Breaking the *Georgia-Pacific* Habit: A Practical Proposal to Bring Simplicity and Structure to Reasonable Royalty Damages Determinations

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I. Introduction

In the mid-1990s, the Federal Circuit endorsed the fifteen *Georgia-Pacific* factors as an appropriate and helpful framework for determining reasonable royalty damages in patent cases. Courts subsequently have applied the *Georgia-Pacific* factors as the commonly accepted default framework for reasonable royalty damages, and courts often instruct juries to use the fifteen *Georgia-Pacific* factors as the test for determining reasonable royalty damages.

The time has come to break the *Georgia-Pacific* habit. Notwithstanding their widespread use, the *Georgia-Pacific* factors have become outdated and impractical. Indeed, the *Georgia-Pacific* factors are not, and were never intended to be, a generally applicable framework for determining reasonable royalty damages. In recent years, the Federal Circuit has cautioned that the *Georgia-Pacific* factors are not a "talisman" for reasonable royalty determinations and has held that it is reversible error to instruct juries on *Georgia-Pacific* factors that are irrelevant or inconsistent with the evidence of record. There is evidence that the *Georgia-Pacific* factors not only complicate the damages analysis but also lead to damages awards that systematically overcompensate patent holders. These problems have led to an increased focus on whether the long list of *Georgia-Pacific* factors is in fact helpful to juries, as well as new proposals to provide a simpler and more coherent framework.

This article provides a proposal to bring simplicity and structure to reasonable royalty determinations through a new framework for damages jury instructions. Courts should replace their reliance on the *Georgia-Pacific* factors with a more concise and coherent set of principles that will facilitate damages awards based on the true market value of the patent at the time of the hypothetical negotiation.

II. Patent Damages Policy Objectives

The notion that providing inventors with certain exclusive rights to their inventions will encourage the development and dissemination of valuable innovations is the bedrock of patent law. This purpose is stated explicitly in the U.S. Constitution, which empowers Congress "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[1]

As two of us discussed in *Breaking the Vicious Cycle of Patent Damages*, "[t]here is little dispute that providing inadequate patent protection to inventors would leave them without optimal incentives to invent."[2] However, "[t]here is also little dispute that the ultimate goal of fostering innovation would be undermined by providing too great a degree of protection to patents and, in particular, that excessive damages for patent infringement would reduce the overall incentive for firms to develop commercial products and to innovate by building on earlier inventions."[3] Thus, an accurate assessment of damages for patent infringement is essential to foster innovation and further the purposes of the patent laws.[4]

An accurate assessment of damages would award the patent holder the market value of a license to use the patented technology. That is the amount on which a willing licensor and a willing licensee would have agreed in a market transaction in which both had the option of walking away from the deal and pursuing their best alternative instead. It is the amount to which they would have agreed had they negotiated at arm's length for patent clearance before the infringer had committed to using the patented technology.[5] That amount will in no event be greater than the incremental value of the patented technology for the intended use compared to the value of the best alternative available at the time.[6]

The *Georgia-Pacific* factors do not direct courts or juries to make that assessment. One of the most significant problems with the *Georgia-Pacific* factors is that

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1 U.S. CONST. art. I, § 8, cl. 8.

2 William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385, 391 (2016) [hereinafter *Breaking the Vicious Cycle*]; *see also, e.g.*, FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 40 (2011) ("[A] patent enables [the owner] to capture returns from R&D investment by preventing others from appropriating the invention and driving down prices through infringing competition."); WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 13 (Harvard Univ. Press, 2003) ("[A] firm is less likely to expend resources on developing a new product if competing firms that have not borne the expense of development can duplicate the product and produce it at the same marginal cost as the innovator; competition will drive price down to marginal cost and the sunk costs of invention will not be recouped.").

3 *Breaking the Vicious Cycle*, *supra* note 2, at 391; *see also, e.g.*, Thomas F. Cotter, *An Economic Analysis of Enhanced Damages and Attorney's Fees for Willful Patent Infringement*, 14 FED. CIRC. B.J. 291, 313–14 (2004) ("[S]upracompensatory awards could . . . induce firms to . . . avoid marketing innovative products, or (in the antitrust context) from agreeing to unconventional, but socially desirable, methods for joint production and distribution of goods." (footnotes omitted)); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007) (excessive royalties "act as a tax on new products incorporating the patented technology, thereby impeding rather than promoting innovation").

4 *Breaking the Vicious Cycle*, *supra* note 2, at 391–92.

5 *Id.* at 392–393.

6 *Id.* at 392.

they do not adequately preclude consideration of the alleged infringer's "lock-in" costs—such as the investments already made in the allegedly infringing product and the cost to switch to a non-infringing alternative—and thus often lead the factfinder to overestimate the value of the patented technology when determining damages awards.[7] To better approximate the true economic value of a patent, and avoid inflating the value of the patent based on lock-in costs, a factfinder should focus on how the parties would value a license to the patent *ex ante*, i.e., *before* the alleged infringer invested in, or a standard setting organization committed to, the allegedly infringing technology.[8] In this hypothetical *ex ante* negotiation, implementers would get preclearance before infringing and before committing to use the patented technology.[9]

Courts, however, have allowed *ex post* considerations, such as lock-in costs and subsequent changes in circumstances, to pollute the hypothetical *ex ante* negotiation.[10] These *ex post* considerations sometimes result in an apparent value for the patented technology that is less than its market value, but more often tend to inflate the value of the patent for a would-be infringer.[11] For example, while seemingly "comparable" licenses can be highly probative evidence, they are often the product of *ex post* bargaining—bargaining *after* the potential licensor has invested in the relevant technology—and therefore may reflect *ex post* considerations, such as lock-in costs or premiums to account for uncertainty related to potential litigation out-

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7 *Id.* at 393, 409–10 ("[I]n the interval between the ex ante hypothetical negotiation date and the ex post actual negotiation date . . . , the infringer will usually have made substantial asset-specific investments tied to the infringing technology . . . . We use the term 'lock-in costs' to refer to how much more it would cost the infringer to switch to an alternative technology ex post than it would have cost to switch ex ante."); SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods. LLC, 137 S. Ct. 954, 972 (Breyer, J., dissenting) ("[T]here is a 'lock-in' problem that is likely to be more serious where patents are at issue. Once a business chooses to rely on a particular technology, it can become expensive to switch, even if it would have been cheap to do so earlier. As a result, a patentee has considerable incentive to delay suit until the costs of switching—and accordingly the settlement value of a claim—are high." (citing *Breaking the Vicious Cycle*, *supra* note 2, at 409–10)).

8 *Breaking the Vicious Cycle*, *supra* note 2, at 392 ("There is a virtual consensus among scholars that the optimum reasonable royalty remedy—in light of both incentives needed to invent and those needed to develop commercial products and to innovate further upon earlier inventions—is one that most closely restores the parties to the position they would have been in had they been able to negotiate a patent license before infringement (i.e., ex ante).").

9 *See id.* at 392–93.

10 *Id.* at 413 ("The 'book of wisdom' doctrine provides that a royalty rate may be determined based in part upon events after the hypothetical negotiation date."); *see also* Fromson v. W. Litho Plate & Supply Co., 853 F.2d 1568, 1575–76 (Fed. Cir. 1988) (discussing the book of wisdom doctrine), *overruled in part on other grounds by* Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp., 383 F.3d 1337, 1343 (Fed. Cir. 2004). *See generally* John C. Jarosz & Michael J. Chapman, *The Hypothetical Negotiation and Reasonable Royalty Damages: The Tail Wagging the Dog*, 16 STAN. TECH. L. REV. 769, 801–03 (2013) (discussing the application of the book of wisdom doctrine to permit consideration of *ex post* facts in setting a reasonable royalty).

11 *Breaking the Vicious Cycle*, *supra* note 2, at 412 ("The use of ex post considerations allows the patent holder to extract a premium—above the ex ante value of the invention—based on factors like lock-in costs."); *see also* Lemley & Shapiro, *supra* note 3, at 2009.

comes, thereby inflating the royalties agreed to in the license.[12] Using these licenses to calculate a reasonable royalty can thus lead to a rate different from what the parties would have agreed upon in *ex ante* bargaining and thus different from the market value of the patented technology.[13] Other *Georgia-Pacific* factors also ask juries to weigh the total *ex post* value of the patent in the infringing product, instead of the incremental benefit compared to the alleged infringer's best *ex ante* alternative.[14] This too results in an inflated royalty rate that fails to capture the value of the patent accurately.[15]

As discussed in *Breaking the Vicious Cycle*, allowing such *ex post* considerations to factor into the hypothetical *ex ante* negotiation systematically overcompensates the patent holder.[16] To accurately assess patent damages, patent damage law must be refined to prevent *ex post* considerations from factoring into the hypothetical *ex ante* negotiation.[17]

We intend in this article to discuss how to implement the principles described in *Breaking the Vicious Cycle* in the real-world context of jury instructions in district court litigation.

III. The *Georgia-Pacific* Factors No Longer Provide Adequate Guidance for Reasonable Royalty Damages Determinations

In this section, we review the history of the *Georgia-Pacific* factors and explain why this antiquated yet widespread method for damages calculations leads to inconsistent and inaccurate jury verdicts.

A. Courts' Use of the *Georgia-Pacific* Factors as the Commonly Accepted Default Framework for Reasonable Royalty Damages

In *Rite-Hite Corp. v. Kelley Co.*, the Federal Circuit endorsed the *Georgia-Pacific* factors as providing a "wide range of factors relevant to [the] hypothetical negotiation."[18] Until recently, the Federal Circuit repeatedly endorsed the *Georgia-Pacific* factors as an acceptable framework for reasonable royalty determinations, emphasizing that consideration of the fifteen factors helps to "tie the reasonable royalty calculation to the facts of the hypothetical negotiation at issue."[19] Relying

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12 *Breaking the Vicious Cycle*, *supra* note 2, at 418–19.
13 *Id.*
14 *Id.* at 420–22.
15 *Id.* at 421–22.
16 *Id.* at 411–38.
17 *Id.* at 465–66.
18 Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1555 (Fed. Cir. 1995) (citing Georgia-Pac. Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1119 (S.D.N.Y.1970)); *see also* Unisplay, S.A. v. Am. Elec. Sign Co., 69 F.3d 512, 517 n.7 (Fed. Cir. 1995) (stating that "[a] comprehensive list of relevant factors in determining a reasonable royalty is set out in [*Georgia-Pacific*]").
19 LaserDynamics, Inc. v. Quanta Comp., Inc., 694 F.3d 51, 60 n.2 (Fed. Cir. 2012) ("'This court has sanctioned the use of the *Georgia-Pacific* factors to frame the reasonable royalty inquiry. Those factors properly tie the reasonable royalty calculation to the facts of the hypothetical negotiation at issue.'" (quoting Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1317 (Fed. Cir. 2011))); i4i

on the Federal Circuit's endorsement, district courts commonly cite to the *Georgia-Pacific* factors as an acceptable framework for determining reasonable royalty damages.[20]

But, in practice, courts apply the framework inconsistently. For example, some courts include only a subset of the *Georgia-Pacific* factors in their jury instructions,[21] while others incorporate all fifteen factors.[22] Some courts will even list more factors in addition to the *Georgia-Pacific* factors.[23] In many jury instructions, the

Ltd. P'ship v. Microsoft Corp., 598 F.3d 831, 854 (Fed. Cir. 2010), *aff'd*, 564 U.S. 91 (2011) ("We have consistently upheld experts' use of a hypothetical negotiation and *Georgia-Pacific* factors for estimating a reasonable royalty."); Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1335 (Fed. Cir. 2009) ("[T]he flexible analysis of all applicable *Georgia-Pacific* factors provides a useful and legally-required framework for assessing the damages award in this case."); Parental Guide of Tex., Inc. v. Thomson, Inc., 446 F.3d 1265, 1270 (Fed. Cir. 2006) ("[A]s both parties recognize, a 'reasonable royalty' rate under section 284 is calculated with reference to the long list of factors outlined in *Georgia-Pacific* . . . ."); Dow Chem. Co. v. Mee Indus., Inc., 341 F.3d 1370, 1382 (Fed. Cir. 2003) ("[T]he district court should consider the so-called *Georgia-Pacific* factors in detail, and award such reasonable royalties as the record evidence will support." (internal citation omitted)).

20 *See, e.g.*, Emblaze Ltd. v. Apple Inc., 52 F. Supp. 3d 949, 955 (N.D. Cal. 2014) ("The *Georgia-Pacific* factors are used in the 'hypothetical negotiation' approach to determining a reasonable royalty."); Magnetar Techs. Corp. v. Six Flags Theme Parks Inc., No. 07-cv-127, 2014 WL 530241, at *2 (D. Del. Feb. 7, 2014) ("The *Georgia-Pacific* factors are widely accepted to calculate a reasonable royalty rate and have been affirmed by the Federal Circuit."); Rembrandt Soc. Media, LP v. Facebook, Inc., 22 F. Supp. 3d 585, 592 n.15 (E.D. Va. 2013) ("The fifteen *Georgia-Pacific* factors, which have been adopted by the Federal Circuit, are used by patentees to raise and lower the royalty rate, thereby allowing a patentee to arrive at the final figure that represents the amount a willing licensee would pay to license the patent at issue."); Microsoft Corp. v. Motorola, Inc., No. 10-cv-1823, 2013 WL 2111217, at *15 (W.D. Wash. Apr. 25, 2013) ("Courts have long experience in conducting hypothetical bilateral negotiations to frame the reasonable royalty inquiry in patent infringement cases under the *Georgia-Pacific* framework."); Pulse Med. Instruments, Inc. v. Drug Impairment Detection Servs., LLC, 858 F. Supp. 2d 505, 510 (D. Md. 2012) ("[C]ourts in this circuit as well as others have consistently looked to experts to apply the *Georgia-Pacific* factors" in determining patent damages); Carnegie Mellon Univ. v. Marvell Tech. Grp., Ltd., No. 09-cv-290, 2012 WL 6562221, at *12 (W.D. Pa. Dec. 15, 2012) ("The Federal Circuit has routinely upheld an expert's use of the *Georgia-Pacific* factors as an appropriate method for assessing damages in patent cases.").

21 *See* X-tra Light Mfg., Inc. v. Acuity Brands, Inc., No. 04-cv-1413, 2007 WL 835360 (S.D. Tex. Feb. 16, 2007) (at Instruction No. 17, listing eleven factors that closely track eleven of the *Georgia-Pacific* factors); ADC Telecomm., Inc. v. Switch-craft, Inc., No. 04-cv-1590, 2007 WL 420277 (D. Minn. Jan. 19, 2007) (at Instruction No. 28, same); Minemyer v. R-Boc Reps., No. 07-cv-1763, 2012 WL 1418472 (N.D. Ill. Feb. 16, 2012) (at Instruction No. 67, same); Forgent Networks, Inc. v. Echostar Tech. Corp., No. 6:06-cv-208, 2007 WL 1836442 (E.D. Tex. May 21, 2007) (at Instruction No. 7.2, listing fourteen factors that paraphrase most of the *Georgia-Pacific* factors); Koito Mfg. Co., Ltd. v. Turn-Key-Tech. LLC, 2003 WL 22297154 (S.D. Cal. April 25, 2003) (listing twelve of the *Georgia-Pacific* factors).

22 *See, e.g.*, Dig. Reg. of Tex., LLC v. Adobe Sys., Inc., No. 12-cv-1971, 2014 WL 7795674 (N.D. Cal. Sept. 4, 2014) (listing all fifteen *Georgia-Pacific* factors in the jury instructions); Cardsoft, Inc. v. Verifone Sys., Inc., No. 2:08-cv-98, 2012 WL 3176523 (E.D. Tex. June 8, 2012) (same).

23 *See* Omega Pats., LLC v. Fortin Auto Radio, Inc., No. 6:05-cv-1113-Orl-22DAB, 2007 WL 843344 (M.D. Fla. Feb. 12, 2007) (at Instruction No. A-34, listing all fifteen *Georgia-Pacific* factors, as well as "16. Any other economic factor that a normally prudent person would, under similar circumstances, take into consideration in negotiating the hypothetical license").

jury is tasked with balancing many different factors, generally without any guidance on the relative importance of the factors or how to balance them.[24]

Courts' continued reliance on the *Georgia-Pacific* factors is grounded more in habit and precedent than in careful analysis. Indeed, notwithstanding their widespread use and acceptance, the Federal Circuit has never performed a detailed evaluation of the merits of each *Georgia-Pacific* factor or identified which factors should be most important to a reasonable royalty determination. Likewise, although use of the *Georgia-Pacific* factors is not required by Federal Circuit precedent, district courts commonly adopt the *Georgia-Pacific* factors with little or no discussion, often simply noting that the factors have been approved by the Federal Circuit.[25]

As discussed below, there are many good reasons to break the *Georgia-Pacific* habit and develop a more coherent set of reasonable royalty instructions.

B. The *Georgia-Pacific* Factors Are Out of Date

The *Georgia-Pacific* factors were first set forth in 1970—nearly fifty years ago. It goes without saying that, since that time, we have experienced a technological revolution, with an explosion of growth in ever more complex technologies and technology products. For example, Intel invented the first microprocessor in 1971, the year after *Georgia-Pacific* was decided. Intel's first microprocessor had 2,300 transistors.[26] Intel now makes processors that have billions of transistors and deliver 3,500 times the performance at 1/60,000th the cost. To put those figures in perspective: if a smartphone were built using its 1971 technology, the phone's microprocessor alone would be the size of a parking space; if housing prices fell at the same rate as the price of transistors in Intel microprocessors, you could purchase a home for the price of a piece of candy.[27]

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[24] *See, e.g.*, *Dig. Reg. of Tex.*, 2014 WL 7795674 (providing no indication of how to balance the factors); Apple, Inc. v. Samsung Elec. Co., No. 11-CV-01846-LHK, 2012 WL 3568795 (N.D. Cal. Aug. 21, 2012) (same); *see also* Jorge L. Contreras & Michael A. Eixenberger, *Model Jury Instructions for Reasonable Royalty Patent Damages*, 57 JURIMETRICS J. 1, 8 (2016) (noting that "the *Georgia-Pacific* framework does not give courts or juries meaningful guidance concerning how the fifteen factors should be weighted or compared").

[25] *See, e.g.*, *Emblaze Ltd.*, 52 F. Supp. 3d at 955 ("The *Georgia-Pacific* factors are used in the 'hypothetical negotiation' approach to determining a reasonable royalty."); *Magnetar Techs.*, 2014 WL 530241, at *2 ("The *Georgia-Pacific* factors are widely accepted to calculate a reasonable royalty rate and have been affirmed by the Federal Circuit."); *Rembrandt Soc. Media*, 22 F. Supp. 3d at 592 n.15 ("The fifteen *Georgia-Pacific* factors, which have been adopted by the Federal Circuit, are used by patentees to raise and lower the royalty rate, thereby allowing a patentee to arrive at the final figure that represents the amount a willing licensee would pay to license the patent at issue."); *Pulse Med. Instruments*, 858 F. Supp. 2d at 510 ("[C]ourts in this circuit as well as others have consistently looked to experts to apply the *Georgia-Pacific* factors.").

[26] *See The Story of the Intel 4004*, INTEL, https://www.intel.com/content/www/us/en/history/museum-story-of-intel-4004.html (last visited October 1, 2017).

[27] *See Celebrating 50 Years of Moore's Law: Whatever Has Been Done, Can Be Outdone*, INTEL, http://download.intel.com/newsroom/kits/ml50/pdfs/moores-law-50-years-infographic-entire.pdf (last visited Jan 5, 2017).

Moreover, courts' continued reliance on the *Georgia-Pacific* factors conflicts with the fresh thinking that the Federal Circuit and district courts have brought to bear in patent damages cases in recent years. In the last ten years, the Federal Circuit has issued a series of important damages decisions that have made significant progress toward achieving fair and accurate patent damages awards.[28] Indeed, the Federal Circuit (along with several district courts) has cautioned that the *Georgia-Pacific* factors are not—and were not intended to be—a generally applicable test.[29]

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28 *See, e.g.*, Ericsson, Inc. v. D-Link Sys. Inc., 773 F.3d 1201, 1235 (Fed. Cir. 2014) ("We further hold that district courts must make clear to the jury that any royalty award must be based on the incremental value of the invention . . . ."); Virnetx, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1327 (Fed. Cir. 2014) ("[T]he requirement that a patentee identify damages associated with the smallest salable patent-practicing unit is simply a step toward meeting the requirement of apportionment. Where the smallest salable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature . . . the patentee must do more to estimate what portion of the value of that product is attributable to the patented technology."); LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 77 (Fed. Cir. 2012) (explaining that "[t]he propriety of using prior settlement agreements to prove the amount of a reasonable royalty is questionable" because settlement agreements "are tainted by the coercive environment of patent litigation [and] are unsuitable to prove a reasonable royalty . . . , the premise of which assumes a voluntary agreement will be reached between a willing licensor and willing licensee, with validity and infringement of the patent not being disputed"); Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1317 (Fed. Cir. 2011) ("[T]here must be a basis in fact to associate the royalty rates used in prior licenses to the particular hypothetical negotiation at issue in the case."); ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860, 870 (Fed. Cir. 2010) (expert's reliance on licenses as evidence of a reasonable royalty was improper where "none of these licenses even mentioned the patents in suit or showed any other discernible link to the claimed technology"); Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1329 (Fed. Cir. 2009) ("[A] lump-sum damages award [based on a reasonable royalty] cannot stand solely on evidence which amounts to little more than a recitation of royalty numbers, one of which is arguably in the ballpark of the jury's award, particularly when it is doubtful that the technology of those license agreements is in any way similar to the technology being litigated here.").

29 *See Ericsson, Inc.*, 773 F.3d at 1230 ("[W]e have never described the *Georgia-Pacific* factors as a talisman for royalty rate calculations . . . ."); Energy Transp. Grp., Inc. v. William Demant Holding A/S, 697 F.3d 1342, 1357 (Fed. Cir. 2012) ("Once again, this court does not endorse *Georgia-Pacific* as setting forth a test for royalty calculations, but only as a list of admissible factors informing a reliable economic analysis."); Whitserve, LLC v. Comp. Packages, Inc., 694 F.3d 10, 31 (Fed. Cir. 2012) ("We do not require that witnesses use any or all of the *Georgia-Pacific* factors when testifying about damages in patent cases."); Asetek Danmark A/S v. CMI USA, Inc., No. 13-cv-00457, 2015 WL 5568360, at *8 n.9 (N.D. Cal. Sept. 22, 2015) ("Not all *Georgia-Pacific* factors are relevant to any particular hypothetical negotiation."), *aff'd in relevant part*, 852 F.3d 1352 (Fed. Cir. 2017); Linear Grp. Servs., LLC v. Attica Automation, Inc., No. 13-cv-10108, 2014 WL 4206871, at *4 n.1 (E.D. Mich. Aug. 25, 2014) ("There are fifteen *Georgia-Pacific* factors. Not all may be applicable in a given case."); Cequent Trailer Prods., Inc. v. Intradin (Shanghai) Mach. Co., No. 1:05-cv-2566, 2007 WL 438140, at *26 (N.D. Ohio Feb. 7, 2007) ("In this case, a number of the *Georgia-Pacific* factors do not apply to the instant facts."); Avocent Huntsville Corp. v. ClearCube Tech., Inc., No. 03-cv-2875, 2006 WL 2109503, at *37 (N.D. Ala. July 28, 2006) ("The fifteen *Georgia-Pacific* factors are not exclusive, however; other factors also may be relevant."); Procter & Gamble Co. v. Paragon Trade Brands, Inc., 989 F. Supp. 547, 607 (D. Del. 1997) ("In performing a hypothetical negotiation analysis, it is important to recognize that some of the *Georgia-Pacific* factors may be of minimal or no relevance to a particular case and other factors may have to be molded by the Court to fit the facts of the case at hand."); Wright v. United States, 53 Fed. Cl. 466, 475 (2002) ("While the *Georgia-Pacific* factors are often probative of a reasonable

Despite these technological and legal developments, the *Georgia-Pacific* factors are still the default framework, and courts still instruct juries using the same fifteen factors that have been used for decades. The time is ripe to reconsider and improve how courts apply the *Georgia-Pacific* factors and, particularly, how they instruct juries regarding patent damages.

C. Conceptual Problems with the *Georgia-Pacific* Factors

Basing reasonable royalty determinations on the *Georgia-Pacific* factors presents several conceptual difficulties for a factfinder to navigate, and leads to inconsistent and inflated damages awards.

First, the *Georgia-Pacific* factors do not provide a coherent framework. Instead, they are a laundry list of "unprioritized and overlapping" factors and do not provide sufficient guidance to the jury regarding how to apply or balance the factors or determine their relative weight.[30] Indeed, the *Georgia-Pacific* court itself recognized the difficulty of applying the factors, noting that there is "no formula by which these factors can be rated precisely in the order of their relative importance or by which their economic significance can be automatically transduced into their pecuniary equivalent."[31] This lack of guidance makes it no easy task for a juror to synthesize, harmonize, and balance the factors to arrive at a reasonable royalty.[32]

Second, multiple *Georgia-Pacific* factors (Factors 6, 8, 10 and 11) are inconsistent with the apportionment principles (Factor 13) that have now become critical components of damages determinations, particularly with respect to computer and software related patents. To begin with, Factor 6 invites the jury to consider the sales of "non-patented items."[33] Factor 6 conflicts with—or at least undermines—

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royalty rate, the court is neither constrained by them nor required to consider each one where they are inapposite or inconclusive." (internal quotation omitted)). For example, many factors are inappropriate in cases involving Standard Essential Patents ("SEPs"). *See Ericsson, Inc.*, 773 F.3d at 1230 ("In a case involving RAND-encumbered patents, many of the *Georgia-Pacific* factors simply are not relevant; many are even contrary to RAND principles.").

30 *See, e.g.*, *ResQNet.com*, 594 F.3d at 869 (explaining that the *Georgia-Pacific* factors are "unprioritized and often overlapping"); Marine Polymer Techs., Inc. v. HemCon, Inc., No. 06-cv-100-JD, 2010 WL 3070201, at *3 (D.N.H. Aug. 3, 2010) ("The *Georgia-Pacific* factors, however, are not prioritized, often overlap in the context of a particular case, and do not all apply in every case.").

31 Georgia-Pac. Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120–21 (S.D.N.Y.1970), *modified sub nom*. Georgia-Pac. Corp. v. U.S. Plywood-Champion Papers, Inc., 446 F.2d 295 (2d Cir. 1971).

32 Contreras & Eixenberger, *supra* note 24, at 8 ("From a practical standpoint, the *Georgia-Pacific* framework does not give courts or juries meaningful guidance concerning how the fifteen factors should be weighted or compared."); Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 628 (2010) ("[T]he fifteen-factor test . . . overloads the jury with factors to consider that may be irrelevant, overlapping, or even contradictory."); Christopher B. Seaman, *Reconsidering the* Georgia-Pacific *Standard for Reasonable Royalty Patent Damages*, 2010 BYU L. REV. 1661, 1703–04 (2010) (discussing how "the *Georgia-Pacific* test provides juries with inadequate instruction on how to determine a reasonable royalty").

33 Factor 6 calls for consideration of "[t]he effect of selling the patented specialty in promoting sales of other products of the licensee; that existing value of the invention to the licensor as a generator

the Federal Circuit's recent emphasis on damages apportionment, which requires damages to be specifically based on the value of the *patented features*.[34] Yet not only is Factor 6 still commonly included in damages instructions, it is listed before Factor 13, which embodies the apportionment principle.[35] Similarly, Factor 8 instructs the jury to consider the commercial success of the accused product, without also asking the jury to consider whether and to what extent the success of the accused product is related to non-patented features or other circumstances.[36] Likewise, Factors 10 and 11 instruct the jury to consider the benefits and the extent of use of "the invention" as a whole without cautioning the jury to exclude the benefits of any conventional elements of the invention or benefits that could be obtained using non-infringing alternatives.[37]

Third, and related to the second point, use of the *Georgia-Pacific* factors leads to systematic overcompensation because they encourage the jury to include *ex post* considerations.[38] As discussed in *Breaking the Vicious Cycle*, Factors 1 and 2,

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of sales of his non-patented items; and the extent of such derivative or convoyed sales." *Georgia-Pac.*, 318 F. Supp. at 1120.

34 *See* Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1337 (Fed. Cir. 2009) ("The patentee . . . must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features."); *see also* Samsung Elecs. Co. v. Apple Inc., 137 S. Ct. 429, 434–36 (2016) (holding that the damages remedy for design patent infringement in a multi-component product may be based either on the product sold to a consumer or a component of that product, depending on the facts of the case); VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1327 (Fed. Cir. 2014) ("[T]he requirement that a patentee identify damages associated with the smallest salable patent-practicing unit is simply a step toward meeting the requirement of apportionment. Where the smallest salable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature . . . the patentee must do more to estimate what portion of the value of that product is attributable to the patented technology."); LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 67 (Fed. Cir. 2012) ("[I]t is generally required that royalties be based not on the entire product, but instead on the smallest salable patent-practicing unit.").

35 Factor 13 calls for consideration of "[t]he portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer." *Georgia-Pac.*, 318 F. Supp. at 1120.

36 Factor 8 calls for consideration of "[t]he established profitability of the product made under the patent; its commercial success; and its current popularity." Georgia-Pac. Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y.1970), *modified sub nom*. Georgia-Pac. Corp. v. U.S. Plywood-Champion Papers, Inc., 446 F.2d 295 (2d Cir. 1971)

37 Factor 10 calls for consideration of "[t]he nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention." *Id.* Factor 11 calls for consideration of "[t]he extent to which the infringer has made use of the invention; and any evidence probative of the value of that use." *Id.*

38 *See, e.g.*, Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., 809 F.3d 1295, 1305 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 2530 (2016) (finding that the district court's analysis of the *Georgia-Pacific* factors overcompensated the patent holder because it "increased the royalty award" based on the patent being included in the 802.11 WiFi standard); Lemley & Shapiro, *supra* note 3, at 2020 (explaining that "royalty rates awarded in court under *Georgia-Pacific* properly should systematically exceed the rates that parties would negotiate out of court"); *see also id.* at 2032–33 ("The average royalty rate granted in all reasonable-royalty cases is 13.13% of the price of the infringing product. This number will strike many patent lawyers as surprisingly high; very

which concern comparable licenses, encourage the jury to consider licenses that are entered into after the infringer is locked in to the patented technology, and that are thus likely to include an inflated royalty because of (among other things) switching costs and concerns about litigation risks including the risk of an injunction.[39]

The use of *ex post* information encompassed in other factors—particularly in Factors 6, 8, 10, and 11—tends to overcompensate patent holders in part because the commercial prospects of the products using the patented technology often seem assured at the time of trial, when the parties valuing the technology *ex ante* would in fact have been uncertain about its success and would have determined the value based on a range of possible outcomes.[40] Consideration of such *ex post* information presents two related problems. First, it increases the risk of "hindsight bias," whereby people naturally tend to overestimate the likelihood of a known outcome.[41] In the patent litigation context, consideration of *ex post* information may distort the jury's assessment of the infringing product's *ex ante* importance or value.[42] Second, it increases the risk of "outcome bias," whereby "evidence of outcome is given too much weight."[43] In the patent litigation context, outcome bias means that the jury might not be able to give appropriate weight to an *ex post* event and account for its often limited relevance, i.e., only as a potential indicator of what the parties' *ex ante* expectations would have been.[44] As stated in *Breaking the Vicious Cycle*, "[t]o avoid or at least minimize these problems, these factors must be interpreted in light of the best alternative available at the time of the hypothetical ex ante negotiation."[45] See Appendix B for a chart that summarizes the relevance of each *Georgia-Pacific* factor to the *ex ante* analysis.

Use of *ex post* commercial information will not always overcompensate patent holders. If the actual commercial success of a product embodying the technology turns out to be much less than had been expected *ex ante*, a royalty determined with *ex post* information might be less than one determined on the basis of only *ex ante* information. This is especially likely if the parties would have agreed to a fixed fee royalty *ex ante*[46] and if the effect of lock-in factors like those reflected in *ex post* li-

few patent licenses negotiated without litigation (or even in settlement of it) result in royalty rates anywhere near that high."); H.R. REP. NO. 110-314, at 26 (2008) (noting that "the Committee [on the Judiciary] was presented with numerous studies showing that current litigation practices often produce a royalty award substantially in excess of a reasonable royalty").

39 *Breaking the Vicious Cycle*, *supra* note 2, at 418–20.

40 *Id.* at 420–22.

41 *See* Bernard Chao et al., *Why Courts Fail to Protect Privacy: Race, Age, Bias, and Technology*, 106 CAL. L. REV. (forthcoming 2018) (manuscript at 25–26) (on file with authors) (discussing hindsight bias and studies on the same).

42 *See id.* at 26 ("[W]hen people know of a particular outcome, they tend to overestimate the likelihood of that outcome.").

43 *Id.* at 26–27.

44 *See id.* at 27–29 (describing studies that demonstrate outcome bias in several contexts).

45 *Breaking the Vicious Cycle*, *supra* note 2, at 421.

46 If the parties would have agreed to a percentage royalty *ex ante*—if, in other words, the parties would have agreed to share the commercial risk—there is no reason to think that a royalty rate determined on the basis of *ex ante* information would be less than that determined with *ex post* in-

cense agreements on the determination of a royalty with *ex post* information is insubstantial.

This possibility does not, however, mean that use of *ex post* information in royalty determinations is prudent. First, use of *ex post* royalties will generally lead to excessive royalties. Some *ex post* information, such as that reflecting lock-in and litigation risk, systematically tends to overstate royalties. Second, while *ex post* commercial information is not inherently biased in one direction or another, patent holders will naturally assert more patents against commercially successful products than against commercial failures because their anticipated recoveries are larger against successful products. Use of *ex post* information will exaggerate the extent to which royalties owed on successful products are excessive and will thus as a general matter imply excessive royalties when patents are asserted. Third, use of *ex post* information would allocate the total royalty cost inequitably among technology users, requiring successful users to pay more than market value and vice versa. Using only *ex ante* information not only will ameliorate this inequity but also, ironically, will increase the rewards to asserting patents against relatively unsuccessful products, and will therefore increase the likelihood that patent holders will be fully compensated and will recover royalties from all infringers.[47]

Fourth, since the jury is not instructed to document its findings on each factor or how it weighed the factors, use of the *Georgia-Pacific* framework results in unpredictable, black box determinations that are difficult to review.[48] The difficulty of reviewing reasonable royalty determinations is reflected by the fact that the overwhelming majority of courts affirm juries' reasonable royalty determinations.[49]

Fifth, various studies have found that jurors have trouble comprehending pattern jury instructions, and can benefit from instructions that limit the legal vernacular and use simpler language more tailored to the facts of the case.[50] Ambiguity in

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formation about the commercial success of the infringing product, except to the extent that it would have included a discount for uncertainty. That will usually also be the case if a per-unit royalty would have been agreed to *ex ante*.

47 The arguments for using *ex post* information seem to rest largely on concerns that patent holders will be undercompensated in aggregate if royalties are determined only on the basis of *ex ante* information because patents will not be asserted against unsuccessful infringers and those infringers will be able to free-ride on the patented invention. As noted in the text, however, there should be fewer free-riders if only *ex ante* information is used. Moreover, patent holders can often avoid free-riding and any resulting under-compensation by licensing at the component level, and thus covering both successful and unsuccessful products, rather than at the end product level.

48 *See Lucent Techs, Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912, 940 (S.D. Cal. 2007) ("[A]bsent a view into the 'black-box' of the jury's decision making process, the Court cannot say that the jury's verdict was inconsistent or without the support of sufficient evidence."); Durie & Lemley, *supra* note 32, at 632–33; Seaman, *supra* note 32, at 1708–10 (discussing the ways in which "jury instructions that recite the potpourri of *Georgia-Pacific* factors tend to make effective post-trial review of reasonable royalty awards more difficult").

49 *See* Durie & Lemley, *supra* note 32, at 634 (finding that the Federal Circuit affirmance rate for reasonable royalty determinations was 77% and that district courts almost never grant JMOL motions regarding reasonable royalties).

50 *E.g.*, Edith Greene & Brian Bornstein, *Precious Little Guidance: Jury Instructions on Damage*

juror instructions or in the legal standard itself "may allow jurors to subvert justice by relying on their biases, prejudices, and whims."[51] Moreover, research suggests that jurors may be biased toward the "anchor" on which he or she is focused, which in patent cases will generally be the patent(s)-in-suit and the patent holder's often inflated damages demand.[52] Compounding the potential for bias is the fact that jurors will inevitably hear a great deal about the benefits of the patents-in-suit but much less about the value of other essential components of the infringing product, and might therefore overvalue the patent's value and contribution to the infringing product.[53] These tendencies highlight the need for a simple and coherent set of instructions that—unlike the fifteen *Georgia-Pacific* factors—can focus the jury on how to evaluate the asserted patent's true *ex ante* market value.

IV. General Principles to Improve Reasonable Royalty Damages Instructions

Given the conceptual difficulties and *ex post* considerations inherent in the *Georgia-Pacific* factors, jury instructions that track the *Georgia-Pacific* framework do not properly focus the jury on determining the incremental value of the patent at issue. In this section, we propose guidelines for how both the form and the substance of the jury instructions can be improved and simplified. These guidelines are intended to inform instructions that will help factfinders determine more consistent and accurate reasonable royalty rates.

A. The Form of the Instructions

The instructions should be simple and should clearly identify the relevant considerations in a cohesive framework. The instructions should also be flexible enough to be applied in different cases and to accommodate additional instructions tailored to the facts of each case.[54]

Awards, 6 PSYCHOL. PUB. POL'Y & L. 743, 748 (2000) ("[J]urors have considerable difficulty understanding pattern instructions adopted from statutory language but that they have more success comprehending, explaining, and using instructions that have been rewritten and simplified using various principles of psycholinguistics."); Walter W. Steele, Jr. & Elizabeth G. Thornburg, *Jury Instructions: A Persistent Failure to Communicate*, 67 N.C. L. REV. 77, 78 (1988); Robert P. Charrow & Veda R. Charrow, *Making Legal Language Understandable: A Psycholinguistic Study of Jury Instructions*, 79 COLUM. L. REV. 1306, 1316 (1979); *see also* Joshua P. Davis, Shannon Wheatman & Cristen Stephansky, *Writing Better Jury Instructions: Antitrust as an Example*, University of San Francisco Law Research Paper 2016-12 at 22 (Jan. 24, 2017), *available at* http://awards.concurrences.com/IMG/pdf/ssrn-id2759634.pdf.

51 Greene & Bornstein, *supra* note 50, at 747.

52 *Breaking the Vicious Cycle*, *supra* note 2, at 427–28.

53 *See* Seaman, *supra* note 32, at 1697–98 ("As a practical matter, at trial, juries hear extensive evidence from the patent holder regarding the critical importance of the patented invention but often receive little or no information regarding 'all the other things that contribute to the success' of the accused product . . . . As a result, juries often come away from a trial 'with an inflated sense of the relative value of [the patented] invention' and consequently award a disproportionately high royalty." (quoting DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW COURTS CAN SOLVE IT 29–30 (Univ. of Chicago Press, 2009)); Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2143 (2013).

54 *See* Ericsson, Inc. v. D–Link Sys., Inc., 773 F.3d 1201, 1232 (Fed. Cir. 2014) ("Although we rec-

B. The Substance of the Instructions

The instructions should incorporate the following principles:

First, the instructions should focus the jury on the ultimate issue of determining the market value of the patent before the alleged infringement.[55] In particular, the instructions should exclude *ex post* considerations such as lock-in costs, and should permit the jury to consider *ex post* information such as the actual commercial success of the product only to the extent that such information sheds light on what the parties would have expected and agreed upon *ex ante*, and only if consideration of such information would not on balance be prejudicial or confusing.[56]

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ognize the desire for bright line rules and the need for district courts to start somewhere, courts must consider the facts of record when instructing the jury and should avoid rote reference to any particular damages formula.").

55 *See* Jorge L. Contreras & Richard J. Gilbert, *A Unified Framework for RAND and Other Reasonable Royalties*, 30 BERKELEY TECH. L.J. 1451, 1459–60 (2015) ("[T]he point at which royalties should be computed is the time at which the infringer is able to choose between alternative infringing and non-infringing implementations, rather than at the time of infringement.").

56 In their article, Norman V. Siebrasse and Tomas F. Cotter propose a hybrid approach, which the authors call the "contingent ex ante" framework. *See* Norman V. Siebrasse & Tomas F. Cotter, *A New Framework for Determining Reasonable Royalties in Patent Litigation*, 68 FLA L. REV. 929, 936 (2016). Siebrasse and Cotter argue that this framework, in which the court attempts to "reconstruct[] the ex ante bargain the parties would have struck with the benefit of ex post information" is superior to the both the pure *ex ante* and pure *ex post* approaches. *Id.* Siebrasse and Cotter suggest that a contingent *ex ante* framework will reduce the incidence of windfalls in those instances in which a purely *ex ante* approach would result in a lower royalty than that to which the parties would have agreed if they had known about the commercial success of the infringing product.

While there is some appeal to this approach, we think on balance it is inferior to the purely *ex ante* approach. First, the hybrid approach would ask the jury not just to imagine a but-for world that did not exist—the *ex ante* bargain, but to imagine one that could never have existed—an *ex ante* bargain with *ex post* information. Second, the jury would naturally give great weight to the *ex post* information, which will appear more real to the jury; and critically important information, such as the relative value of alternatives to the patented technology, which is not embodied in observable *ex post* events will undoubtedly be given short shrift. Third, by focusing on such *ex post* events as the commercial success of the infringing product, the hybrid approach will exacerbate the significance of the unavoidable tendency of juries to exaggerate the share of the value of the infringing product that is properly attributable to the patented technology. *See Breaking the Vicious Cycle*, *supra* note 2, at 42–28.

Finally, the concern of Siebrasse and Cotter about windfall seems largely misplaced. For one thing, the windfall concern is unlikely to be significant where the result of an *ex ante* bargain is a percentage royalty, because the actual royalty would in that case reflect the extent of commercial success; that is largely true also of a per-unit royalty. Moreover, while an implementer that enters into an *ex ante* license at a fixed fee royalty will benefit if the infringing product enjoys unanticipated commercial success, that benefit is not a windfall. The *ex ante* bargain reflects what the parties would have agreed to in the real world, including the agreed-upon allocation of market risk. And any benefit to an implementer whose infringing product is unexpectedly successful will be offset by harm to implementers (and benefit to patent holders) when the infringing product turns out to be less successful than anticipated. The hybrid approach is thus not likely to increase returns to patent holders compared to those anticipated *ex ante*, and thus their incentives to innovate; but by putting more risk on implementers, the hybrid approach might inhibit their commercialization of patented technology and their investment in follow-on invention based on that technology.

Second, the instructions should make clear that the market value of a patent is based on, and cannot be greater than, the incremental value of the patented technology over available alternatives.[57] For this valuation, the idea of an *ex ante* negotiation should be used only as a device to focus the jury on determining the amount to which the parties (considering their commercial relationship) would have agreed at a time before the alleged infringer was locked-in to the claimed technology and was, in theory, free to walk away from the deal.

Third, the instructions should clearly exclude the value contributed by factors other than the claimed invention that would not be reflected in the market value of the patented technology. These factors encompass not only technical components and features that are not part of the claimed invention but also the value added by any other factor, such as the accused infringer's manufacturing process, product marketing, or brand recognition.

Fourth, the instructions should highlight the importance of an established licensing royalty for the asserted patents, and should also explain that other sufficiently comparable agreements may also help to inform the jury's ultimate determination of reasonable royalty damages. But the instructions should also instruct jurors to consider whether any of the licenses were negotiated after the infringer was committed to using the subject technology, and thus might reflect a price inflated by *ex post* factors like lock-in costs or litigation risks.[58]

Finally, the instructions should emphasize the commercial context in which the parties would have conducted the hypothetical negotiation.[59]

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[57] *See* Contreras & Gilbert, *supra* note 55, at 1457 ("[A] patent['s] . . . incremental contribution relative to the next-best alternative . . . is the appropriate metric to evaluate a reasonable royalty."); Seaman, *supra* note 32, at 1661 (proposing that "a reasonable royalty for patent infringement should not exceed the accused infringer's expected costs of adopting an acceptable noninfringing substitute" because "a rational actor will not pay more for a particular good or service when a lower-cost replacement is available"); Thomas F. Cotter, *Four Principles for Calculating Reasonable Royalties in Patent Infringement Litigation*, 27 SANTA CLARA COMPUT. & HIGH TECH. L.J. 725, 743 (2011) (noting that while there are practical difficulties in determining the value of a next-best alternative, "logic suggests that a patent's expected contribution to profitability or cost reduction in relation to the next-best alternative—its expected *economic utility* to the user, if you will—should be a key determinant of the user's reservation price for the use of the invention").

[58] The trial court should also exercise its gatekeeper role to keep from the jury license agreements that are so infected by *ex post* considerations or other non-comparable factors that their introduction into evidence would be more prejudicial than helpful. *See Breaking the Vicious Cycle*, *supra* note 2, at 420 & n.157.

[59] Adjustments may be necessary to reflect differences in context. Particularly for SEPs, the date of the hypothetical negotiation should be the date just before the patent became essential to the relevant standard, rather than the date of first infringement. *See id.* at 430–32; Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012) ("[O]nce a patent becomes essential to a standard, the patentee's bargaining power surges because a prospective licensee has no alternative to licensing the patent; he is at the patentee's mercy.").

V. Evaluation of Recent Alternatives to the *Georgia-Pacific* Factors

Acknowledging that a verbatim recitation of the fifteen *Georgia-Pacific* factors fails to instruct a jury adequately on how to determine a reasonable royalty rate, various bar associations, courts, and working groups have drafted model jury instructions for patent cases.[60] While most are an improvement upon the all-too-common verbatim recitation of the *Georgia-Pacific* factors, we do not believe that these models sufficiently provide judges and juries with a simple, flexible set of instructions that will help the jury determine a truly accurate and fair reasonable royalty rate. The most prominent alternative model patent jury instructions—those of the National Jury Instruction Project, the Northern District of California, the Federal Circuit Bar Association, and the American Intellectual Property Law Association ("AIPLA")—are discussed below.

National Jury Instruction Project's Model Patent Jury Instructions.[61] The form and substance of the National Jury Instruction Project's model instructions suffer from many of the same deficiencies as the *Georgia-Pacific* framework. Indeed, these instructions still ask a jury to weigh multiple complex factors and call for consideration of *ex post* information that will tend to inflate the damages award.

First, the model instructions list ten factors with no guidance on how these factors should be weighted or applied.[62] Similar to the *Georgia-Pacific* framework, jurors likely will not understand how to balance these factors or determine their relative weight.

Second, the jury is instructed to assume that the hypothetical negotiation took place "just before the time when the infringing sales first began."[63] But setting the date of the negotiation based on the date of the first infringing sale—rather than just before the alleged infringer elected to use the allegedly infringing technology—results in the hypothetical negotiation that includes lock-in costs because the alleged infringer will have already invested considerable resources to acquire needed complements, build the product and get it to market.

Compounding this problem is the fact that several of the factors themselves, like the *Georgia-Pacific* factors, incorporate considerations that post-date the first sale:

- The first four factors appropriately focus on licensing evidence, including licenses to the patent, comparable licenses, the licensing history of the parties, and licensing practices in the relevant industry.[64] However,

[60] *See* Contreras & Eixenberger, *supra* note 24, at 4–6 (summarizing the various efforts and their developments).

[61] *See* NAT'L JURY INSTRUCTION PROJECT, MODEL PATENT JURY INSTRUCTIONS §§ 6.5–6.6 (2009), *available at* http://www.nationaljuryinstructions.org/documents/NationalPatentJuryInstructions.pdf.

[62] *Id.* at § 6.6.

[63] *Id.*

[64] *Id.*

these factors do not expressly instruct jurors to consider whether the licenses were negotiated after the subject technology had already been incorporated into the accused product. In such situations, the price of the license may be inflated by *ex post* considerations like lock-in costs and the licensee's concerns about litigation. Additionally, the instructions do not explain what the jury should consider to be a "comparable" license agreement.

- The seventh factor tells the jury to consider "[t]he significance of the patented technology in promoting sales of the alleged infringer's products and earning it profit."[65] This instruction is not limited to the parties' expectations at the time of the hypothetical negotiation but instead invites the jury to consider the invention's effect on *ex post* sales of non-patented items. This instruction allows pollution of the damages award by *ex post* events, conflicts with apportionment principles, and tends to inflate the damages award.
- The eighth factor calls for consideration of "[a]lternatives to the patented technology and advantages provided by the patented technology relative to the alternatives,"[66] without instructing that the jury should consider the best alternative available at the time of the hypothetical negotiation. Additionally, and as we noted in *Breaking the Vicious Cycle*, the availability of alternatives should not be treated merely as one factor "to be considered on equal footing with the others."[67] Instead, juries should be instructed that alternatives provide a fundamental constraint on the reasonable royalty. "Properly understood . . . the alternatives put a ceiling on the amount a willing licensee would pay *ex ante*, because it would not pay more than the patent is worth compared to the alternative of not taking a license."[68]
- Finally, the ninth factor asks the jury to consider "[t]he portion of the alleged infringer's profit that should be credited to the invention as distinguished from non-patented features, improvements or contributions."[69] This factor calls for consideration of actual profits, rather than just expected profits. To properly assess the incremental value of the patented technology, this factor should be limited to the excess profit from using the patented technology beyond what would have been obtained using the next-best alternative available on the hypothetical negotiation date.[70] And it should be limited to expectations about profits,

65 *Id.*
66 *Id.*
67 *Breaking the Vicious Cycle*, *supra* note 2, at 422.
68 *Id.*
69 NAT'L JURY INSTRUCTION PROJECT, *supra* note 61, at § 6.6.
70 *Breaking the Vicious Cycle*, *supra* note 2, at 422.

not actual *ex post* experience that would not have influenced the *ex ante* bargain.

Northern District of California's Model Patent Jury Instructions.[71] The Northern District of California's model instructions improve upon the *Georgia-Pacific* framework in several ways.[72] First, rather than a verbatim listing of factors, they discuss in a simpler and more cohesive manner the principles that the jury should apply.[73] Second, they give helpful practical instructions on how to calculate a reasonable royalty.[74] Third, they offer a separate instruction for Standard Essential Patent ("SEP") cases on apportionment and the licensee's obligation to license the patent on reasonable and nondiscriminatory terms.[75]

However, the instructions lack many key components. First, the jury is instructed to assume that the hypothetical negotiation took place "at the time when the infringing activity first began."[76] This is an improvement over setting the date at the time of first sale, but setting the date at the time the infringement first began (rather than just before the alleged infringer elected to use the allegedly infringing technology) still results in the hypothetical negotiation including lock-in costs. At the time infringement first began, the alleged infringer will have already invested to build the product with the allegedly infringing technology.

Second, while the jury is instructed that the royalty "must reflect the value attributable to the infringing features of the product, and no more,"[77] the jury is not told to award a royalty rate based only on the incremental value of the invention over alternatives available to the alleged infringer at the time of the hypothetical negotiation. Without this explanation, the damages award may not reflect the true market value of the patented technology.

Third, while the instructions encourage the jury to consider comparable licenses,[78] they fail to explain that jurors should consider whether *ex post* factors such as lock-in costs might have inflated the price of those licenses. They also do not explain what the jury should consider to be a "comparable" license agreement.

Fourth, the instructions do not prompt the jury to consider commercial considerations that could show a patent holder's willingness or reluctance to license the patent-in-suit, including whether the parties are competitors or whether the patent holder had a policy not to license the patent. As we explain below, this evidence

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71 *See* N.D. CAL., MODEL PATENT JURY INSTRUCTIONS §§ 5.6–5.9 (2015), *available at* https://web.archive.org/web/20161208163256/http://cand.uscourts.gov/juryinstructions.

72 *See* Contreras & Eixenberger, *supra* note 24, at 12.

73 *See* N.D. CAL., MODEL PATENT JURY INSTRUCTIONS, *supra* note 71, at § 5.7.

74 *See id.*

75 *See id.* at § 5.9.

76 *Id.* at § 5.7.

77 *Id.*

78 *Id.*

could shed light on the parties' relative bargaining positions and an appropriate damages award.[79]

Federal Circuit Bar Association's Model Patent Jury Instructions.[80] The Federal Circuit Bar Association's model instructions are also an improvement over the verbatim listing of the *Georgia-Pacific* factors.[81] First, these instructions set the hypothetical negotiation date "at a time prior to when the infringement first began."[82] Second, the jury is instructed that "[e]vidence of things that happened after the infringement first began can be considered in evaluating the reasonable royalty only to the extent that the evidence aids in assessing what royalty would have resulted from a hypothetical negotiation."[83] Third, the instructions include just three simple factors.[84] Fourth, an additional instruction covers apportioning in cases concerning SEPs.[85]

Nevertheless, these instructions are still lacking in certain respects. First, while the instructions include just three simple factors for the jury to consider, the factors are imprecise, and the instructions do not give the jury sufficient guidance on how to apply them. The instructions state only that the jury should consider "[t]he value that the claimed invention contributes to the accused product" and the "[t]he value that factors other than the claimed invention contribute to the accused product."[86] The jury will struggle to make those value determinations without a more robust explanation.

Second, although the instructions set the hypothetical negotiation date before the first infringement,[87] they give the jury no understanding of how long before that first infringement to set that date. Indeed, the instruction is broad enough to capture one minute before the alleged infringer first infringed. In those situations, the hypothetical negotiation will still include lock-in costs. The jury should be instructed expressly that hypothetical negotiation occurs just before the alleged infringer elected to use the allegedly infringing technology.

Third, the instructions ask the jury to consider "comparable license agreements,"[88] but they do not give the jury any guidance to determine what agreements are "comparable."

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79 *See infra* notes 117–121 and accompanying text.

80 *See* FED. CIR. BAR ASS'N, MODEL PATENT JURY INSTRUCTIONS §§ 6.5–6.8 (2016), *available at* http://fedcirbar.org/Resources/Other-Materials/Model-Patent-Jury-Instructions.

81 *See* Contreras & Eixenberger, *supra* note 24, at 9–12 (discussing development and merits of the model instructions).

82 FED. CIR. BAR ASS'N, MODEL PATENT JURY INSTRUCTIONS, *supra* note 80, at § 6.6.

83 *Id.*

84 *See id.* at § 6.7; *see also* Contreras & Eixenberger, *supra* note 24, at 10 (noting that the three factors "are clearly derived from, but do not strictly follow, the *Georgia-Pacific* factors").

85 FED. CIR. BAR ASS'N, MODEL PATENT JURY INSTRUCTIONS, *supra* note 80, at § 6.7.

86 *Id.*

87 *Id.* at § 6.6.

88 *Id.* at § 6.7.

Finally, the instructions fail to instruct juries (1) to consider whether *ex post* factors such as lock-in costs might have inflated the price of comparable licenses, (2) to consider only the incremental value of the patented technology over non-infringing alternatives available to the alleged infringer at the time of the hypothetical negotiation, or (3) to account for commercial considerations that could show a party's willingness or reluctance to license the patent-in-suit. Failing to instruct on these issues will likely result in a less reliable and accurate award relative to the model instructions proposed by the National Jury Instruction Project and Northern District of California.

AIPLA's Model Patent Jury Instructions.[89] The AIPLA model instructions are also an improvement in many respects. First, the instructions are tailored to the facts of the case and apply simple language that the jury will more readily understand.[90] Second, the instructions give guidance on how to assess whether license agreements are "comparable."[91] Third, the instructions appropriately state that "[t]he reasonable royalty award must be based on the incremental value that the patented invention adds to the end product" and that "measuring this value requires a determination of the value added by the patented features" to "the infringing features of the product, and no more."[92]

Nevertheless, the instructions do not give the jury enough guidance on how to determine the "incremental value" added by the invention. First, the instructions tell the jury to consider the fifteen *Georgia-Pacific* factors as well as a sixteenth "catchall" factor that calls for consideration of any "economic factor" that a "normally prudent business person" would consider under similar circumstances.[93] But the jury still is not told how to balance or apply these many factors.

Second, the instructions set the date of the hypothetical negotiation "just before the infringement began."[94] As discussed above, this time period will usually include lock-in costs because the alleged infringer will already have invested to build the allegedly infringing product. Compounding this problem is the fact that—as discussed above—many of the *Georgia-Pacific* factors incorporate considerations that post-date first infringement.

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[89] AIPLA, MODEL PATENT JURY INSTRUCTIONS §§ 11.13–11.25 (2016), *available at* https://www.aipla.org/committees/committee_pages/Patent-Litigation/Committee%20Documents/Forms/AllItems.aspx?RootFolder=%2fcommittees%2fcommittee_pages%2fPatent-Litigation%2fCommittee%20Documents%2fModel%20Jury%20Instructions&FolderCTID=0x0120002F8CB41CE81E514CA7508DB4ED795056.

[90] *See generally id.*

[91] *Id.* § 11.23.

[92] *Id.* § 11.13.

[93] *Id.* § 11.15.

[94] *Id.* § 11.14.

Third, while the jury is instructed that the royalty "must be based on the incremental value that the patented invention adds to the end product,"[95] the jury is not told that the "incremental value" reflects the value of the invention over available non-infringing alternatives.

VI. A New Practical Approach to Reasonable Royalty Instructions

In this section, we propose a new, more practical approach to jury instructions regarding reasonable royalty damages. The guiding principle is for the jury to fashion a remedy that reflects the actual market value of the patented technology at the time prior to when the defendant invested in the allegedly infringing technology. As such, the instructions should consistently focus the jury on restoring the parties to the position they would have been in if they had willingly negotiated a license *ex ante*. In addition, we propose a simplified list of four factors for the jury to consider in determining reasonable royalty. We further propose that the instructions should be tailored to each case with guidance regarding the relevant disputed facts and the parties' proposed methodologies for calculating the damages award. We believe that this approach will facilitate more accurate damages awards that are more easily reviewable by both district courts and the Federal Circuit. A set of model instructions is included in Appendix A.

A. Instructions Regarding Reasonable Royalties Generally

The instructions should begin by introducing the concept of reasonable royalty damages and making clear that what is intended is a determination of the market value of the patented technology. The jury should be instructed that the market value is that to which the parties would have agreed in a negotiation occurring before lock-in and when the parties were free to decline a license in favor of whatever alternatives were available. Patent lawyers and judges are familiar with the term "hypothetical negotiation"; but, as others have noted, that term might confuse the jury as to what they are being asked to do and might suggest that they are being called upon literally to construct the negotiation itself.[96] The instructions should focus the jury more directly on the task of determining the patent's *ex ante* market value and that, when the jury refers to negotiations, it should use the term "pre-investment negotiation" instead of the less precise, unmoored term "hypothetical negotiation."

The first step in the reasonable royalty analysis is to determine the appropriate date for the parties' pre-investment negotiation. To appropriately assess a patented invention's true market value, the negotiation date should be a date on which the accused infringer is deciding between using the patented technology versus any alternatives to the patented technology. A reasonable royalty should therefore be defined for the jury as follows:

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[95] AIPLA, MODEL PATENT JURY INSTRUCTIONS, *supra* note 89, at § 11.13.

[96] *See, e.g.*, Contreras & Eixenberger, *supra* note 24, at 7–8; Jarosz & Chapman, *supra* note 10, at 783; Seaman, *supra* note 32, at 1677–81.

> A reasonable royalty is the payment that the patent holder and the accused infringer would have agreed to immediately *before* the accused infringer invested in using the allegedly infringing technology.[97]

Setting the valuation or negotiation date immediately before the decision to use the technology is preferable to using the date of first infringement because only the earlier date excludes lock-in costs from the analysis. Excluding lock-in costs is important because they are not representative of the true economic value of the claimed invention and including them in the determination overcompensates the patent holder.

Cases involving SEPs present somewhat different considerations. For these cases, juries should generally be instructed that the patent should be valued just before the technology purportedly covered by the patent was incorporated into the standard.[98] The later date on which the individual implementer chose to use the patented technology is *not* the correct date because the implementer did not have the option at that time of choosing an alternative technology.[99] We thus recommend calling the negotiation in SEP cases the "pre-standard negotiation."

This adjustment is necessary because, as we noted in *Breaking the Vicious Cycle*, lock-in often long precedes infringement of standardized technology and standardized technology is thus especially vulnerable to *ex post* contamination.[100] Once a standard is adopted, the costs associated with modifying the standard to design around SEPs are substantial, and the individual infringer no longer has the option of using alternatives to the standardized technology. Unlike non-SEP cases, the lock-in here is not a result of the infringer's product development and implementation costs. It is rather the result of the substantial group coordination and decision-making costs that the standard setting organization ("SSO") and its members have incurred to develop and adopt the standard, and that would have to be incurred again to change or replace it. These costs often include not only the costs of achieving consensus among a large and heterogeneous group but also costs incurred for hundreds or more complementary technologies and parts that would have to be changed to switch to an alternative to the patents-in-suit. Instructing juries that the negotiation

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97 *See Breaking the Vicious Cycle*, *supra* note 2, at 426 ("The hypothetical negotiation date should be set at just prior to the time that the infringer became committed to using the infringing technology, which in most cases will be the lock-in date . . . . [T]his provides the optimal framework for assessing the incremental benefit conferred by the claimed technology as compared to available alternatives.").

98 Joseph Farrell et al., *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603, 637 n.134 (2007); Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents*, 28 BERKLEY TECH. L.J. 1135, 1147–48 (2013); Contreras & Gilbert, *supra* note 55, at 1491–93; FTC, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 23 (Mar. 2011) ("Courts should cap the royalty at the incremental value of the patented technology over alternatives available at the time the standard was chosen.").

99 *See Breaking the Vicious Cycle*, *supra* note 2, at 431–32 ("The FRAND commitment means that the patent holder no longer has a right, presumed in the paradigmatic story, to refuse to license its patent; by the same token, the infringer is entitled to use the patented technology and does not need to obtain the consent of a recalcitrant or mercenary patent holder in order to do so.").

100 *Id.* at 429.

took place immediately prior to the patent's incorporation into the standard will ensure that the reasonably royalty rate is not artificially inflated by these lock-in costs.[101]

After explaining the valuation date, juries should be instructed on what they should assume about the negotiation. Specifically, the jury should be instructed to assume that both parties believed the patent was valid and would be infringed, and that both parties were willing to enter an agreement and would have acted reasonably in their negotiations. The jury should further be instructed to choose a royalty that would have resulted from the negotiation, and not simply a royalty either party would have preferred.

In some situations, as explained in *Breaking the Vicious Cycle*, the patent holder would not willingly have licensed the patents to the infringer *ex ante* but rather would have preferred to retain exclusive or nearly exclusive control over the patented technology. That situation is most likely to arise in cases involving direct competitors or cases in which, as in the pharmaceutical industry, there are only one or a few patents embodied in a commercial product. Although the jury must determine a reasonable royalty and therefore cannot conclude that the parties would not have agreed on a value for the patents, competitive and other commercial considerations are often highly relevant to determining the relative bargaining power of the parties and thus the amount of the royalty and should not be ignored by juries. In Factor Four, below, we discuss how jury instructions should address this situation.

B. Four Factors for Determining Reasonable Royalty Damages

The jury should be instructed regarding the considerations that are relevant to the reasonable royalty determination. Instead of the lengthy and unwieldy list of fifteen *Georgia-Pacific* factors, we propose just four. This streamlined set of factors will facilitate more accurate, predictable, reviewable, and consistent damages awards. As discussed below, the first factor instructs the jury to determine damages based on the value of the claimed invention over alternatives available at the time—i.e., based on the added value of the invention. The second factor acts as a backstop to the first factor, cautioning the jury against determining damages based on factors or components unrelated to the claimed invention—i.e., to exclude value added by other factors or components. The third factor instructs the jury that comparable license agreements might in appropriate circumstances serve as an important guide to determining what the parties would have agreed to in a hypothetical negotiation. The fourth factor instructs the jury to consider the economic relationship of the parties (e.g., whether the patentee would generally prefer exclusive use of its invention or to license its invention broadly).

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[101] Nevertheless, and as we also noted in *Breaking the Vicious Cycle*, it might be appropriate in some circumstances to assess different reasonable royalties based on different hypothetical negotiation dates for early movers (who may have assumed greater exposure implementing the infringing technology before the standard was adopted) and late adopters (who may have delayed implementation until the standard was adopted). *See id.* at 426 n.200.

1. *Factor One: The Incremental Value Contributed by the Invention*

The jury should be instructed that the patent holder is entitled to recover damages only for the ***incremental value*** that the claimed invention contributes to the accused product, determined by comparing the allegedly infringing technology to the alleged infringer's best *ex ante* alternative.[102]

Juries should therefore consider the effect of commercially acceptable alternatives to the claimed invention that do not infringe the patent holder's patents and that were available at the time of the parties' negotiation. An accused infringer would not agree to pay a royalty larger than the incremental value of the claimed invention over this commercially acceptable non-infringing alternative. For example, if the patent is directed to an improved windshield wiper for a car, the incremental value would be determined based on the benefits of the patented windshield wiper over other commercially available windshield wipers.[103]

Further, when determining the incremental value contributed by the claimed invention, juries should be instructed to disregard "switching costs." "Switching costs" are the costs that the accused infringer would incur to switch from practicing the claimed invention to an alternative method or product. These costs may include, for example, the cost of redesigning products, retooling factories, and eliminating inventory.[104]

2. *Factor Two: The Value Contributed by Factors Other Than the Claimed Invention*

The reasonable royalty may not be based on value added to the accused product by any factor other than the claimed invention. For example, juries should be instructed to exclude value added by the accused infringer's manufacturing process, product marketing, or brand recognition.[105] The jury should also exclude value added by components, features, or technologies that are not part of the claimed inven-

[102] *See, e.g.*, Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1235 (Fed. Cir. 2014) ("We further hold that district courts must make clear to the jury that any royalty award must be based on the incremental value of the invention."); *see also* AstraZeneca AB v. Apotex Corp., 782 F.3d 1324, 1334–35 (Fed. Cir. 2015) ("When an infringer can easily design around a patent and replace its infringing goods with non-infringing goods, the hypothetical royalty rate for the product is typically low . . . . By the same reasoning, if avoiding the patent would be difficult, expensive and time-consuming, the amount the infringer would be willing to pay for a license is likely to be greater.").

[103] The best alternatives should be determined by taking into account both cost to the infringer and the value to the infringer of the available alternatives. If the infringer would have to incur a cost to use the best alternative, perhaps because it is covered by a third party's patents, the maximum amount the infringer would pay for the invention at issue in the hypothetical negotiation would be equal to the sum of the cost of the best alternative and the incremental value of the invention at issue over that alternative.

[104] *See Breaking the Vicious Cycle*, *supra* note 2, at 410 n.106.

[105] On the other hand, if, for example, the patented invention allows the manufacturer to use a simpler manufacturing process, then that benefit may be considered value attributable to the patented invention for purposes of determining damages.

tion, including technologies embodied in other patents that are owned by the accused infringer or others. For example, if the patent is directed to an improved windshield wiper for a car, the jury should exclude from the damages calculation the value added by the car's branding and its many other components, such as the steering wheel, engine, or transmission.[106]

Some have criticized this principle on the ground that it does not enable to patent holder to share in the synergies created by the combination of the patented technology and the other product components. This criticism is mistaken. The starting point to understanding the mistake is to appreciate that the reasonable royalty determination calls for a determination of the market value of the patented technology—of the royalty to which the parties would have agreed *for the intended use*. A patented technology that makes a unique and significant contribution to a very valuable product will, all other things equal, add more value to the finished product than one that contributes to a product that has little value; and the market value of the patented technology will reflect that incremental value. In that sense, the patent holder is able to appropriate a portion of the synergies created by combining the products' components. But if there are unpatented alternatives that could make an equally significant contribution to the product, the market value of the patented technology will be modest, even if the product is very valuable. (Tiffany& Co. does not pay more than the local gas station for printer paper.)

This point can be expressed with a bit more precision. The patented technology competes with alternatives for use in the product. If it is the best of the alternatives, its use will create surplus value compared to the alternatives. All other things equal, the more valuable the product, the larger the surplus. The infringer and the patent holder, in effect, bargain over how to split the surplus—how, in other words, to share the synergies created by the combination of the patented technology and the other components in the product. The outcome of the bargain depends, among other things, on their relative bargaining power and on the expense and risk of bringing

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106 *See, e.g.*, VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1326 (Fed. Cir. 2014) ("[W]hen claims are drawn to an individual component of a multi-component product, it is the exception, not the rule, that damages may be based upon the value of the multi-component product."); Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1318–19 (Fed. Cir. 2011) (explaining that a patentee may not use all of the revenues that a defendant has made from selling accused products unless the patented feature is "the basis for customer demand" for the accused products); Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1337 (Fed. Cir. 2009) ("The patentee . . . must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features."); Georgia-Pac. Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y.1970) (explaining that damages awards should be based on "[t]he portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer."); *see generally* Garretson v. Clark, 111 U.S. 120, 121 (1884) ("The patentee . . . must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features . . . or he must show . . . that the profits and damages are to be calculated on the whole machine, for the reason that the entire value of the whole machine, as a marketable article, is properly and legally attributable to the patented feature.").

the relevant product to market.[107] But the patent holder in no case should receive more than its share of the synergies created by the combination of components in the infringing product. Any greater share would give the patent holder more than it would have received had the parties in fact agreed on a royalty at the outset.

In furtherance of the objective of not including value contributed by other components, the Federal Circuit has held that, where the claimed invention covers just one feature or technology in the accused product, damages generally must be based on, at most, the "smallest saleable patent-practicing unit" of the product.[108] The "smallest salable patent-practicing unit" is the smallest part or component within the accused device that is offered for sale and that substantially embodies the claimed invention.[109] Even when considering the smallest saleable unit, however, damages awards should not include the value of features or technologies within the smallest saleable unit that are unrelated to the claimed invention. The value of the smallest saleable unit should thus be apportioned to isolate the value contributed by the claimed invention.[110] For example, consider again a patent directed to an im-

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[107] *See Breaking the Vicious Cycle*, *supra* note 2, at 392 n.10.

[108] *See, e.g.*, *LaserDynamics, Inc. v. Quanta Comp., Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012) (explaining that the royalty base for patent damages must be based on at most the "smallest saleable patent-practicing unit").

[109] *See id*.

[110] In a recent article, Anne Layne-Farrar criticizes the use of the smallest saleable unit on the ground that it does not appropriately tie damages to the value the accused infringer receives from using the patented technology. Anne Layne-Farrar, *The Patent Damages Gap: An Economist's Review of U.S. Statutory Patent Damages Apportionment Rules*, 26 TEX. INTELL. PROP. L.J. (forthcoming 2017) (manuscript at 7) (on file with authors). She argues that the price of the component embodying the patented technology might be suppressed because the infringer did not pay for the technology,and proposes doing away with the smallest saleable unit requirement where the patented technology is worth more than the price of the smallest saleable unit, even if the patented technology is not the basis for customer demand of the end product and thus does not satisfy the entire market value rule. *Id.* at 18–19. In those cases, she proposes that a patentee may rely on the end product price of the entire product as the royalty base and apportion out any percentage of the price that is not impacted by the patented technology. *Id.* at 19.

Prof. Layne-Farrar's proposal is problematic and unnecessary. First, patent damages lawyers will always present patent damages to the jury in reference to some "anchor," which will usually be the infringing device or product. The smallest saleable unit requirement is intended to establish the "anchor" that is closest to the patented technology and is thus least likely to lead the jury astray, toward overvaluing the patented technology by taking other components into account. Moreover, Layne-Farrar does not shed any light on how to determine whether the value of the patent exceeds the price of the smallest saleable unit, except by reference to the prejudicial price of the end product, nor does she explain how to determine the portion of the price of the end product that is properly attributable to the patent. *See id.* at 14–17. Second, Prof. Layne-Farrar's proposal fails to recognize the real-world dynamic of a trial before a jury. Inevitably, the focus of the trial is the claimed patented invention, and much less time and attention can be and is devoted to other technologies, patented inventions, and other components incorporated into a larger product. This real-world dynamic requires an anchoring point or concept to guide the factfinder. Even if Layne-Farrar were correct that the smallest saleable unit anchor would in some instances be too low, her proposal would in almost every case result in an anchor even further from the correct value. Third, Layne-Farrar's concern applies only to a small subset of instances in which the smallest saleable unit is actually sold: those where the value of the patented technology is very large in relation to the price of the component and the infringer nevertheless did not set the price expecting that it proved windshield wiper for a car: if the allegedly infringing car maker purchased the windshield wiper from a third party, then the windshield wiper likely would be the smallest saleable unit. But the jury would still be required to separate out the value of the patented windshield improvement from the value of other aspects of the wiper, such as a special material that is not part of the claimed invention but that is used to make the wiper.[111]

3. Factor Three: Comparable Agreements

The jury should be instructed to consider prior agreements by the patent holder to license the patent(s)-in-suit or other agreements if they were negotiated in circumstances, and concerned subjects, sufficiently comparable to those that would be involved in the parties' negotiation regarding the patent(s)-in-suit.[112]

Actual licenses for the patent(s)-in-suit from around the time that the accused infringer first elected to use the allegedly infringing technology can be highly probative as to what constitutes a reasonable royalty because such licenses reflect the economic value of the patent(s)-in-suit in the marketplace at the relevant time.[113]

To use licenses to other patents as evidence of reasonable royalty damages, the party offering the licenses has the burden to show that the licenses are both technologically and economically comparable to the license that the parties would have agreed to in their negotiation. The jury should be instructed that, to make this showing, the party offering the license must compare the technology, scope, context, and value of that license with the technology, scope, context, and value of a pre-investment license to the patent-in-suit. The licenses do not need to be identical, only comparable. But showing only a loose or vague comparability between the technological or economic aspects of the licenses fails to meet this burden.[114]

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would eventually have to pay for the technology. Fourth, while in extreme cases infringement can result in suppressed product prices, that can be a problem no matter what the size of the anchor. And, in any event, a jury may consider in its damages valuation any evidence that a component's market price is misleadingly low, so there is no need to use the higher end-product price as the anchor.

[111] *See, e.g.*, *VirnetX*, 767 F.3d at 1327 ("[T]he requirement that a patentee identify damages associated with the smallest salable patent-practicing unit is simply a step toward meeting the requirement of apportionment. Where the smallest salable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature . . . the patentee must do more to estimate what portion of the value of that product is attributable to the patented technology.").

[112] *See, e.g.*, *Lucent*, 580 F.3d at 1325; *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1325 (Fed. Cir. 2014) ("[U]sing sufficiently comparable licenses are a generally reliable method of estimating the value of a patent."); Contreras & Eixenberger, *supra* note 24, at 11.

[113] *See, e.g.*, *LaserDynamics*, 694 F.3d at 81 (finding that agreements licensing the patent-in-suit were not too old to be probative because the value of the patented technology was apparent at the time they were entered into); *see also Breaking the Vicious Cycle*, *supra* note 2, at 417–20 (discussing how "the 'comparable' licenses to be considered are often the product of ex post bargaining and therefore reflect ex post considerations such as lock-in costs, as well as premiums to account for uncertainty related to potential litigation outcomes").

[114] *See, e.g.*, *VirnetX*, 767 F.3d at 1330 ("When relying on licenses to prove a reasonable royalty, alleging a loose or vague comparability between different technologies or licenses does not suf-

When assessing economic comparability, the jury should be cautioned that the royalty stated in the agreement will not necessarily reflect the true market price of the licensed patent if there is evidence that the agreement was part of a broader relationship between the parties. For example, if as part of the agreement the patent holder provided other types of consideration in addition to the patent license itself, such as a cross license to other patents, the stated royalty might exaggerate the real consideration paid for the patent itself.[115]

If the allegedly comparable license was negotiated at a time after the licensee had invested in the technology (such as by building a factory), the jury should be instructed that the stated royalty rate might have been inflated by the licensee's lock-in costs. As a general matter, when licenses are negotiated *ex post*, rather than *ex ante*, their value fails to capture the true market value of the patent at the time of the *ex ante* hypothetical negotiation date. By the time of the *ex post* actual negotiation date, the licensee might have already begun practicing the licensed patent, and thus might have entered the *ex post* negotiation already locked into the patented technology and concerned about litigation risk. This differs from a pre-investment bargain because lock-in will likely encourage the licensee to pay a substantially higher royalty rate *ex post* than the true market value of the patent at the *ex ante* negotiation date.[116]

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fice."); *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1317 (Fed. Cir. 2011) ("[T]here must be a basis in fact to associate the royalty rates used in prior licenses to the particular hypothetical negotiation at issue in the case."); *ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860, 870 (Fed. Cir. 2010) (expert's reliance on licenses as evidence of a reasonable royalty improper where "none of these licenses even mentioned the patents in suit or showed any other discernible link to the claimed technology"); *Lucent*, 580 F.3d at 1329 ("[A] lump-sum damages award [based on a reasonable royalty] cannot stand solely on evidence which amounts to little more than a recitation of royalty numbers, one of which is arguably in the ballpark of the jury's award, particularly when it is doubtful that the technology of those license agreements is in any way similar to the technology being litigated here."); *Finjan, Inc. v. Secure Comput. Corp.*, 626 F.3d 1197, 1211–12 (Fed. Cir. 2010) ("We have recently reiterated that use of past patent licenses [to determine damages awards] must account for differences in the technologies and economic circumstances of the contracting parties.").

115 As we discussed in *Breaking the Vicious Cycle*,

> [I]t is often difficult to ascertain the actual terms of the entire agreement between the parties and to determine the royalties paid for the patents-in-suit. Patent holders, knowing that their licenses will influence royalty awards in future litigation, have an incentive to structure their agreements in ways that exaggerate the apparent cost of the licenses to the licensees. For example, they can provide various types of consideration in addition to the patent license itself and allocate a disproportionate share of the total amount paid by the licensee for the package to the patent license.

Breaking the Vicious Cycle, *supra* note 2, at 418; *see also* Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. L. & ECON. REV. 280, 300–01 (2010).

116 *See Breaking the Vicious Cycle*, *supra* note 2, at 418–19 (noting that many licenses are negotiated after the licensee has already begun practicing the licensed patent and at a time when the licensee is locked into the technology and concerned about litigation); Jonathan S. Masur, *The Use and Misuse of Patent Licenses*, 110 NW. U. L. REV. 115, 120–21 (2015).

Litigation settlement agreements, for example, necessarily are affected by *ex post* considerations, since they are negotiated after the alleged infringement began and are shaped by circumstances of the litigation that are unrelated to the actual economic value of the patent. These litigation-induced settlement agreements should be excluded; if they are admitted, juries should be instructed that such agreements are generally disfavored because they tend to overstate the value of the patents.[117]

When the patent holder can prove that the royalty stated in the license included a discount because of uncertainty as to whether the patents(s)-in-suit were valid and infringed, the court should also instruct the jury to exclude that discount in the reasonable royalty determination.

4. *Factor Four: Commercial Considerations Showing Either Desire or Reluctance to License*

The parties might not in fact have been willing to negotiate a license *ex ante*. However, it is necessary to assume that the parties would have agreed to an *ex ante* license in order to determine a reasonable royalty. Making that assumption does not require us to ignore the reality that some licensors might be more eager to license than others. A licensor's relative willingness to license can, in certain cases, be relevant to assessing the reasonable royalty.[118]

To see how this relative unwillingness might affect the reasonable royalty, we should first consider the patent holder that would have wanted to license its patents to the infringer *ex ante*. In that situation, the parties would have agreed to a royalty that would have reflected the relative bargaining power of the parties, up to a maximum equal to the incremental value of the patented technology compared to the infringer's best alternative. In effect, the parties would bargain over how to divide the incremental value of the patented technology.[119]

In other situations, commercial considerations might demonstrate that a party would be "unwilling" or reluctant to license. For example, if a patent holder had an established policy and marketing program not to license the patent or had a policy to license only under special conditions designed to preserve its patent exclusivity, a jury could find that that party would be reluctant to license. In that situation, the ju-

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117 *See, e.g., LaserDynamics*, 694 F.3d at 77 (explaining that "[t]he propriety of using prior settlement agreements to prove the amount of a reasonable royalty is questionable" because settlement agreements "are tainted by the coercive environment of patent litigation [and] are unsuitable to prove a reasonable royalty . . . , the premise of which assumes a voluntary agreement will be reached between a willing licensor and willing licensee, with validity and infringement of the patent not being disputed"); *see also Rude v. Westcott*, 130 U.S. 152, 164 (1889) ("[A] payment of any sum in settlement of a claim for an alleged infringement cannot be taken as a standard to measure the value of the improvements patented, in determining the damages sustained by the owners of the patent in other cases of infringement.").

118 *See Breaking the Vicious Cycle*, *supra* note 2, at 445 n.280 (discussing when a licensor should be considered an *ex ante* "willing" licensor rather than an "unwilling" licensor).

119 *See id.* at 392.

ry can find that the parties to the hypothetical bargain would have agreed upon a higher royalty rate, up to a maximum equal to the incremental value of the patented technology compared to the infringer's best alternative. A patent holder that would not have been willing to license its patent to the infringer *ex ante* may be entitled to damages equal to that maximum.[120]

Note, however, that a party should not be considered an unwilling or reluctant licensor if it was willing *ex ante* to license the patents but would not have entered a license *ex ante* for strategic reasons, in the expectation that it could strike a better deal at a later time. "In other words, a patent holder cannot avoid being deemed a willing licensor . . . if it intended all along to license the infringer but wanted to wait until the infringer was locked-in in order to negotiate at that time a higher royalty."[121]

Certain other commercial considerations might show that a party would have been especially "willing" to license. For example, if the commercial relationship between the patent holder and the accused infringer would have been an inventor-promoter relationship (rather than a competitive relationship), the evidence might enable the jury to find that one party or the other would have had a stronger desire to license the patent. If that party were the patent holder, the infringer might have been able to negotiate for a lower royalty rate, i.e., for a larger share of the incremental value provided by the patented technology. That might be the case for a patent holder that was bound by a commitment made to an SSO to license the patent on [Fair,] Reasonable, and Non-Discriminatory ("[F]RAND") terms, and thereafter was unable to enhance its bargaining position by threatening not to license the patent.[122]

C. Damages Instructions in [F]RAND Cases

SEP cases require determination of a "reasonable" royalty, just as non-SEP cases do. As with non-SEP cases, the "reasonable" royalty should be no greater than the incremental value of the claimed invention over the next best alternative.[123]

The damages framework we propose is thus conceptually applicable to SEP cases, including those involving [F]RAND royalties; but the criteria need to be adjusted to account for certain differences:

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[120] *Id.* at 440–41 n.265.

[121] *Id.* at 445 n.280.

[122] *Ericsson, Inc. v. D-Link Sys. Inc.*, 773 F.3d 1201, 1230–31 (Fed. Cir. 2014) (holding that the patent holder's licensing policy and the commercial relationship between the patent holder and the accused infringer are not appropriate considerations for determining RAND royalties); *see also Georgia-Pac.*, 318 F. Supp. at 1120.

[123] Jorge L. Contreras and Richard J. Gilbert present a thorough discussion of the similarities between SEP and non-SEP cases, and persuasively argue that a unified framework is needed to assess reasonable royalties in both types of cases. *See generally* Contreras & Gilbert, *supra* note 55. The authors particularly note that the patent's "incremental contribution relative to the next-best alternative . . . is the appropriate metric to evaluate a reasonable royalty" for both SEPs and non-SEPs because both require apportionment and present concerns over hold-up. *Id.* at 1457; s*ee also Breaking the Vicious Cycle*, *supra* note 2, at 447 n.288.

The date of hypothetical negotiation: As discussed above, juries should generally be instructed that the hypothetical negotiation date must be just before the patented technology was incorporated into the standard, *not* the date on which the individual implementer chose to use the patented technology.[124] We also recommend calling it the "pre-standard negotiation."

Factor One: When a patent is essential to a standard and subject to a [F]RAND commitment, the parties in a pre-standard negotiation would agree to a reasonable royalty based on the contribution of the patented technology to the capabilities in the standard, and the contributions of those capabilities in the standard to the accused infringer's products. Accordingly, the jury should be instructed to ensure that any reasonable royalty award reflects only the additional amount the alleged infringer would pay for the right to implement the standard including the patented technology rather than a standard that included the best alternative available at the time of the hypothetical negotiation.[125]

Factor Two: Although the royalty should reflect the contribution of the patented technology to the standard, the jury should be instructed that the royalty should not include value contributed by other patents or technologies incorporated into the standard or the accused product or any other factor such as the accused infringer's product marketing or brand recognition.[126] As explained above, this approach will enable the patent holder to obtain the market value of the patented technology, including a portion of the synergies created by the combination of components in the standard.[127]

Factor Three: Instead of asking the jury to consider comparable licenses from around the time that the accused infringer first elected to use the allegedly infringing technology, the court should instruct the jury to consider licenses from around the time the patent became essential to the standard.

Factor Four: When the patents are subject to a [F]RAND commitment, the patent holder must be considered a willing licensor that cannot discriminate against any particular party. Thus, instead of instructing the jury to consider commercial considerations that might have affected the patent holder's incentives to license the patent, in cases involving [F]RAND-encumbered patents, the court should instruct

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124 *See supra* notes 97–100 and accompanying text.

125 *See, e.g.*, *Ericsson*, 773 F.3d at 1235 ("[D]istrict courts must make clear to the jury that any royalty award must be based on the incremental value of the invention, not the value of the standard as a whole or any increased value the patented feature gains from its inclusion in the standard.").

126 *See, e.g.*, *Microsoft Corp. v. Motorola, Inc.*, No. 10-cv-1823, 2013 WL 2111217, at *12 (W.D. Wash. Apr. 25, 2013) ("[A] RAND commitment should be interpreted to limit a patent holder to a reasonable royalty on the economic value of its patented technology itself, apart from the value associated with incorporation of the patented technology into the standard."); *id.* at *18 ("[A] reasonable royalty would not take into account the value to the licensee created by the existence of the standard itself, but would instead consider the contribution of the patent to the technical capabilities of the standard and also the contribution of those relevant technological capabilities to the implementer and the implementer's products.").

127 *See supra* notes 104–110 and accompanying text.

the jury to consider the patentee's obligation to license the patent-in-suit on reasonable and non-discriminatory terms. The instructions should include the language from the letter of assurance and or the SSO policy as appropriate. The instructions should also note that the jury must take into account the [F]RAND commitment in determining a reasonably royalty.[128]

D. The Jury Should Be Instructed Regarding Different Types of Royalties

Because the outcome of a negotiation may take various forms, the jury should be instructed that there are different types of potential reasonable royalty damages.

1. Lump Sum Royalties vs. Running Royalties

Depending on the circumstances of the case and the evidence presented, the jury should be instructed on the difference between lump sum and running royalties, and that they must choose which structure is most appropriate based on the evidence presented.

The jury should be instructed that a one-time lump sum payment is a single payment that the accused infringer would have paid for a license covering all sales of the licensed product. Depending on the circumstances, the evidence might indicate that the parties would prefer a lump sum royalty over a running royalty. A lump sum royalty has the advantages of providing more certainty as to the cost of the license and avoiding monitoring and compliance issues.

On the other hand, a running royalty is a type of royalty where the accused infringer would have paid the patent-holder either a percentage of the sales price or a specific dollar amount every time the accused infringer sold a product incorporating the patented technology. The jury should be instructed that determination of the running royalty requires identification of the appropriate royalty base (e.g., where applicable, the smallest saleable unit or entire market value) and the appropriate royalty rate.

2. Post-Verdict Reasonable Royalties

No enhancement of the reasonable royalty should be awarded for post-verdict infringement.[129] The hypothetical negotiation already assumes that both parties con-

[128] *See, e.g.*, *Ericsson, Inc. v. D-Link Sys. Inc.*, 773 F.3d 1201, 1230–31 (Fed. Cir. 2014) ("'[T]he commercial relationship between the licensor and licensee'—is irrelevant because Ericsson must offer licenses at a *non-discriminatory* rate.").

[129] The parties might, of course, agree to change the post-verdict royalty if, for example, the court-determined royalty is too high and deters sales of the infringing product that might benefit both the patent holder and the infringer. Because renegotiation resulting in a higher royalty would be likely only in the most extreme cases (presumably involving repeat players and/or multifaceted commercial relationships), it has been suggested that post-verdict royalties might have a pro-infringer bias. *See* Vincenzo Denicolò et al., *Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders*, 4 J. COMPETITION L. & ECON. 571, 579 (2008). This possibility does not, however, justify enhancing post-verdict royalties. In the first place, downward adjustment of royalties is likely only in the very unusual case in which the court sets a running

sidered the patent to be valid and infringed. Also, (except perhaps in very unusual cases) the *ex ante* bargain would not be limited to the period prior to verdict, so determination of the royalty agreed to in that bargain would encompass the rate to which the parties would have agreed for the post-verdict period.[130]

E. The Jury Should Be Instructed on the Manner of Performing the Damages Calculation

In addition to jury instructions that provide simple *qualitative* factors for damages determinations, the jury should also be given simple *quantitative* methods for calculating a specific damages number.

The goal is not to force the jury to use any particular damages calculation methodology, but rather to provide the jury with guidance and options that clarify their choices and simplify their task. For example:

The parties might agree on the form of the calculation but disagree only on the inputs to the calculation. In such cases, the parties can provide the formula to the jury, and explain that the jury's task is to determine the inputs to the calculation and then complete the calculation.

The jury might also be asked to choose between the parties' competing damages calculation methodologies, which can be recited in the instructions as competing options for calculating the damages number.[131]

Alternatively, the jury can be invited to set forth its own damages calculation methodology based on its own evaluation of the evidence and damages methodologies presented by the parties.

The court should include the damages calculation methodologies on which the jury is instructed as options on the verdict form. The verdict form should require the jury to show its work—i.e., to identify the specific method of calculation and the inputs to the calculation based on the evidence presented. This will facilitate appellate review and eliminate the "black box" nature of many damages determinations.

royalty that is large enough in relation to the total cost of the infringing product to materially impact the price and sales volume of the product. It is hard to see how efficiency overall would be served by imposing excessive costs on technology users as a general matter in anticipation of an occasional market correction. Moreover, any post-verdict negotiation is itself likely in almost all cases to result in an excessive royalty because it will partially reflect lock-in costs.

130 In the rare case in which it is determined that the *ex ante* license would have been for a more limited period, the jury should be instructed to determine a royalty for subsequent years using the criteria described above, but on the assumption that that royalty would have been determined by a negotiation at or shortly prior to the expiration of the *ex ante* license agreement.

131 It would be the court's responsibility, as gatekeeper, to keep from the jury any methodologies that are not reasonably calculated to answer the correct legal question, i.e., the royalty the parties would have agreed to in the hypothetical *ex ante* negotiation in light of the best alternative available at that time and exclusive of any *ex post* considerations, such as lock-in costs or litigation risks.

F. The Jury Should Be Instructed How the Damages Determination Relates to the Particular Facts of the Case

A verbatim recitation of the factors discussed above (or worse, the full list of the *Georgia-Pacific* factors) might be too abstract for juries to apply accurately to the evidence presented at trial. As noted above, studies have indicated that jurors' comprehension of instructions can be improved by reducing legal vernacular in favor of simplicity and clarity.[132]

Accordingly, to ensure that juries understand the instructions well enough to appropriately determine reasonable royalty rates, judges should go beyond merely reciting factors or legal standards and instead clearly customize the instructions to fit the facts of the case.

For example, with respect to non-infringing alternatives, a generic instruction—i.e., "consider whether the accused infringer had a commercially acceptable non-infringing alternative to the claimed invention available at the time of the hypothetical negotiation"—is less helpful than a specific instruction tied to the facts of the case. The court should tell the jury what a non-infringing alternative is, what the defendant alleges is a non-infringing alternative, and how that affects the royalty calculation:

> In this case, [the accused infringer] contends that [non-infringing alternative] was an alternative that was available to [the accused infringer] at the time of the [*non-SEP cases*: "pre-investment negotiation"; *SEP cases*: "pre-standard negotiation"] and that did not infringe the [asserted patent], i.e., it was a "non-infringing alternative." If you find that [alleged non-infringing alternative] was a non-infringing alternative to the claimed invention, then [the accused infringer] would not have agreed to pay a royalty larger than the incremental value of the claimed invention over this commercially acceptable non-infringing alternative, and any royalty you award must be based on this incremental value over the cost of the alternative.

Making these adjustments to customize the instructions will go a long way toward ensuring that the jury both understands the instructions and applies them appropriately.

VII. Conclusion

The fifteen *Georgia-Pacific* factors are no longer an appropriate framework for instructing juries on reasonable royalty damages. They are out of date both technologically and doctrinally. Simply put, the factors are unwieldy, confusing, and tend to systematically inflate damages awards above the true market value of the patented technology. The time has come for a change.

We have proposed a new, more practical framework to simplify reasonable royalty jury instructions. The goal is to facilitate more accurate, predictable, reviewable, and consistent damages awards. The following are key takeaways that should be incorporated into the reasonable royalty instruction:

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[132] *See* Greene & Bornstein, *supra* note 50, at 748; *see also* Steele & Thornburg, *supra* note 50, at 90–91.

First, unlike the all-too-familiar verbatim recitation of the fifteen *Georgia-Pacific* factors, jury instructions should be simple, practical, and tailored to the facts of the case. The jury should be asked to consider fewer factors and should be given a more robust and clear explanation of the importance of the factors, how they relate to the facts of the case, how they affect a reasonable royalty award, and how to calculate the reasonable royalty award. This will improve the ability of the jury to understand the reasonable royalty instructions and apply them appropriately.

Second, jury instructions should consistently focus the jury on determining the *ex ante* incremental value of the patented technology over the alleged infringer's best alternative. This is not adequately accomplished by the *Georgia-Pacific* factors, which call for the jury to consider numerous *ex post* considerations and which treat the availability of a non-infringing alternative as just one factor among fifteen. Adopting a framework that excludes such *ex post* considerations from the assessment of a reasonable royalty—and placing proper focus on the relevance of a non-infringing alternative—will help to avoid inappropriately awarding the patent holder damages based on the value of extraneous factors, such as the alleged infringer's lock-in costs or concerns about litigation risk.

Third, jury instructions should clearly instruct jurors on apportionment principles and the value contributed by factors other than the claimed invention. In particular, the jury should be instructed expressly to consider the value added by other patented technologies embodied in the accused product as well as factors such as the accused infringer's manufacturing process, product marketing, or brand recognition. This will help diminish the jury's natural tendency to overvalue the patent-in-suit compared to other essential components of the infringing product, and will help avoid inappropriately awarding the patent holder damages based on the value of non-patented technology.

Finally, jury instructions should focus the jury on the probative value of prior license agreements and commercial evidence that would indicate the licensor's relative willingness *ex ante* to enter an agreement with the alleged infringer. This type of evidence is often highly relevant to what the parties would have determined to be the real-world, fair-market value of the patented invention. But the jury also should be instructed to consider whether and how *ex post* factors such as lock-in costs might have affected the price of those licenses or the parties' willingness to negotiate.