. v. CLS Bank*, 134 S.Ct. 2347 (2014).
- [2] *Cal. Inst. of Tech. v. Hughes Comms, Inc. et al*, 2014 U.S. Dist. Lexis 156763 (C.D. Cal. Nov. 3, 2014).
- [3] *East Coast Sheet Metal Fabricating Corp. v. Autodesk, Inc.*, 2015 U.S. Dist. Lexis 5535 (D.N.H, Jan. 15, 2015).

¹¹ *McRO, Inc. v. Sony Computer Entm’t Am. LLC*, 55 F. Supp. 3d 1214, 1227.

¹² *Id.* at 1223.

¹³ *Alice*, 134 S. Ct. 2347, 2354.

- [4] *Gottschalk v. Benson*, 409 U.S. 63 (1972).
- [5] *Diamond v. Diehr*, 450 U.S. 175 (1981).
- [6] *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998).
- [7] *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008).
- [8] *Bilski v. Kappos*, 561 U.S. 593 (2010).
- [9] *Mayo Collaborative Services v. Prometheus Labs, Inc.*, 132 S. Ct. 1289 (2012).
- [10] Robert Sachs, “A Deeper Dive into Court Trends, and New Data on Alice Inside the USPTO”, *bilskiblog.com*, July 2, 2015.
- [11] *Ultramercial v. Hulu*, 772 F.3d 709, (Fed.Cir. 2014).
- [12] *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (2014).
- [13] *McRO, Inc. v. Sony Computer Entm’t Am., LLC*, 55 F. Supp. 3d 1214 (2014).

Author Biographies

Scott Slomowitz is an intellectual property attorney with over 20 years of experience in all aspects of IP which includes patents, copyrights, trademarks and trade secrets. He represents large corporations and small

businesses, as well as sole inventors in counseling them on how best to protect their IP. He holds an electrical engineering degree from the University of Delaware and worked as a flight controls engineer at Boeing Helicopters for several years. His industry experience, as well as being a patent holder of several inventions himself, places him in the unique role of being a well-seasoned IP attorney and inventor.

Gary Greene is experienced in handling matters in all aspects of intellectual property law, including licensing, litigation, and U.S. and foreign patent and trademark prosecution. He has particular experience in mechanical and electro-mechanical technologies. Mr. Greene is registered to practice before the United States Patent and Trademark Office and is also a licensed professional engineer. Mr. Greene is admitted to practice law in U.S. federal and state courts, as well as at the U.S. Patent and Trademark Office. Mr. Greene obtained a Bachelor of Mechanical Engineering and Master of Laws at Villanova University, and a Juris Doctor at Widener University.

Nicholas M. Tinari, Jr. is a registered patent attorney, whose practice comprises many aspects of intellectual property law, including analyzing, procuring, challenging and enforcing patents and copyrights on behalf of individuals, small businesses, research institutions and multinational corporations. His patent practice encompasses a wide variety of technologies, particularly those in the electronics, imaging, medical device, and software fields. Prior to his law practice, Mr. Tinari was a lead engineer in the aircraft instrumentation and avionics fields designing microprocessor-based analog and digital equipment including hardware and software design. His clients included Eaton Corporation, Litton Industries and Spitz Space Systems.