Augmented Legality® 1.0

The first collection of articles from AugmentedLegality.com – the leading source for discussion of augmented reality’s impact on law and society.

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These are the personal writings of
Brian D. Wassom, Esq., a Partner at
Honigman Miller Schwartz and Cohn LLP
39400 Woodward, Ste 101
Bloomfield Hills, MI 48304
248.566.8490
bdw@honigman.com
twitter: @bdwassom
INTRODUCTION

This e-book collects most of the content I posted on my AUGMENTED LEGALITY® blog during its first year of existence. Accessible at AugmentedLegality.com or through Wassom.com, AUGMENTED LEGALITY® is designed to be the leading source for discussion and analysis of the legal principles that will govern the use of “augmented reality” (or “AR”) technologies.

After writing about AR for various publications, I launched AUGMENTED LEGALITY® in March 2011 to fill what I perceived to be a conspicuous void. If AR lives up to even half of its potential, it will revolutionize the way human beings interact with information, and with each other, at least as much as the internet and mobile phones have done. And as those technologies have demonstrated, anything that makes that big of an impact on human interactions cannot help but lead to equally significant adjustments in the laws that govern those interactions. Nevertheless, as far as I could tell, no one was—or, indeed, even is today—writing on a regular basis about how these revolutionary developments are going to change the laws and customs that govern our society.

AUGMENTED LEGALITY® is my attempt to anticipate, analyze, and, perhaps, influence the legal developments that are surely just around the corner. The more prepared the AR industry and society at large are for these technologies, the better job we will do in fashioning a legal system that maximizes the potential of AR and minimizes its dangers.

Over the coming year, I plan to expand the reach of AUGMENTED LEGALITY® with an even more organized online collection of articles and analysis, expanding online discussion, and more. You can also follow my AR-related posts on Twitter, or contact me directly to further discuss your individual concerns.

I am a practicing lawyer at a full-service corporate law firm, and we represent clients in the AR industry. So this is the part where I remind you that this book is discussion, not legal advice, and that I’m not your lawyer until we agree otherwise in writing. What’s more, the views discussed here are mine alone, not those of my firm or its clients. My goal with AUGMENTED LEGALITY® is to advance the conversation about legal principles within the AR community, and to help prepare us all for the emergence of this exciting technology.

Please feel free to let me know how I can make the resources on AUGMENTED LEGALITY® even more useful for you. I hope you find this collection of information helpful and thought-provoking.

Brian D. Wassom, Esq.

April 18, 2012
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PART I - THE BIG PICTURE

1. SUMMARY OF AR LAW

The Coming Conundra: Real Laws In an Augmented Reality

Originally posted on March 22, 2011

Over the past decade, there has been no shortage of articles, CLEs, and speeches in legal circles about the implications of “virtual reality.” Many an academic hand has been wrung over the rules that govern control of the bits of data that translate into “objects” and “real estate” in online environments. To date, however, the vast majority of attorneys have safely managed to go about their business without needing to give a second thought to the question of who owns what in Second Life.

That is about to change. No longer content to remain on two-dimensional computer screens, virtual objects and other digital data have begun a mass migration into the “real” world. The buzzword for this phenomenon is “augmented reality”—digital data superimposed on the physical world—and it is poised to take our everyday lives, and the laws that govern them, by storm.

The AR Revolution

First-generation augmented reality, or “AR,” has been around for some time. Think of the yellow first down line that has become a staple in NFL broadcasts. The players don’t see the line, of course, but those equipped with special viewing devices—in this case, televisions—see it as if it were right there on the field.

Over the past year, more creative uses of the technology have emerged. Scores of print advertisements and greeting cards feature special, barcode-like codes that, when held up to a computer webcam, reveal a virtual object on the user’s monitor. In some stores, customers can hold a box of Legos up to a webcam and see a virtual representation of the fully-assembled toy.

Mobile applications are where the real growth in AR is happening today. Hold a video-equipped smartphone up to the nighttime horizon, for example, and Google Sky will connect the dots of constellations and tell you their names. Stand in front of a restaurant, and Yelp will display consumer reviews as if they were floating in space in front of the door. Other programs like Tagwhat and TwittARound will show you user-generated content floating in the place from which they were posted. Work is underway on facial recognition programs that will display a person’s Facebook profile in a bubble over their head. And in some cities, you can already get directions to the nearest subway station not on a 2-D map, but in a 3-D yellow line that appears on your videophone’s screen as if it were painted on the sidewalk you’re standing on.

Such features are useful up to a point—specifically, the point where users’ arms get tired of holding their video phones out in front of them. Mobile AR will truly take off when individuals can see virtual data not on a screen, but through video-enabled glasses that superimpose data on the lenses. Think this is mere science fiction? It’s not—at least, not for long. Prototypes of such devices already exist. In all likelihood, these will become mainstream devices in much less time than it took for the cell phone to go from a hefty automotive accessory to an indispensable, pocket-sized gateway to a global computer network.

Meanwhile, the number of objects fitted with location-aware sensors, RFID tags and the like grows every day. Combine this explosion of interactive capability with an always-on means of viewing
virtual data, and you have the ingredients for a fully customizable, completely immersive augmented reality.

**Augmented Legality**

How might laws, and the ways we apply them, need to adapt to a world where AR is omnipresent? It may be too soon to know the answers, but framing the right questions is the first step. Let’s consider just a few aspects of life—and litigation—that may be affected.

**Advertising and Unfair Competition.**

In a fully immersive AR world, advertisements will float in midair, untethered to billboards, or appear as if digitally painted on physical objects. What boundaries must such content observe? Courts today are still wrestling with what to do when search engines display a competitor’s ads next to search results for a brand name. But what if a Burger King ad appeared in your field of vision every time you physically looked at the Golden Arches?

The pressure for time, place, and manner regulation of advertising would surely increase in a world where ads could literally appear anytime, anywhere. But where would the lines be drawn? And how much restriction would the First Amendment allow?

**Copyrights.**

Owners of copyrights control the right to publicly display, publicly perform, reproduce, distribute, and make derivatives of their works. Yet uses by others that “transform” the work in a new, noncompetitive (and, usually, noncommercial) way are generally considered “fair.” Where does that line get drawn when inanimate content gets adapted into something physically interactive—such as an interactive avatar of a famous fictional character? What if that creation is only viewable to an individual user, in a personal “layer” of data that only he can perceive? In a sense, it’s the Napster, Grokster, and RIAA cases all over again, except this time the users can walk amongst their downloads rather than storing them on hard drives.

**Intentional Torts.**

When virtual data can be instantly associated with facial recognition software, all sorts of new avenues for defamation, disclosure of embarrassing facts, and even infliction of emotional distress open up. And if a person encounters a threatening person or thing that she doesn’t realize is virtual, can she have a reasonable apprehension of harm, and therefore be assaulted? If so, who is liable? What about AR graffiti—could it be considered a nuisance, property damage, or trespass to chattels?

**Negligence.**

The term “attractive nuisance” could take on an entirely new meaning in an immersive AR world. And it seems only a matter of time before a plaintiff alleges that his injury was caused by AR content impairing his view of the physical world, or by an AR ad that startled the plaintiff and caused him to swerve.

New technology will also bring new products liability allegations. How might devices that constantly beam data into our eyes affect our vision over the long-term?
Privacy concerns

will grow exponentially. There is already alarm over the amount of data that governments and corporations collect on us. But what if all of that information was aggregated and visible, not in a file folder somewhere, but superimposed on our houses, or even our very persons, for all the world to see merely by looking at it?

Less comprehensive invasions of privacy still raise serious concerns. An author writing in The Atlantic, for example, linked AR with the political polarization over California’s Proposition 8, the gay marriage ban. What if we could program our AR glasses to flag every person who voted for a law we don’t like—or who is a registered member of the opposite political party? In its recent Doe v. Reed decision, the Supreme Court held that States must disclose the names of those who sign political petitions. An app linking that data to particular individuals would be straightforward in an AR-immersed world.

Of course, glasses that superimpose data onto our vision would likely be equally capable of recording everything we see and hear, raising the obvious potential for eavesdropping and intrusion upon seclusion. Indeed, wearable video cameras are already on the market today. The Summer 2010 arrest (and exoneration) of Maryland resident Anthony Graber for “eavesdropping” on a policeman with his helmet-cam became emblematic of this hot-button issue. But as such devices become commonplace, how far will the breadth of our “reasonable expectations of privacy” diminish?

The Courtroom Experience.

Why should tortfeasors have all the fun? As with previous iterations of digital technology, AR may transform not only the substance of litigation, but also the procedures that govern it.

Accident recreation, for example, becomes an entirely different tool when, instead of viewing a cartoonish, 2-D animation, jurors don AR glasses in the courtroom and are made to feel as if they are inside the doomed vehicle. Successive visual effects could be layered onto a witness as they sat in the courtroom, simulating injuries they received. Lawyers could physically manipulate for the jury all manner of virtual objects during their closing arguments.

But AR could also add to litigators’ burdens. It has not been long since the federal courts began to wrap their arms around the thorny issues inherent in preserving, producing, and reviewing electronic data. How much more complicated will this process become when the data is not only electronic, but virtual? In “v-discovery,” it will not be enough to produce digital imagery; the party will also need to demonstrate how that image was projected onto the physical world and perceived by one or more individuals, each from their own unique vantage point. That process could have attorneys longing for the “old days” when their biggest challenge was preserving the metadata in an email.

How AR will manifest itself and shape society is yet to be seen. But any technology that enables individuals to alter their very perception of reality cannot help but effect an equally radical impact on human behavior and social norms. We whose job it is to help our clients and the courts navigate these shifting paradigms would do well to pay attention as these events unfold.
You can’t have an informed discussion—especially in the legal context—without first defining the terms that you’re using. This blog is going to talk a lot about “augmented reality” (or “AR”), so it’s important to understand exactly what we mean by that phrase. I’ve already given one definition—"overlaying digital data on the physical world"—but let’s see if we can unpack that a little further.

The subject of the phrase is “reality.” That’s the thing being “augmented” by AR technology. So what do we mean by “reality” in this context? Obviously, we could take this in several directions. For example, when asked recently to give an example of “augmented reality” that the general public could easily understand, one leading AR commentator responded (perhaps jokingly): “drugs.”

That’s not what the emerging AR industry has in mind. It doesn’t encompass the dream worlds of such films as *Inception* or *Sucker Punch*, or a drug-enhanced vision quest. Poetic license aside, we’re not talking about mental, emotional, spiritual, or metaphysical “reality” when we discuss the latest AR app. Instead, we mean the actual, physical world we all inhabit.

What, then, does it mean to “augment” that reality? Starting again with what it *doesn’t* mean, it’s important to note the distinction between AR and virtual reality, or VR. This more-familiar term describes a completely self-contained, artificial environment. Think *Tron* or *The Lawnmower Man*, or the web-based worlds of *Second Life* and *Warcraft*. The actual, physical surroundings of the person experiencing the simulated environment don’t factor into the equation.

AR, then, is a blending of VR with plain, old physical reality. *The American Heritage Dictionary* defines the verb “augment” as “to make (something already developed or well under way) greater, as in size, extent, or quantity.” That’s what AR does. It uses digital (or “virtual”) information to make our experience of actual, physical reality “greater.” It doesn’t create a brand-new, standalone plane of existence; it simply adds to the information we already process in the physical world. (This an *objective* description, of course; whether AR makes our experience *subjectively* “greater” promises to be a fascinating and ongoing debate.)

Tying this understanding of “augmented” back into the word “reality” shows why it’s important to define our terms. How does this technology increase the “size, extent, or quantity” of our physical reality? To answer that question, we need to recall how it is that we experience the physical world. And the answer, of course, is through our five senses: sight, smell, touch, taste, and hearing.

“Augmented reality,” therefore, is technology that gives us more to see, smell, touch, taste, or hear in the physical world than we would otherwise get through our non-augmented faculties.

This definition perfectly describes the examples of AR that already exist. Those include the yellow *first down line* in NFL broadcasts; “magic mirrors” that superimpose eyewear or clothing over our physical reflections; *walking directions* superimposed on the sidewalk in front of us; and data fields (such as *home prices* or *sex offender registry* profiles) that appear to float in the air next to a particular building.

But this definition also encompasses applications that have barely begun to be conceived, much less created. The vast majority of AR apps in existence or in the planning stages involve only one physical sense: sight. They overlay virtual imagery on top of what we already see with our naked eyes, essentially mooting the need for a computer monitor. The real world becomes our monitor when viewed through AR-enabled devices. This in itself will be monumentally useful—but there is more.
What about using AR to augment reality for those whose ability to perceive the world (through one of more of the five senses) is impaired? I heard this question posited at the AR Immersion 2010 Conference hosted by Total Immersion, one of the biggest players in the AR field, and it’s a noble question. Some such apps are on the way, such as this one that would translate shapes and colors into pitch and volume for the blind, and DanKam, which assists people with color blindness. Many more examples are surely just around the corner.

It seems inevitable that sound will play a bigger role in AR as sight-based apps become more mainstream. After all, sight and sound already go hand-in-hand in our everyday experiences. Perhaps devices that identify people by facial recognition or iris scans will be supplemented by identifying voiceprints as well.

Touch (or “haptic”) technology will also follow along. Minority Report-inspired gloves will inevitably replace the computer mouse as AR optics replace the computer monitor. As I’ve opined elsewhere, I don’t see AR technology becoming fully mainstream until using it to interact with data becomes as easy as looking at it and touching it.

What about the remaining (and related) senses: smell and taste? Here is where I’ve yet to see even the speculative AR literature tread. According to the definition above, devices that expand these senses are just as much “AR” as anything else. I doubt that the demand for these features, or the technology to offer them, are quite as advanced as some of the other examples. But I’ll be fascinated to see what a mature AR industry comes up with in order to expand into these realms.

What do you think? Does my definition capture the meaning of “augmented reality”? And are you excited by its potential?

2. DEVELOPMENTS AND PLAYERS IN THE AR WORLD

A. DEVELOPMENTS

An Inauspicious Beginning to AR Litigation

Originally posted on September 20, 2011

It has finally happened. The era of augmented reality litigation has begun. Just ... not the way I had expected.

I’ve spent years thinking—and the past several months blogging—about the legal principles that will govern the use of augmented reality technology. The AR industry promises to change the way we view our world and interact with data—changes so subtle yet profound that the technology will alter our behavior every bit as much as the internet and cell phones have. As AR technologies get more sophisticated, diverse, and widely adopted, we have to expect that they’ll bring equally radical and innovative applications of legal principles. Only through the process of litigation, legislation, and negotiation will we as a society form the rules that govern the technology’s use.

What lawyer wouldn’t be excited about that?

For a long time, I’ve had an automatic search running, poised to alert me to the first judicial decision dealing with augmented reality. Like the SETI radio telescope array in Contact, it operated in silence for a long time. Meanwhile, my Augmented Legality blogs have been largely speculative, predicting how the legal system might handle future AR scenarios.
Then, on a brisk afternoon just a few days ago, I got a hit.

There it was, in my inbox. The very first opinion from any court anywhere in the United States using the phrase “augmented reality.” A little shiver went up my spine. “It has begun,” I thought. “The future is here.” I clicked to open the search results, and . . .

It was rubbish. An order automatically dismissing a wacky complaint that reads as if it was written by a schizophrenic in a tinfoil hat.

Literally. The handwritten complaint and motion for restraining order filed by one Marcus Maley against the jail and sheriff of Wyandotte County, Kansas alleges, among other things, that Maley is “continually engulfed in ELF 74 hz.”; that he’d had an “electronic weapon” implanted in his pituitary gland and been subjected to medical experimentation by the CIA’s “ARTICHOKE” program; and that the authorities had tortured and attempted to murder him.

Oh, and also that he’d been subjected to the “illegal use of augmented reality.”

That’s it. Not even any creative imaginings of how AR might be used by secret government agents or corrections officers. Just that solitary, throwaway reference. However AR was supposedly used in this case, though, it must have been quite severe; Maley alleged that he was owed $100 million and “a restraining order against all law enforcement, city, state, and federal . . . in the United States, of the United States, anywhere in the world due to the nature of this case and . . . the possible use of ‘augmented reality.’” A quick check of the court’s PACER filing system suggests that this is not the first lawsuit that Maley has filed, either. The court quickly and on its own initiative entered an order queuing the case up for dismissal.

So what will this decision do to help shape on the development of AR case law? Not a darned thing. But one day, years from now, when treatises on the subject of AR Law are written and taught from, one of them might contain a footnote with this interesting piece of trivia: that the very first judicial decision making any reference to augmented reality was issued on September 12, 2011 by Judge Sam A. Crow of the U.S. District Court for the District of Kansas, in a case called Maley v. Wyandotte County.

*A Trillion Points of Light? Taggants as Ubiquitous AR Markers*

Originally posted on June 2, 2011

The nearly universal sentiment of those who spoke at the recent Augmented Reality Event (ARE2011) was that AR markers are on the way out. Markers are the odd little black-and-white designs or QR codes that most contemporary AR apps use to trigger the display of virtual imagery on the user’s screen. These apps need to look for markers because mass-market mechanical vision technology just isn’t sophisticated enough yet to discern and recognize most real-world objects, let alone to superimpose digital data on those objects in real time (with a few primitive exceptions like I Am Autobot.) The consensus I perceived at ARE2011 was that achieving next-generation AR—i.e., the ability to seamlessly and dynamically overlay digital data on the living, breathing, moving physical world—would depend on improving the ability of machines to see and comprehend (and therefore augment) the world around them.

But what if that consensus turned out to be 100% wrong? What if, instead of improving mechanical vision by a few orders of magnitude, it turned out to be easier to simply cover the entire world with tiny AR markers?
Mind you, I’m no programmer or hardware designer. And I have oodles of respect for those people I met at ARE2011 who are actually putting in the hard work necessary to make this amazing technology happen. I’m just a lawyer throwing around ideas.

I have to believe, however, that I’m not the only one to see this coming. Consider the following:

**The explosion of RFID technology.** “RFID tags, a technology once limited to tracking cattle, are tracking consumer products worldwide,” reports HowStuffWorks. “Many manufacturers use the tags to track the location of each product they make from the time it’s made until it’s pulled off the shelf and tossed in a shopping cart. Outside the realm of retail merchandise, RFID tags are tracking vehicles, airline passengers, Alzheimer’s patients and pets. Soon, they may even track your preference for chunky or creamy peanut butter.”

A recent proposal even called for “[i]ncorporating small, edible RFID tags embedded in your food.” Such a system would allow tracking food products along the entire food chain, from production to digestion, and even enable such devices as “smart plates” that scan your meal via Bluetooth and alert you to potential food allergens.

Whether or not that ever happens, it’s safe to say that more and more of the objects in our everyday lives are going to be tagged—and, eventually, talking to each other—in the near future. The buzzword coined to describe that infrastructure is “the internet of things,” which you can read more about here, and discuss in this LinkedIn group.

**The defense industry’s investment in AR.** The U.S. defense industry has long been one of the world’s primary drivers of innovation. Much of this technology eventually trickles down to the consumer level. The cases in point most relevant to this topic, of course, are GPS technology and the internet itself.

AR will be no different. A clear takeaway from ARE2011 was that military spending is behind much of the innovation currently happening in the field. Some of the start-ups represented at the conference work exclusively for the military, and venture capitalists were there looking specifically for dual-use military technology with strong potential for commercial spin-offs.

**The military’s interest in taggants.** “Taggants,” according to one company who makes them, “are microscopic or nano materials that are uniquely encoded and virtually impossible to duplicate—like a fingerprint. They can be incorporated into or applied to a wide variety of materials, surfaces, products and solutions.” Think RFID tags, but a heck of a lot smaller.

According to a recent L.A. Times article, “[e]arlier this year, the Air Force asked for proposals on developing a way to ‘tag’ targets with ‘clouds’ of unseen materials sprayed from quiet, low-flying drones.” The paper quoted the president of one company that’s developing such nanotaggants as saying that **tagging, tracking and locating “is a hot topic in government work. It isn’t easy tracking somebody in a crowded urban environment like what is seen in today’s wars.”**

According to that company’s website, its “nanocrystal taggants are deployable in solvents, inks/paints, and aerosols, allowing them to be easily integrated into various [military] applications . . . and customized for the unique needs of other operations [as well].” It already makes “nanocrystal security inks that can be incorporated directly into clear laminates, plastics, or appliqués[,] ... and dye- and pigment-based inks (including black inks) for use in banknotes, concert tickets, lottery tickets, or CDs — and even in varnishes and lacquer finishes.” The transparent, “nanophotonic” taggants are optically clear, but can be designed to respond to a specific range of UV radiation.
Add these trends together, and what do you get? A technology capable of literally painting the world with AR markers. Micro- or nanotaggants baked into paint, plastics, asphalt, ink, or even dust would be invisible to the naked eye, but capable of marking all manner of 3-D objects in a way that appropriately equipped AR optics could potentially recognize. We may no longer need to intentionally scan little, 2-D black squares in order to trigger digital content. Instead, we may be able to slip on AR eyewear that automatically uses invisible pulses of energy to locate the nanotaggants embedded in physical objects and superimposes digital data on them in a crisp, seamless, precise-to-the-centimeter manner—what Blaise Aguera y Arcas of Microsoft called “Strong AR” in his ARE2011 keynote.

This technology is closer than you think. Nanotaggants are already being marketed in conjunction with electro-optical scanners to combat counterfeiting of bank notes and lottery tickets. The military has its suppliers working on taggants that can be “crop-dusted” over enemy troops to track their movements. If and when this technology becomes commercially widespread (as happened in a highly analogous way with the military’s GPS tracking technology), what legal issues might arise?

(Disclaimer time: these are my personal predictions about a technology that doesn’t (quite) exist yet. It is not meant to apply to, or cast aspersions on, any of the companies, products, or services currently on the market.)

**Regulation.** If a network of commercial-grade, AR-capable nanotaggants does emerge, let’s hope there’s only one such network. That is, that the taggants operate on a frequency and in a manner that all AR-capable hardware can use. Just as there’s only one internet, one set of GPS satellites, one power grid, and one sewer system (just to name a few public utilities), so too should there only be one network of taggants.

Otherwise, the networks becomes fragmented, and the benefits inherent in a universal system are lost. What good would it be if your AR eyewear could only recognize the objects coated with taggants made by a particular manufacturer? It would be like trying to walk down the street while only able to see things that are blue. Even smartphones that use various proprietary networks to make phone calls all have chips that operate on the same GPS system, and they all connect to the same internet. And the various phone companies’ signals all operate within a defined range of frequencies demarcated by the federal government. If it were not so, competitors would be broadcasting signals that interfered with all sorts of other communication. Without oversight, we could see a dozen or more companies trying to spray, paint, and infuse their own proprietary taggants into anything and everything—and that could get out of hand quickly. I don’t necessarily have warm, fuzzy feelings about governmental regulation in the abstract, but this is an area where some degree of centralized oversight would be well-advised.

**Health and Environment.** The benefit of oversight becomes all the more clear when you think about the potential, unintended side effects of all this micro-machinery being spread everywhere. But that cat is already out of the bag. AR-capable nanotaggants may accelerate the problem, but there are already enough nanodevices in use for people to be talking about these issues.

This is actually an area where, for once, the government is ahead of the game. In 2000, it created the National Nanotechnology Initiative, which “serves as the central point of communication, cooperation, and collaboration for all Federal agencies engaged in nanotechnology research.” In 2008 and 2011, the NNI published a Nanotechnology Environmental, Health, and Safety Research Strategy, which is intended to provide a research framework in the core areas of human exposure, the environment, human health, and measurement tools, and risk assessment and risk management, along with research needs in predictive modeling.
Nevertheless, experts already see a lot of nanotech litigation coming. “Product liability and toxic exposure attorneys,” says Ronald Wernette, author of the Nanotort Law Blog, “suggest that the first civil tort suits will be filed within the next five years. They anticipate a variety of claims, including consumer claims based on the fear of future physical harm. At issue could be whether manufacturers of consumer products appropriately tested nanomaterials, whether the government approved the product, and whether the potential harms were adequately disclosed. ... Employees of nanomaterial manufacturers are likely to bring exposure claims, and ... theories applied to nanotechnology claims will include defective design, defective manufacturing, and failure to warn claims.”

This could all actually be positive news for companies thinking about constructing a nanotaggant network; maybe by the time the taggants are ready for prime time, either the NNI or the courts will have established some helpful guidelines for avoiding liability.

Privacy. I’ve already raised some of the privacy questions that ubiquitous AR will inspire, such as what happens to our reasonable expectations of privacy when we’re all wearing AR eyewear capable of recording and live-blogging everything we see. (And sure enough: only a few months later, Eyez, the first commercially available eyewear intended for just that purpose, was announced.)

Technology like that will certainly further complicate the debate over what should be public and private. But with trackable nanotaggants, it could become possible for the first time to literally destroy the possibility of privacy altogether—at least when it comes to concealing your physical location. In this future, when anything and everything—even our clothes—are tagged, everything will be trackable.

But I’m not even talking about the taggants we’ll know are there. Consider: the nanotaggants that the military is currently developing are intended to be sprayed onto enemy combatants so they can be tracked in situations where direct surveillance is impossible, such as urban combat. Because these devices exist on a micro or nano scale, they’re invisible to the human eye. Ideally, the soldier won’t even know he’s been tagged, let alone be able to find or remove all of the devices. There would be nothing to stop governments, law enforcement, criminals, or anyone else from using similar technology to track anyone.

Even if you knew you were tagged, could you remove them all? A human skin pore is 200~250 nanometers wide, which easily allows nano-scale products to be absorbed into the skin (at least according to this “nano-cosmetics” website). What if you inhaled or ingested them (as posited by those who fear the environmental consequences of the technology)? Like Lady Macbeth, you’d wash and wash, but never get the damned nano-spot out.

The inability to hide your physical location would have consequences for personal safety that go beyond one’s sense of privacy. Would the Witness Protection Program become unfeasible if those hunting you could locate your taggants? What about firearms with taggant-detecting scopes? Talk about walking around with a target on your back.

These are just a few of the ideas that this concept of nano-markers brings to my mind. But I’ve digressed enough for one post. For more information on these subjects, follow the links above. For an in-depth discussion of where nanotechnology as a whole could take us someday, visit the online home of Eric Drexler, who has been thinking and writing about these subjects since at least the mid-1980’s.

What do you think? Am I on to something here, or out to lunch?
This could finally be the year that the public begins to see augmented reality as a serious, important technology. Lance Ulanoff, the editor-in-chief at Mashable, certainly thinks so. He listed AR as the first of “5 Tech Trends to Watch in 2012.” “Trust me,” he wrote, “by 2013, you’ll be hard-pressed to find anyone who hasn’t at least tried augmented reality.” On January 2, 2012, BBC News wrote that “augmented reality … is beginning to take hold in the US.”

And with any new industry comes legal milestones. As AR companies becomes more prominent, they will encounter the same legal issues that occur in every industry. I’ve already told you about the first legal dispute over AR, which involved marketing to teens. Here are five legal issues that I think at least one AR company will encounter sometime this year:

1. The First Licensing Model for AR content. Copyright law will always play a big role in AR publishing. It is the law of creative expression, and AR is a medium through which some of the most creative content of our generation will be expressed. In other media, those who author creative content give licenses (i.e., permission) for others to reproduce, distribute, alter, publicly display, or publicly perform that content—sometimes for free, sometimes in exchange for money. AR publishing will work the same way.

Daqri has already announced its plans to be “the YouTube of AR,” where anyone can upload or download user-generated AR content for free. Sometime in 2012, I expect to see at least one company monetize AR content—perhaps through an in-app purchasing feature, allowing users to download custom images that they could then see through their smartphones.

Personally, I’d love for Apple to offer downloadable AR skins for its Siri personal assistant. That way, you could not only hear Siri give you directions, but actually see her (through your iPhone) pointing them out right in front of you. (And you know that Apple will give her an entire digital body, but only charge you an arm and a leg.)

2. The First Negligence Lawsuit. “I couldn’t see that wet spot on the floor because the digital, two-headed dragon was in my way!” I’ve already blogged about the risk that mobile AR users will become distracted by digital content and injure themselves on very physical objects. As AR gaming, scavenger hunts, and the like take off in popularity this year, I see the first personal injury lawsuit being filed sooner than most people might think. And the first augmented commercial for personal injury lawyers can’t be far behind.

3. The Introduction of AR Eyewear Starts the First AR Patent Fight. It might not happen exactly that way. But two things seem to me not only inevitable, but imminent. One is physical eyewear with AR capabilities. The other is a series of patent infringement lawsuits over AR technologies that rival the patent wars already underway throughout the mobile industry. It seems only logical that such an innovative, ground-breaking, and im.

4. The First Trademark Opposition. There are only so many different ways to say “augmented,” “immersive,” and the other adjectives that suggest AR. Many startups are not yet thinking about protecting their trademark rights. They may be surprised when they apply to register their name, only to be accused by another company of coming too close to their own trademark. That happens daily in other industries, and is likely to happen to an AR company soon.
5. **Porn Puts AR on the Radar of Family Groups and Law Enforcement.** You can always count on the military and the porn industry to push technology forward. AR already has investors in both camps. The porn industry is already investing heavily in AR. If Apple really does put skin on Siri as I speculated above, we might see “alternative,” user-generated versions soon thereafter. And as Joe Rampolla (a law enforcement officer and consultant specializing in cybercrime, and one of the first people to publicly address the law enforcement aspects of AR) says, “wherever society finds pornography, child pornography is not too far behind."

We may not see all of these events in 2012, but I’d bet that most of them will come to pass. And I’m sure that we’ll see others that aren’t listed here. I’ll revisit this post in December to evaluate my predictions.

### B. **Interviews & Announcements**

**Brian Mullins of daqri: The Man Who Would Democratize AR**

*Originally posted on June 13, 2011*

Brian Mullins is not a man who dreams small. On his to-do list? Launching a publishing platform on the order of YouTube and WordPress, creating a new mass market for 3D digital models, and democratizing the nascent augmented reality industry so that anyone and everyone can start adding digital content to their physical world.

And that’s just over the next year or two. After that, he has in mind changing how the entire manufacturing industry operates, and reinventing the educational system by “presenting the sum total of human knowledge in the most effective way possible.”

Brian’s vehicle for achieving these goals is **daqri,** the Orange County-based AR startup where he is co-founder and CEO. I got to hear Brian’s team announce daqri at last month’s **ARE2011 Conference,** and since then I’ve been part of its private beta testing. I share Brian’s enthusiasm and wonderment about the future of augmented reality, and he kindly agreed to be the subject of Wassom.com’s first posted interview. I’m publishing it today to coincide with the scheduled public announcement of daqri’s availability and features.

We spent some time talking about daqri and what it can do now, which is exciting enough. But Brian has a long-term vision for the AR industry, and it’s clear that he intends daqri to be relevant for the long haul.

If you haven’t heard of daqri yet, you’re not alone. The company has been “in stealth mode for a year,” Brian says, “and trying to keep a low profile” while the product was under development.” They wanted to get it right before going public. “We spent a lot of time building the technology from scratch. It’s all our own algorithms.” But now the product is ready for prime time.
There are already a lot of exciting AR products and features on the market. What makes daqri different is that it's primarily a platform for user-generated AR content, rather than an app designed to present that content in any particular, structured manner. Instead of partnering with one of the competing AR browsers already on the market, daqri built its own technology from the ground up. While it's in an app form today (on iOS and Android), daqri's long-term strategy is to move into HTML5 working directly within mainstream browsers like Safari.

“The analogy is to YouTube or WordPress,” says Brian—sites that give individuals the tools and space they need to create and share their own content, and then get out of users’ way. “Before YouTube, nobody had video on their website. Now you can get the same level of service for home videos as you do for trailers for Hollywood blockbusters. That's our philosophy for personalizing the AR medium. If we can engage more creative people by separating the technology from the creative process, they'll do more with AR than we can even imagine.”

At the moment, daqri relies primarily on QR codes to trigger its digital content. (Enterprise customers also have the option of combining daqri with their Microsoft Tags and NFC codes.) They chose the QR platform because it's already established. QRs may not be quite as mainstream yet as the old, familiar bar code, but they're certainly starting to pop up everywhere. Users, therefore, face "no complicated call to action," Brian says. Most smartphone users will see the code, and automatically recognize that they can scan it with a QR reader app to discover the content behind it.

That’s one way that daqri offers value to businesses already incorporating QRs into their packaging and printed materials. "If you’re going to use really valuable printed space for a QR code," Brian says, "it should be augmented, too. We think that’s one of the really powerful parts of daqri—that you can use the QR without changing anything."

But that isn’t to say that it wasn’t a technological feat to get QR codes to work as AR markers. Most such markers, as I’ve discussed before, consist of thick black lines that are easier for mechanical sensors to discern. Brian says that it “took a lot of refinement” before their software recognized the level of minute detail that the codes contain.

Still, he’s already looking beyond QR. One of today’s announcements will be “FastFrame,” daqri’s custom marker generator. “You just upload the file, we create the marker, and then deliver it,” says Brian. “Then you can print that on your packaging, or poster or whatever, and just make a really cool, really personal augmented reality marker.” QR codes will still remain part of that process, though, and can be incorporated within the FastFrame.

“We’re [also] working on markerless tracking right now,” he says. Within next year of two, daqri anticipates using “natural feature tracking to supplement the markers.” The app would “use the QR code to find the plane, then extend from that plane very easily to find the natural features.” Ultimately, “we think that’s going to be the bridge to the no-marker transaction.”

To anyone familiar with the industry, it’s no surprise what’s keeping these dreams from becoming an instant reality. "It’s absolutely the hardware holding us back," Brian says. Mechanical vision technology just isn’t where it needs to be in order to bring out AR’s full potential—although there are some exciting products on the horizon (like the demonstration eyewear that Brian’s trying on in the picture below from ARE2011).

So I asked Brian: if you could design the ultimate AR hardware, what would it be? "To begin with," he said, “a second camera for every headset. The ability to triangulate with two cameras makes the algorithms simpler, faster, and more robust—more like the way the human eye does it.”
I’ve argued in this blog and elsewhere that AR won’t gain “mainstream adoption so long as it requires users to hold their video phones out in front of them, or to sit in front of a monitor. When seeing and interacting with virtual objects becomes as easy as looking at them (through eyewear) and touching them (through Minority Report-style handwear), then the potential of AR will begin to be realized.”

“I absolutely agree with you” on those points, Brian said. “The industry is already moving toward first-person AR, where you’re wearing a head-mounted display. That technology’s a lot further along than most people realize.” He cites Apple’s decision to hire the former head of MIT’s wearable computing project as a “really telling acquisition.” That will “change the way we consume data,” and “move apps into the first-person environment.” Brian predicts “commercially viable products within the next two years” that are not just expensive toys, but products that are affordable and have “all-day wearability.”

“Gestural interfaces,” moreover, are the “natural way to interact with first-person data.” And daqri is “working pretty actively on gesturing, both on the mobile screen and in the AR environment.”

**Legal issues on the horizon.** Since this blog examines emerging AR technologies primarily from a legal perspective, I asked Brian what legal hurdles he sees in the near future.

In the near term, Brian’s concerned mostly with copyright issues. “3d objects and the images they’re textured with all have copyright associated with them,” he says, “and rights holders need to understand that and be careful.” Brian sees YouTube’s experience with copyright infringement issues as a model to emulate. daqri respects the rights of copyright owners, Brian says, and it has a policy and mechanism in place to remove infringing content from its platform. But Brian also admires what he considers YouTube’s protection of fair use, and its resistance to overly zealous takedown demands.

When it comes to brand protection in AR, Brian hopes to see an evolution in the stereotypical thinking of rights owners. “To a certain extent it’s going to be incumbent on brands to embrace the new medium,” he says. “I think the ones that allow you to remix will have the most success in it. If I can get a Coca-Cola can in 3d for my AR mashup, that can’s going to get a lot of exposure.”

He chuckled when I mentioned the recent Mashable article called “Who Owns the Advertising Space in an Augmented Reality World?” “That’s an interesting discussion that needs to be had,” he said, “but it got a lot more attention than it needed.” In today’s AR environment, you only see the ads if you intentionally pull out your smartphone and look at the space through an AR app. “Ubiquity will change the discussion” once AR eyewear is commonplace. But even then, Brian has a hard time seeing the harm. I posed question of what happens if, every time I look at McDonald’s through my AR eyewear, I get coupon for Burger King. “What’s to stop someone today from putting up a Wendy’s sign in the lot next door to the McDonald’s?” he responded. All of which will be fascinating questions for we IP lawyers to tackle in the near future.

Besides, Brian added, “the killer apps will be ad-blocked. Then I won’t see any of that junk when I’m walking around.”

**Revolutionizing Industry and Education.** daqri is actually Brian’s third company. His previous venture was in manufacturing, so the factory floor is an environment near and dear to Brian’s heart.

AR “on the factory floor will change the manufacturing industry forever,” he says. Instructions for how to assemble things and run machinery “will not be language-dependent;” they will be entirely visual. He cited studies suggesting that productivity would skyrocket in such an
environment—a conclusion buttressed by the several examples of industrial AR that were presented at ARE2011.

He also sees the daqri platform as a catalyst for entirely new business models in the 3D digital imaging industry. There are “currently no good outlets to get this content to the consumer,” he says. Instead, modelers sell B2B, such as by providing objects for video game consoles—files that are too computationally complex for a smartphone. A YouTube-like platform for AR will presumably cause a surge in demand for affordable, consumer-grade 3D models, and therefore to new pricing models and a proliferation of mobile-ready content. So far, Brian says, these content providers have been receptive to his ideas. They’re a young industry, and have seen what the movie and recording industries have gone through in adjusting to online, B2C distribution models.

The idea that really fires up Brian’s imagination, however, is AR as the ultimate learning tool. His favorite example is the scene in The Matrix where Trinity needs to learn how to fly a helicopter. “She just calls up the instructions,” he recounts, “and they’re delivered to her on the spot. AR will also deliver instructions to you on the spot.

“AR will become a way to get knowledge in people’s heads much faster than any other way that we’ve done education,” Brian says. “It could possibly allow the sum total of human knowledge to be presented in the most effective way possible. Everybody should have access to that.” He draws inspiration on this point from his favorite books, Daniel Suarez’s novels Daemon and Freedom. Without spoiling the plot, Brian says that the problem of how to preserve and communicate knowledge in exactly that way is a key element of the books. (Brian is not the first AR expert to recommend these books to me. The audio version of Daemon is therefore next in my Audible queue.)

Nevertheless, Brian doesn’t advocate throwing out all your physical textbooks. “We think AR brings relevancy back to print. When that print can come to life, then you can experience it in AR and out of AR as well”—a concept captured brilliantly by this concept video by artist Sorin Voicu.

In sum, my conversation with Brian was not only a unique insight into the business model of one of the AR industry’s most promising startups, but also a fascinating brainstorm about AR’s future role in society with someone who knows what he’s talking about. If Brian’s passion for this subject is any indication, then both he and daqri will be relevant players in this field for a long time to come.

* * *

Welcome “AR Dirt” to the Blogosphere
Originally posted on January 30, 2011

I’m happy to see that my friend and colleague Joe Rampolla has joined the blogosphere. You can find him at ARDirt.com.

Joe has been thinking and speaking about augmented reality and related technologies for years now. He and I met shortly after I launched this blog, and discovered that we have some very similar ideas and concerns about the promises and dangers of AR. I’ve quoted him more than once in these pages.

Joe’s perspective is unique, because he brings a law enforcement background to the conversation. He has been a law enforcement officer for 17 years for a suburban police department in the NY/NJ Metropolitan area. In 2003 he was assigned to a regional computer crimes task force in Northern New Jersey. He is a nationally recognized speaker on the topics of cybercrime, augmented
reality, virtual worlds, cyber-terrorism, cyber-bullying and undercover Internet Relay Chat (IRC) investigations. He has taught International law enforcement at Microsoft in Redmond WA, in the Ontario Canadian Providence, and taught cybercrime topics to all levels of law enforcement for the National Internet Crimes Against Children Task Force. In his spare time he teaches in various diverse communities as an outreach coordinator for homeland security interests. Joe serves as a consultant for various organizations across the United States and presents for the National District Attorney’s Association (NDAA) and Fox Valley Technical College.

AR Dirt features not only his blog, but also his new book on AR, video, an Innovators Q&A, AR news, and more. With Joe’s commitment and enthusiasm, I’m sure we’ll see this site grow into an important resource for the AR industry.

What’s more, Joe has honored me by choosing me as his first interviewee. You can read my “Innovator’s Q&A” here.

* * *

BC “Heavy” Biermann: Taking Back Public Spaces With AR

Originally posted on January 13, 2012

I’m one of several people who write about how augmented reality will change the world someday. BC “Heavy” Biermann is one of the few people currently helping to make that happen. In addition to working as an assistant professor of media, BC is the founder and developer behind The Heavy Projects, the brains behind several innovative AR projects. In the course of preparing my upcoming talk on “Augmented Reality and Social Change,” I had the great fortune of talking to BC and learning more about his vision of our augmented future.

**Occupy AR**

The first example of BC’s work that I came across—and the one most obviously tied to social change—is the “Occupy AR” channel he developed at the height of last fall’s Occupy protests. This was a channel on the junaio AR browser by metaio. The channel carried information for the Occupy protests in five different cities across the country. Using the GPS coordinates of scheduled demonstrations, the channel guided users to the site, and offered related contact information.

The Occupy AR channel made a splash online as one of the earliest, starkest examples of AR being used to foment social change. BC supports the Occupy movement and is happy to have contributed. But I discovered that he wasn’t exactly thrilled with the final product.

“It came down to a lack of time,” BC says. For starters, he never intended the channel to rely on geolocation. He much prefers AR applications that use feature tracking. “That’s why I chose the junaio platform in the first place,” he said, “because it was the best at feature tracking at the time.” (He hasn’t yet gotten a chance to develop for the newer Layar Vision platform.) BC’s original concept was designed to recognize the NYPD logo, overlay that with the Occupy symbol, and use that to direct users to the park where the demonstrators were camped out. But the code to make that happen wasn’t working, and developments within the Occupy movement were happening quickly. So he fell back to the geolocation mechanics that most smartphone AR apps use.

“I had a whole web-based back-end planned, too,” BC laments. This would have tied into the Occupy AR channel to allow users to upload video, and give organizers the chance to collect visitor analytics. He made preliminary plans with the Occupy Wall Street organizers in New York to develop the site, “but again, time just ran out.”
As a result, he has no idea how many people actually used the Occupy AR channel. If nothing else, though, it **proved the concept** that AR can offer a unique way to use draw people to a physical location using digital data.

**Hijacking Outdoor Advertisements**

BC takes more pride in the development work he’s done for the New York-based Public Ad Campaign. This organization believes “that public space and the public’s interaction with that space is a vital component of our city’s health,” and **considers “outdoor advertising [to be] the primary obstacle to open public communications.”** Its mission is to “air our grievances in the court of public opinion and witness our communities regain control of the spaces they occupy.”

One of Public Ad Campaign’s several attempts to further this goal was a project called the “AR Ad Takeover.” This smartphone/tablet app used feature tracking to recognize particular print advertisements that were then prominent across New York City. The app then superimposed original art on top of those ads, essentially replacing their commercial message with an expression of the Campaign’s choosing.

In April 2011, BC launched a similar app that **hijacked the movie poster** for the film *Pirates of the Caribbean: On Stranger Tides*. The app morphed the face of “Captain Barbossa” (played by Geoffrey Rush) into that of Goldman Sachs CEO Lloyd Blankfein—who BC calls “the real pirate.” (Since then, BC notes with a healthy dose of irony, he’s noticed film companies intentionally using AR in some of their movie posters.)

The Heavy Projects have at least two new projects in the works for 2012. The first is a “digital murals” project to **“re-skin” public buildings.** Using feature tracking and 3D digital models, users will be able to superimpose a different appearance over certain buildings, and even see them “decay over time.” The second project seeks to replicate these efforts in young minds. BC is working with a nonprofit organization in New York to **teach inner-city kids** how to use junaio to replace outdoor advertisements with their own “ARt.”

**Democratizing Messaging in Public Space**

Each of these are steps in an “iterative process” toward an overall “philosophical” goal in mind with these efforts, he says. It is two-fold: first, to change the way people think about public space, and second, to democratize the way public spaces are used for communication. Or, as BC says, “eradicating the last bastions of common space that you can’t control.”

“**AR can democratize messaging in public space,**” BC says. “I’m not against commercial messaging *per se*, but I’m opposed to commercial dominance.” Like most of us who write about the future of AR, BC envisions a world where people wear AR-powered eyewear that seamlessly superimposes digital data atop our field of vision in a seamless, effortless manner. But for BC, the “killer app” for such hardware would be an “open environment platform that allows users to **filter their environment according to their interests.**” Users of such a platform would not see the billboards and other commercial messaging that now occupy so much of our public space unless they chose to.

As hard as BC is working to make this dream a reality, however, he freely acknowledges the drawbacks that would come with it. I asked him whether this ability to filter one’s experience of reality could lead to more political groupthink (also called the “**echo chamber effect**”), where people only get information that reinforces their pre-existing beliefs, leading to an erosion in social cohesion and civic discourse.
“The question is right on target,” says BC, “and honestly, I have no good answer for it right now.” He suggests that there should eventually be a way to combine filtering with an avenue for unfiltered information as well. But the echo chamber problem is already inherent in our current media environment, he notes, and on balance, he believes that ending what he sees as commercial dominance of public spaces will still be a net-positive.

BC is also grounded enough to not want to throw the baby out with the bathwater. I asked him about another form of public messaging that people often consider an eyesore: the abundance of traffic signage that lines our roads. Why not, as I’ve speculated about, replace them all with digital content viewable only to drivers through an augmented windshield?

His reaction exhibited caution and thoughtfulness. “Generally, I’m in favor of reducing clutter,” he says. “But stop signs are for pedestrians too. If not everyone needs to see it, then I favor removing it. But that also presupposes that all drivers have access to the right technology, and that it’s reliable.” In other words, this is not something that’s around the corner.

Dream or Destiny?

On that note, I asked BC whether he believes that his vision of an augmented public space will ever truly come to pass. “I’m hopeful, put it that way,” he says. Most of the R&D he’s seen has been taking place in Europe, but US companies are catching up. BC has his eyes on Qualcomm and the Google Goggles project. “As a developer, it’s out of my hands,” he says. Bu he can’t wait for the hardware to catch up with the potential offered by the type of AR software he’s able to develop.

“We’ve also got to keep ‘gimmicky’ AR from dominating the market,” he says. “It will be more challenging to promote AR as a means of democratizing public spaces if the public comes to associate AR with “pointless” apps that BC considers mere “diversions.”

Whether or not you agree with BC’s view of commercial messaging and public spaces, his creativity and determination are admirable. BC Biermann is poised to be one of the people in the vanguard of socially meaningful augmented reality.

PART II - WHERE AR AND LAW INTERSECT

3. ADVERTISING & MARKETING

First, They Came for the Doritos: AR Campaign Spurs Legal Complaint, With More to Come

Originally posted on October 24, 2011

It’s on.

For real, this time. Unlike the prisoner lawsuit I discussed last month, a newly filed legal complaint raises non-imaginary (although certainly still-untested) legal theories concerning an actual, commercial use of augmented reality. AR litigation is now a cold, hard reality. And the result of this initial salvo could have a huge impact on AR campaigns across the board.

The Specifics: Who’s Alleging What
On October 19, 2011, four consumer advocacy groups (the Center for Digital Democracy, Consumer Action, Consumer Watchdog, and The Praxis Project—who I’ll refer to collectively as “CDD”) filed a Complaint and Request for Investigation with the Federal Trade Commission (FTC) against PepsiCo and its subsidiary, Frito-Lay. The complaint calls on the FTC to investigate and bring action against these companies for allegedly “engaging in deceptive and unfair marketing practices in violation of Section 5 of the FTC Act.” Together with their complaint, the CDD issued a press release and a detailed collection of case study videos—apparently from the advertisers themselves—explaining the challenged ad campaigns.

The CDD objects to several aspects of Frito-Lay’s online ad campaign for its “Doritos Late Night” line of products. The campaign was a multi-faceted approach that employed a variety of cutting-edge techniques. Most of these are rooted in social media, such as the “Hotel 626” and “Asylum 626” social games. (I’ll discuss these in more detail in subsequent posts. This post focuses on the AR aspects of the campaign.)

The ultimate point of the Complaint is to argue that Frito-Lay’s campaign deceives teens into eating too many unhealthy snacks, thus contributing to the childhood obesity problem. For support, the complaint relies on a report called Digital Food Marketing to Children and Adolescents, conducted by National Policy & Legal Analysis Network to Prevent Childhood Obesity (NPLAN). The Report (non-coincidentally released on the same day as the Complaint) begins from the unstartling premise that “contemporary marketing practices are increasingly multidimensional” and rely on social and relational methods rather than hard-sell advertising.

But the Report and the Complaint go on to call out five specific forms of outreach to which teens are “uniquely susceptible.” At the top of that list are

Augmented reality, online gaming, virtual environments, and other immersive techniques that can induce “flow,” reduce conscious attention to marketing techniques, and foster impulsive behaviors ....

The CDD’s reasoning, therefore, is not limited to what Frito-Lay did. But the Complaint chooses to single out the Doritos campaign as “particularly problematic.”

The Doritos Late Night Campaign

At least one, and arguably two, aspects of this campaign qualify as AR.

Most notable is the “Late Night Concert” featuring the band Blink-182. Here’s how the Complaint describes it:

The Late Night music experience utilized “augmented reality,” an immersive marketing technique featuring a vivid interactive experience that can be personalized for individual users. Bags of Doritos Late Night chips were printed with a special symbol to serve as a “ticket” for the concert. Flashing that symbol at their webcams would create the appearance of the stage popping out of the bag of chips.

The CDD also calls out a related feature involving the music video for Rihanna’s song “Who’s That Chick.” The producers filmed two versions of the video with identical camera angles and choreography. The only difference is that the default video is shot with “daytime” lighting and costumes, while the “Late Night” version has a “darker” backdrop and wardrobe. Holding a Doritos Late Night bag up to a webcam while the video is playing will “unlock” the Late Night version and automatically switch between the two. By at least some definitions, this, too, is augmented reality.
The *Doritos Late Night* campaign appears to have been a success. According to the Complaint and the video case studies it cites, the website received almost 100,000 hits in its first week, with an average visit length of 4.5 minutes.

**Next Steps for the Doritos Complaint**

I’ve been careful to describe this as a “legal complaint” rather than a “lawsuit.” The process that the CDD has started is not a “lawsuit” in the traditional sense of a plaintiff suing a defendant in order to get certain relief.

Rather, what the CDD has done is to gather all of the data it can find to support its argument, package the data in what it thinks is the most persuasive manner, and lain it all at the FTC’s doorstep, asking the FTC to do something about it.

**The FTC’s has no legal obligation to act.** It can choose simply to do nothing. The FTC is “empowered and directed” by Section 5 of the FTC Act (15 U.S.C. § 45) “to prevent persons, partnerships, or corporations ... from using unfair methods of competition in or affecting commerce and unfair or deceptive acts or practices in or affecting commerce.” But it’s up to the FTC itself to decide whether such methods are being used, and if they are, whether “a proceeding by it in respect thereof would be to the interest of the public.” To reach that decision, it usually conducts an investigation first.

Even if the FTC does act, there’s no deadline for action. It has been known in some cases to let investigations lie dormant for years, only to pick them up again and take action months or years later.

After investigating, if the FTC decides to act, it has two options under Section 5. First, it can file a lawsuit in federal court against the allegedly deceptive marketers, seeking an injunction against the unlawful practices and penalties of up to $10,000 “for each violation.”

Second, it can hold an administrative hearing, in which the FTC files a complaint and the marketer may defend itself before the Commission itself. Any interested third party (e.g., the CDD) may petition to intervene and offer testimony. That process can also result in an order that the marketer cease and desist the objectionable practice. In either scenario, the ruling may be appealed to a U.S. Court of Appeals.

Meanwhile, PepsiCo has little it can do but wait, and to parry the CDD’s PR blitz. ”We are aware of the filing to the FTC and believe it contains numerous inaccuracies and mischaracterizations,” Frito-Lay spokesperson Aurora Gonzalez has been quoted as saying. ”PepsiCo and its Frito-Lay division are committed to responsible and ethical marketing practices. Our marketing programs, which are often innovative, comply with applicable law and regulations.”

**Is Your AR Campaign the Next Target?**

Those in the AR industry will recognize Doritos’ webcam-based AR advertising model as entirely commonplace. Although the production values for the campaign appear quite high, the technique of holding a marker up to a webcam to activate content on a desktop monitor is first-generation AR that has been around as long as the industry itself (which is to say, at least a couple years).

In other words, there’s nothing about the technical aspects of this campaign that make it “particularly problematic.” Rather, the CDD is on a mission to reduce the consumption of junk food by teens. This campaign used AR to sell teens such food, so it attacked AR. Presumably, if the Ad
Council were using AR to lower teens’ inhibitions against quitting smoking, the CDD would not object.

But *Doritos Late Night* is far from the only campaign on the CDD’s radar. The CDD has already made it known that, while PepsiCo “is in forefront ... we are likely to file other complaints in the next year or so.” And the CDD’s website about the complaint lists some specific examples of other campaigns it objects to. *Some of the examples on that list were also successful AR campaigns.*

**The reasoning behind the Doritos Complaint doesn’t stop at foods**, either. Consider this passage from the Complaint about the ills of “immersive” environments:

**Frito-Lay’s ability to disguise its marketing efforts is further enhanced by the use of ”immersive” techniques.** Immersive marketing is designed to foster subjective feelings of being inside the action, a mental state that is frequently accompanied by “intense focus, loss of self, distorted time sense, effortless action.” Immersive environments can also induce a state of “flow,” causing individuals to lose any sense of the passage of time. **Immersive environments use augmented reality techniques to deliberately blur the lines between the real world and the virtual world,** making the experience even more compelling, intense, and realistic. In such an emotional environment, a teen is even less likely to recognize that the game or concert event is marketing for the reasons discussed above.

The same reasoning could be applied to adults, and to the use of immersive AR to sell virtually anything. *Some of the most active discussion on this blog has been on that very subject.* If the CDD makes any headway with this argument in fighting snack sales, who will use it next against some other use of AR? *”Immersion” is the sine qua non of AR. The CDD’s line of attack, if successful, could pose a potentially existential threat to a large portion of the AR industry as we know it.*

Of course, we don’t currently have reason to conclude that the people behind the Doritos Late Night campaign did anything wrong, or that the FTC will ultimately take any action on the matter. Any discussion of the merits of this particular dispute is necessarily one-sided at this point, because **we’ve only heard one side of the story.** People in the AR industry (many of whom, I’m honored to say, read this blog) could tick off a laundry list of ways that AR can **positively** impact the consumer experience.

But that won’t stop additional complaints from being filed.

**Take-Aways**

- AR is on the radar of consumer watchdog groups. *They see “immersive” as a code word for “deceptive.”*
- Any AR advertising campaign targeting teens or other groups that are arguably more vulnerable to suggestion should be particularly wary of attacks by such groups.
- **Be careful about how you describe your own campaigns!** The CDD’s complaint and website is chock full of quotes and excerpts from the Doritos advertisers’ own case studies. Be aware that someone may try to use your own words against you.
- Start making notes about **how your use of AR benefits consumers and the public.**
- Get legal advice about what constitutes “unfair and deceptive practices” while you’re designing your campaign, not after it’s over.
Acknowledgment: In preparing this post, I consulted one of my law partners, Attorney David Ettinger, who has extensive experience with FTC investigations. Many thanks for his useful insights into FTC procedure.

* * *

Beyond Doritos: How Else Might AR Be Called “Deceptive”?

Originally posted on November 15, 2011

As my readers are now well-aware, augmented reality marketing campaigns are now on the radar of consumer advocacy groups. Last month, four of these groups filed a complaint claiming that a Doritos campaign involving augmented “virtual concerts” was “too immersive” for teenagers to handle, and “deceptively” blurred the lines between advertising and entertainment.

Marketers should take heed of these claims. Regardless of their merit in the Doritos case, some other aggrieved party is likely to make them again in the future, over some other marketing campaign—because “immersiveness” is an essential quality of AR.

But no two cases are exactly the same, and some plaintiffs are more creative than others. Which raises the questions: in what other ways could an AR marketing claim be alleged to be “deceptive”? What causes of action might another plaintiff bring besides the Federal Trade Commission complaint lodged against Doritos?

I. False Advertising

One likely candidate is a lawsuit alleging “false advertising.” The federal Lanham Act (which is also the source of federal trademark law) defines false advertising as “any false designation of origin, false or misleading description of fact, or false or misleading representation of fact, which ... in commercial advertising or promotion, misrepresents the nature, characteristics, qualities, or geographic origin of his or her or another person’s goods, services, or commercial activities.”

In order to prevail, a plaintiff must prove that the defendant made a false or misleading statement of fact about a product or service, and that this statement was likely to influence a customer’s purchasing decisions. In reality, though, defendants responding to such complaints end up shouldering an expensive burden to show that their statements (or implications) were true and not misleading. Quite a few of these cases have been brought over the years. Prof. Rebecca Tushnet’s 43(B)log, one of the leading resources on this area of law, is up to nearly 900 entries under the “false advertising” category.

How might AR be used to “misrepresent the nature, characteristics, [or] qualities” of goods or services? To answer that question, let’s phrase it another way: how might representations made via AR get the facts wrong?

One obvious answer is “mistakenly.” AR remains an emerging technology with a lot of developing yet to do. And there are currently a lot more ideas about how to apply the technology than there is hardware capable of implementing those ideas. It may seem to the general public that the camera capabilities of smartphones and tablets are maturing rapidly, but to AR developers waiting for markerless object recognition, millimeter-precise GPS, and stereoscopic machine vision capabilities, they’re moving at a snail’s pace.
Consequently, some over-ambitious AR apps may try to convey or recognize more data than they're able to—resulting in blocky, choppy, imprecise output. (For example, the jerky floating boxes that characterize most location-based AR apps on Android devices.) Under the wrong set of circumstances, that might end up conveying information that is false and has a material impact on a consumer.

Another answer is “by cutting corners” or “over-polishing.” Take, for example, the incident this summer in which British regulators banned L’Oreal from running ads containing these two photos of Julia Roberts and Christy Turlington. L’Oreal’s marketers digitally enhanced both photos to the point that it could not prove to the regulators’ satisfaction that the advertised makeup products were able to produce results like the ones shown.

By definition, digitally enhancing physical reality is a fundamental element of what AR does. This type of situation, therefore is one that AR marketers could very easily get themselves into if they’re not careful (and if they don’t run their content by trained lawyers first.)

II. Business Defamation

Of course, more than just “marketers” should be concerned about making false statements of fact that injure another person or company. The law of defamation (a.k.a. libel or slander) provides a cause of action against anyone who publishes a demonstrably false statement of fact that injures another’s reputation. We usually think of this cause of action in terms of a slander against an individual’s reputation. But businesses can also bring defamation claims against those whose false statements injure the reputation of their products or services.

Therefore, augmented representations made of a product could potentially defame that product’s manufacturer, regardless of whether the augmented content was in an advertisement or some other context.

How might this scenario play out? As one example, take this excerpt from a short story about AR law published in 2007. (*) David, the protagonist, is an attorney in the near future bringing a defamation claim against a company for misrepresenting his client’s product in augmented space:

Wysiwyg—among the few manufacturing businesses left in the area—was David’s client. Its sales had dipped when the defendant, a competitor, issued press releases questioning Wysiwyg’s quality standards and business practices. David sued for defamation, and now sought to add an additional count based on his recent discovery that the defendant’s comments had been published in [augmented form] as well. ...

Predictably, [the competitor’s lawyer] stressed that the videos underlying the original complaint and their 3-D versions contained identical statements. He therefore argued that they collectively gave rise to only one cause of action under defamation law’s “single publication rule.”

“Concededly,” said David in response, “the virtual world is still a place where, from the law’s point of view, the streets have no name.... But publishing the statements in virtual form adds significant content that is also defamatory. For example, the speaker is seen holding a part allegedly from Wysiwyg. A virtual viewer can pause and examine that object in three dimensions, gaining a significantly poorer impression of my client’s workmanship. And someone wearing v-gloves . . . could even pick the thing up and examine it. Virtual actions, in this case, speak louder than words.”

Judge Darling stroked his chin and nodded. After a few additional questions, he granted David’s motion.
The story set this scene in the year 2022, but I’m willing to bet that we’ll see something like this happen well before then.

How about you? What potentials for deceptive or misleading speech do you see in augmented digisphere?

4. **INTELLECTUAL PROPERTY**

   **A. COPYRIGHT**

   **Does Augmenting Art Infringe Its Copyright?**

   *Originally posted on March 14, 2012*

   As I’ve written about before, artists and entrepreneurs have already found various creative ways to interact with physical artwork through augmented reality. The Public Art Project, for example, sponsored a campaign that allowed various artists to digitally superimpose their own messages on billboards and other commercial advertising. A related project recognized the face of a pirate captain in the poster for the movie *Pirates of the Caribbean 4*, and caused it to morph into the face of Lehman Brothers’ president—“the real pirate,” according to the artist.

   But how does copyright law apply to all of this? To my knowledge, no one has raised copyright objections to these specific examples, and I’m not suggesting that anyone should. But it’s an important question to consider now, because this sort of augmented substitution is only going to get more commonplace in the very near future.

   Let’s start by describing exactly what copyright does and does not protect. Any tangible work containing even a modicum of original, creative expression qualifies for copyright protection. That includes visual art, sculptural works, photos, movies, and the like. Section 106 of the U.S. Copyright Act gives authors the exclusive right to control five specific uses of their works: the rights to reproduce, distribute, publicly display, and publicly perform it, and to make derivative works of the original.

   In the specific factual context that we’re considering here—*i.e.*, using static, physical displays to trigger an augmented experience on a user’s mobile device—the rights of distribution, public display, and public performance don’t seem likely to come into play. The original work is already being displayed; the augmented content doesn’t change that, nor does it further distribute the image.

   How about the rights of reproduction and derivative works? Those issues are a little more nuanced. In the typical “augmented substitution” scenario, in which content on a mobile screen simply overlays or complements the existing work, no infringement is likely. That’s because the digital content isn’t actually doing anything to the original work. It’s not making a copy of or altering the original. Even though the physical display acts as a trigger for the digital content, and even though the user’s mobile device causes the digital content to appear as if it exists in the real world in place of the original, it doesn’t actually exist there. It’s an effective illusion for creating an immersive experience, but it’s an illusion nonetheless. The content stays on the mobile screen, where it is a separate digital work that exists apart from the physical display.

   But the question gets more complicated when the digital content actually makes the physical display appear to morph. That’s because, more likely than not, the AR software has already stored a copy of the original and altered versions of the physical work in its memory. In other words, the programmer may have created a reproduction and a derivative of the physical work long before anyone uses the program to interact with the physical artwork.
As an example consider this AR content called “Italicizing Mona Lisa.” It is designed to display on your phone as you hold it up to a physical version of the iconic painting, creating the illusion of animation in the painting:

In order to create the illusion of movement in the physical painting, the AR programmer first reproduced the artwork, then created a digital alteration of it. That doesn’t raise any copyright concerns here, because Mona Lisa has long since passed into the public domain. But artists who digitally copy and morph copyrighted works are taking a risk.

Of course, that isn’t the end of the analysis. A number of defenses could potentially apply in any given case, most notably the defense of fair use. But that’s a fact-specific defense that applies on a case-by-case basis. Certain legal principles may very well develop in the near future that apply generally to all AR uses of physical works (and I’ve certainly got my own ideas about what those principles should be, which I’d be happy to discuss with you offline), but exactly how that will play out remains to be seen.

What is certain is that using mobile devices to augment two-dimensional printed content is a business that’s getting a lot bigger, so these are issues that a lot of companies will be encountering very soon.

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**Augmented Reality Tattoos and Copyright Law**

Originally posted on May 8, 2011

Two completely unrelated stories broke in the past week that, when considered together, raise interesting questions for the augmented reality industry. (Just the sort of serendipity for which the blogosphere is designed!) The first was the news that the artist behind Mike Tyson’s facial tattoo had filed a copyright infringement suit against Warner Brothers for replicating the tattoo on one of the characters in the upcoming movie, “The Hangover Part 2.” And the guys at Freakonomics have opined that “he has a pretty good legal claim.”

Second came the widely circulated story about the guy who tattooed an AR card onto his wrist that, when viewed through the Nintendo 3DS, generates an AR image:

Of course, those who follow AR literature will recall that this is not the first time people have experimented with AR tattoos. All the way back in February, for example, ThinkAnApp created this animated dragon tattoo:

That video inspired Mashable to write of “the futuristic cyberpunk dream of putting on sunglasses to see people’s skin spring to life.” But what happens when such dreams crash into the reality of lawsuits like the one over Mike Tyson’s tattoo? Will copyright battles of the future be fought over what we put on our skin?

I think the answer is most assuredly “yes.” As I’ve explained before, U.S. copyright law applies to original works of creative expression that are fixed in a tangible medium. Virtually any type of graphic art (like Tyson’s tattoo), digital image (such as the images generated by the Nintendo 3DS), or digital animation (like the flying dragon tattoo above) is sufficiently creative to qualify. Skin is a “tangible medium,” as are the monitors, eyewear, or whatever other type of device on which the image is displayed.

The Copyright Act affords to the creators of such works five basic rights with respect to the copyrighted work—the rights to control its reproduction, adaptation, distribution, public display, and
public performance. Typically, as in the Mike Tyson case, a tattoo is a static work of graphical art, so the issue is whether it has been reproduced (on someone else) and put on public display. (The Freakonomics guys point out that there’s a pretty good “implied consent” defense to the public display argument, since the artist had to know that Tyson would go outdoors and occasionally be filmed.)

The issues are a little more complicated for AR tattoos. Rather than being limited to a finite set of skin-and-ink images, AR will allow people to wear a virtually limitless set of digital art and animations. Presumably, however, the copyrighted work in question won’t be the images that are actually inked onto the person’s skin, so there might not be any “reproduction” made of the copyrighted work. As in the examples above, all that’s perceptible to the unaided eye is a marker or QR code. It’s the act of viewing that code through an AR device that renders (and perhaps reproduces, depending on the circumstances) the digital image or animation. That might get the person wearing the tattoo off the hook for copyright infringement, and put the liability on the person using the AR viewer instead. On the other hand, the doctrine of “contributory infringement” exists for holding liable people who intentionally cause others to infringe copyrights; it could conceivably be available in circumstances like these.

(The contributory infringer, however, wouldn’t necessarily be the person who created or wore a tattoo. Markerless AR technology can, and will increasingly be able to, associate digital information with physical objects that were not specifically designed as AR placeholders. But that’s a topic for another day.)

Nor is it obvious that the image generated by an AR tattoo is being displayed or performed “publicly.” That’s especially true today, in 2011, when AR remains a rare, emerging technology, and AR images can be viewed only by webcams and smartphones, and then only in conjunction with a special program or website. So if the “3DS Guy” from the first video above walks down the street with his AR tattoo tomorrow, only someone who knew enough to approach him and ask to look at his wrist through a Nintendo 3DS would see anything other than a black rectangle with a question mark in it. Likewise, the flying dragon tattoo above only looks like a black square until the guy wearing it stands still long enough in front of a webcam connected to the right website.

Neither example seems like a terribly “public” display. When AR eyewear becomes ubiquitous, however, the equation will change radically. But whether, and under what circumstances, such displays and performances can fairly be considered “public” depend on developments that can scarcely be predicted at this point. Use of AR may even become so pervasive that making an image available to be viewed could, as with Tyson’s tattoo, create an “implied license” to “wear” the image publicly.

Whatever happens, the AR-infused world is guaranteed to get a lot more complicated—and interesting—from both a technological and legal viewpoint. Those who undertake to design that world would benefit from informed legal counsel from the earliest planning stages.

* * *

Projection Mapping, AR, and Architectural Copyrights

Originally posted on April 28, 2011

I have to admit: it took me awhile to “get” projection mapping. If you haven’t heard about it, “projection mapping” was defined by Mashable as “a relatively new technology that animates
stationary objects with 3D video.” I had seen references to this “new technology” in a few different places recently, and it appears to be all the rage. Still, it seemed to me an awful lot like projecting a video on a really big surface, which is hardly “new technology.”

Then I took a few minutes and actually watched some of the videos linked to these articles. Wow. Awesome. When done well, projection mapping creates the powerful illusion of a building actually coming to life and moving in three dimensions.

Now think about how prevalent this concept will be when augmented reality becomes widely available. I doubt that there will be many buildings that aren’t animated in one way or another. Unlike contemporary projection mapping, however, the effect will be superimposed by the user’s AR viewer, instead of light being physically projected onto the surface of the building. Those who design these experiences will no longer be limited to the actual physical dimensions of the brick-and-mortar edifice. Instead, you could find a building actually wrapping its (simulated) arms around you, or see (virtual) flames spewing from its windows, or any other effect one can imagine.

All of which leads a curious IP attorney to wonder: could any of this activity infringe the architectural copyrights of the person who designed the building?

First, a quick tutorial: U.S. copyright law applies to original works of creative expression that are fixed in a tangible medium. It affords to the creators of such works five basic rights with respect to the copyrighted work—the rights to control its reproduction, adaptation, distribution, public display, and public performance.

One type of creative expression in which copyright may inhere is an “architectural work”—i.e., “the design of a building as embodied in any tangible medium of expression, including a building, architectural plans, or drawings.” But Congress also recognized that allowing architects to fully enforce all five of these rights could cause all manner of logistical nightmares throughout society. So it pared back some of the protections available in architectural works. Specifically, Section 120 of the Copyright Act allows people to make, distribute, and display pictures of public buildings. It also lets the owners of a building alter or destroy the building, if they so choose, without needing to first get the architect’s permission. (Can you imagine if those exceptions didn’t exist?)

With these things in mind, let’s consider whether projection mapping impermissibly adapts (or, in copyright parlance, “creates a derivative work of”) the architectural work embodied in the building being projected upon.

The short answer, in my view, is “no.” With the caveat the outcome of any particular case depends on the specific facts at issue, I can’t imagine a realistic scenario in which projection mapping (as it’s currently done) would create an infringing derivative work. At least two reasons come to mind. First, nothing is actually being done to the architectural work (i.e., the building design) itself. Instead, the presentation involves two separate “works”—the building, and the video. Yes, the video is designed to take advantage of the unique design of the specific building that it’s being projected upon. Its effect would be far less impressive if it were projected onto any other surface. And that effect is meant to create the illusion that the building design is changing. But it’s only an illusion. No actual alteration to the architectural work ever occurs.

Second, even if a creative litigation attorney argued that simply creating the perception of a morphing building was enough to create a derivative of the building design, such an “alteration” should fall within Section 120’s exception. Although there is very little case law interpreting Section 120, one court accurately observed that “Section 120(b) does not expressly contain any limitation upon the manner or means by which a [building owner] may exercise his right to alter the structure.
Presumably, no such limitations were intended by Congress, else they would be expressed in [that section].” The one catch here is that, as written, this statutory exception allows only the “owner” of a building, not anyone else, to authorize an alteration to the building. So the projection mappers would need to have the owner’s permission; guerilla marketers would not have this statutory defense. Again, though, there would not appear to be any actual alteration made in the first place.

But would the result be the same if the illusion of an animated building were accomplished through AR smartphone/eyewear instead of an actual video presentation? Yes—for the most part. Whether the video image is actually projected on a building or only overlaid over the viewer’s perception via AR, there is still no alteration of the actual building occurring.

There is a potential catch, however, depending on how the AR effect is accomplished. If the data superimposed on the building consists solely of original imagery designed to overlay the building, that’s conceptually equivalent to existing projection mapping. But what if the AR designer copies the actual building design into virtual space, then alters that design, in order to create the end result?

That would complicate things from a copyright perspective. An architectural work can be embodied either in 2-D written drawings or in a 3-D manifestation. Making a copy of the design is infringement, unless an exception applies. Section 120 allows people to make “pictures, paintings, photographs, or other pictorial representations of the work.” A virtual recreation may very well fit that description. But the statute does not expressly allow the person who makes that pictorial representation to then alter the picture. Arguably, that could be creating a derivative work.

Even under those circumstances, potential defenses are available. For example, at least one court has found within Section 120 an implied right to copy and alter a building’s plans for the purpose of creating an owner-approved alteration to the building. Otherwise, the court reasoned, an architect hired by a homeowner to renovate a home would be forced to do so without the benefit of written plans—a dangerous prospect. A similar argument could be made in the AR space, depending on the purpose of the alteration. A different court, however, has disagreed that any such implied right to copy plans for the purpose of altering a building exists.

The fair use defense is also an option. But that is a very case-specific argument that depends on the facts at issue, so it’s never something that a potential infringer will want to rely on as the primary support for their actions. The safest route for someone designing an AR alteration of a copyrighted building design, therefore, is to get some informed legal advice before proceeding.

Bottom line: out of all of the legal issues that augmented reality designers are likely to encounter, copyright infringement for altering a user’s perception of a building is not likely to be among the most problematic. But the mere possibility that it could become an issue highlights the fact that, when it comes to avoiding legal liability, an ounce of prevention is worth a pound of cure.

**B. TRADEMARKS AND UNFAIR COMPETITION**

**A Distinctive Touch: Augmented Textures and Haptic Trademarks**

*Originally posted on July 21, 2011*

Soon, technologies that augment our sense of touch may lead to a rush of trademark applications seeking to protect a wide variety of artificial textures.
The Dawn of Haptic AR?

A few days back, the @Augmentology Twitter account pointed out the website of an interesting Helsinki-based company called Senseg. Senseg advertises its “E-Sense” technology as “a wholly new way of creating a sophisticated sensation of touch.” Specifically, it “makes use of an electro-sensory phenomenon that replicates the feeling of touch. As very tiny electrical charges pass into the tixel elements, the individual tixels generate a controlled electric field which extends several millimeters above the surface.”

“The resulting effect,” according to the website, is “a delicate, dynamic feedback that creates a range of sensations from vibration patterns and clicks to textures which run from rough to smooth and from sticky to slippery.” The “tixels” are 99% transparent, Senseg says, and can be applied to “virtually any surface,” from clothing fabric to glass.

Senseg’s ideas are fascinating, but they are certainly not the only players in the haptic (i.e., “of or relating to the sense of touch”) market. I have previously defined “augmented reality” (AR) as “technology that gives us more to see, smell, touch, taste, or hear in the physical world than we would otherwise get through our non-augmented faculties.” I’ve also observed (and other Quora readers agree) that AR technology will never be fully realized until users can reach out and touch virtual objects with haptic gloves. Therefore, I view haptic technology like this as a vital component of the AR industry.

One way this technology seems likely to (literally) get into the hands of consumers is, as Senseg’s website suggests, through retailers using haptic technology to further enhance the “feel” of their products. When that begins to happen, I believe we’ll witness a resurgence of interest in haptic trademarks. (Others have called these “tactile,” “texture,” or even “touch” marks, but I prefer the more definitionally sound and technologically consistent term “haptic.”)

A Primer on Haptic Trademarks

The law of trademarks and unfair competition aims to reduce the likelihood of confusion in the marketplace as to the source of particular goods. It does this by granting a seller of goods and services the right to use indicators of source to identify his wares, and to stop others from using indicators of source that are confusingly similar to his. An “indicator of source” is usually a logo, brand name, or slogan (e.g., the Golden Arches, the word “McDonald’s,” or “I’m Lovin’ It”). But the law doesn’t artificially limit retailers’ creativity in coming up with things that can indicate source. Therefore, we also have registered marks based on sound (e.g., the lion’s roar at the beginning of MGM films, or the tones at the end of an Intel commercial) and trade dress (i.e., the particular manner in which a product is packaged or a store is decorated).

The primary requirement for any of these things to serve as a trademark is that it be “distinctive” – in other words, that it can stand out as being associated with one, and only one, source of goods or services. The opposite of “distinctive” in this context is “generic,” i.e., typical of a wide range of products. That’s why McDonald’s can trademark the phrase “Big Mac,” but not the word “hamburger.” A mark can either be “inherently distinctive,” as in such invented words as “Kodak,” or it can be distinctive by having developed “secondary meaning” – i.e., that the mark has come to be associated with its source over time.

Less-conventional marks are often difficult to protect because they incorporate features that perform a function rather than advertise the source of the product. Functional aspects of a good cannot receive trademark protection.
Of the less-conventional trademarks, **haptic marks are perhaps the least common**. Those commentators who have broached the subject in recent years have only identified a handful of such federally registered marks. They include a registration by American Wholesale Wine & Spirits for “a velvet textured covering on the surface of a bottle of wine”—specifically, its Khvanchkara brand of wine. In the course of convincing the U.S. Patent and Trademark Office to register this mark, American Wholesale distinguished its “velvety covering” from that of the more iconic Crown Royal bag by noting that Khvanchkara is “tightly encased within the fabric,” and that the “FEEL of a LIMP bag is quite different from the FEEL of a TURGID velvety surface attached to a wine bottle.” Similarly, Touchdown Marketing has registered a trademark in the “pebble-grain texture” and “soft-touch feel” of its basketball-shaped cologne dispenser, and Fresh, Inc. has registered the “cotton-textured paper” that wraps its soap products.

Conceptually, a distinctive touch ought to be just as protectable by trademark law as any other unique indicator of source. Indeed, in 2006, the International Trademark Association (INTA) adopted “a resolution supporting the recognition and registration of ‘touch’ marks.” (pp.10-11) In practice, however, **it is very difficult to separate the way something feels with the function that texture performs**—and to come up with a texture that is truly “distinctive” of one product as opposed to other brands within the same category of products.

**Breaking the Connection Between Feel and Function**

That is where haptic AR technologies like the one proposed by Senseg and other companies comes in. The ability to coat the surface of any product with a transparent layer of “tixels” capable of mimicking any arbitrary texture the manufacturer chooses would finally break the connection between a product’s feel and the function it performs. Consider, for example, a **book cover that feels wet**, or a **plastic squirt gun that feels metallic**. There is no necessary correlation between what these products are, or what they do, and the way they feel. There should, therefore, be no conceptual barrier to those manufacturers seeking trademark protection in those textures.

Of course, **not every artificial texture will automatically be eligible for trademark protection**. Many haptic enhancements may still be chosen for functional reasons. The maker of an automotive steering wheel or a baseball, for example, might choose to make their products artificially sticky to enhance performance. A cell phone might be designed to get warmer in one’s pocket as it rings, in order to catch the user’s attention. And it could be that certain haptic enhancements still do not rise to the level of being sufficiently distinctive of a particular source to serve as a trademark.

Still, by promising the ability to manipulate the sensation of touch independent from other aspects of a product, haptic AR technologies open up a **new and exciting world** of trademark possibilities. Consumers may soon reach out and touch ... whatever retailers want them to.

**C. PATENT**

Think There’s No Hurry to Patent Your AR Inventions?

*Originally posted on October 4, 2011*

Think again.
For one thing, the United States recently changed its approach to determining patent priority. It used to be that even if someone else beat you to the punch in applying to register an invention, you could undo their patent by proving that you invented it first. No longer, thanks to the America Invents Act that President Obama signed into law on September 16, 2011. Starting in 2013, it will be the “first to file,” not the “first to invent,” who wins.

That, of course, is the system that Europe and virtually the entire rest of the world already uses.

For another thing, others are already patenting their augmented reality inventions.

The AR industry stood up and took notice a few months ago when Apple filed these AR-related patent applications for the iPad:

[U.S. Patent App. 20110164163 (July 7, 2011)]

But AR has been in the process of “emerging” for years now—plenty long enough for all sorts of companies and inventors to get their ideas registered. Here are just a few examples culled from the public patent records:

[FIGURE 16]
FIG. 19

U.S. Patent No. 6,297,853 B1

U.S. Patent No. 5,742,521
But AR has been in the process of “emerging” for years now—plenty long enough for all sorts of companies and inventors to get their ideas registered. Here are just a few examples culled from the public patent records:

These are just a few of the more visually interesting registrations and applications on file. As of Dec. 10, 2011, a search for “augmented reality” in the Google Patents search engine on returned “about 11,100 hits.”

There is, of course, still plenty of room for innovation in the augmented reality field. Just not quite as much room as some might assume.

And as anyone reading the tech headlines lately knows, patent litigation is all the rage nowadays. Anyone and everyone with a patent, it seems, is suing or being sued by a competitor with a similar patent or product. Especially with respect to smartphones and tablets—precisely the platforms on which consumer AR is just starting to take off.

If you’re serious about succeeding with your AR business plan—and especially if you hope to attract investors—it would be well worth your time to research the existing patent landscape in your field, and get your patent application on file as soon as reasonably possible. You owe it to yourself to at least consult a patent attorney.

Soon.
D. Right of Publicity
(see the article below)

5. Privacy

Forget Facial Recognition—
Body Recognition May Be the Real Privacy Concern
Originally posted on April 24, 2011

Take a picture; it’ll last longer.” Many times has that bit of sarcasm been directed at people who stare just a little too long. But suppose the guy is staring because he’s taking your picture?

That creepy scenario may play itself out sooner than we think. While many commentators are (rightly) concerned about the ramifications of technology that identifies us by our facial features, devices that can map our bodies in three dimensions and track every gesture in real time are already flooding our living rooms. The Microsoft Kinect is just the first of what will surely be many types of devices with this ability.

Such advanced mechanical vision is a necessary precursor to a world with fully interactive augmented reality applications. It won’t be long until we have AR eyewear with the same (and even better) ability to perceive and record three-dimensional objects. (Call this 3-dimensional video, or—if can I coin a term—"3deo.")

But we don’t need to wait for AR eyewear to see some of the consequences of ubiquitous 3deo. All sorts of people have already hacked the Kinect to do some pretty amazing things. Kinects didn’t even exist a year ago. How much more quickly, and with much higher resolution, will this sort of thing be done five years from now? A long glance by someone wearing 3deo-equipped AR eyewear may be all it takes to record a high-resolution image of your entire body as you walk past them on the sidewalk.

Would that be legal? In the US, under today’s laws, the answer is very probably “yes.” (The reaction that Google Street View has gotten in Europe suggests that privacy laws in those countries may take a dimmer view of the practice.) There is no expectation of privacy that prevents anyone from taking your photograph in open, public places. The liberties of free speech and newsgathering inherent in the First Amendment to the US Constitution make it nearly impossible to legally prohibit such conduct. The same rules would apply to 3-dimensional photography or video.

Nor would copyright law stand in the way. US copyright law protects original works of creative expression. The courts are quite clear, though, that replicating in a different medium (including 3-D digital models) something that already exists doesn’t qualify as original expression. As this article ably explains, that means that replicating an actual human body in digital space would not create a copyrightable work.

Legal remedies may exist, however, depending on what someone does with their digital recreation of you. The number of potential uses are as broad as the imagination, and many of them may not be objectionable at all. Imagine a “Mii” avatar that looked exactly like you, for instance.
But human nature being what it is, there’s one obvious way that someone’s digital image could be misused: porn. Cell phones and the internet have already made it far too common for naked pictures—whether genuine or Photoshopped—to be distributed online without the depicted person’s consent. The personal and social consequences for the victim can be devastating.

But what if it were just as easy to digitally render your entire body in three dimensions as it currently is to snap a photo? The cell phone "sexting" phenomenon is already bad enough; teens with 3deo-capable phones are going to get themselves into even worse situations than they do now. But you wouldn’t necessarily even have to be naked for someone to make such a rendering. Body scanners at the airport already see through our clothes; perhaps smaller devices will do the same in the future. And even without that ability, could it be that difficult for a computer to discern the shape of our bodies based on how our clothes fall over them—at least accurately enough to satisfy the peeper’s deviant purposes?

The porn industry is already investing heavily in AR, and for a time, it may take well-financed companies to generate AR content that people will pay for. But not for long. Like the internet before it, AR technology will soon be cheap and accessible enough for anyone to make and publish their own content—especially when gathering “source material” becomes as easy as people watching. Once someone has your 3D digital image, there’ll be nothing to stop them from animating it any way they like.

(Should we take this already-disturbing hypothetical one horrible step further? As Joe Rampolla (a law enforcement officer and consultant specializing in cybercrime, and one of the first people to publicly address the law enforcement aspects of AR) says, “wherever society finds pornography, child pornography is not too far behind.” Imagining how perpetrators of child pornography might put this technology to use is not a pleasant thought to dwell on.)

**What legal avenues might be available** to combat unconsented-to uses of a person’s 3D image? When it comes to the perverse misuse of minors’ images, the answer is simple: it’s a crime that law enforcement battles every day, and they will continue to do so in the AR context. Even as to adults, we may need tougher criminal laws if pornographic misuses of peoples’ likenesses becomes rampant.

Civil law offers some options as well. Two of them stem from the common law right of privacy. There are four traditional causes of action for invasion of privacy. One is called “intrusion into seclusion.” As one California court explained, this claim is “the one that best captures the common understanding of an ‘invasion of privacy.’ It encompasses unconsented to physical intrusion into the home, hospital room or other place the privacy of which is legally recognized, as well as unwarranted sensory intrusions such as eavesdropping, wiretapping, and visual or photographic spying.” To succeed on the claim, one must prove “(1) intrusion into a private place, conversation or matter, (2) in a manner highly offensive to a reasonable person.”

Without doubt, using 3deo technology to peer through one’s clothes and create a nude digital rendering would qualify as an “unwarranted sensory intrusion.” But the claim seems less likely to succeed if the image remained clothed; in that case, nothing secret has been intruded upon.

Another type of privacy invasion is called “misappropriation of likeness,” which is exactly what it sounds like—a cause of action for misusing a person’s image, name, face, or other identifying characteristic. Also called the “right of publicity,” this body of law has evolved so much that one leading treatise considers it an economic tort rather than an issue of privacy. That’s because, in order to prevail on this claim, one generally has to prove that their image has “commercial value” and has been used for commercial purposes (although the details of this claim vary significantly from state to state.)
state.) Using it in a creative, expressive, noncommercial way typically falls within the zone of free speech protected by the First Amendment.

For example, in 2003, Kieren Kirby (vocalist for the 90s band Dee-Lite) sued Sega for violating her right of publicity—and lost. The video game character “Ulala” clearly bore a strong resemblance to Kirby (not to mention that “Ooo la la” was one of Kirby’s signature lyrics). But the court found that Sega had sufficiently “transformed” Kirby’s image, such that Ulala was new, creative expression. In other words, while Kirby’s likeness may have served as raw material or inspiration for the character, the game creators tweaked that image enough to make it no longer Kirby’s. Therefore, even if someone copied your 3-dimensional figure without your knowledge and consent and used it as a starting point for a digital character, they too may escape the right of publicity’s reach.

When it comes to sexually themed uses of a person’s likeness, however, several courts have used the right of publicity to put a stop to it. For example, when a video of a popular television news anchor dancing in a wet t-shirt contest found its way online, a federal court in Ohio ordered the video taken down because it violated the anchor’s right of publicity—her right to control the commercial exploitation of her likeness. Bret Michaels and Pamela Anderson won a lawsuit to block publication of their sex tape on similar grounds. And more recently, Kim Kardashian argued that a sex doll bearing a striking resemblance to her violated her right of publicity. Anyone who found their 3D image being put to similar use in AR space would have a strong (though far from guaranteed) chance of success.

Depending on the circumstances, other legal theories might apply as well, including the tort of intentional infliction of emotional distress. Non-legal countermeasures may also become available. Perhaps the fashion world will respond by developing clothes that throw off recording devices, much like the checkered camouflage wraps that the auto companies use to shield prototype cars from the paparazzi (not an uncommon sight here in Detroit).

The point, however, is that we need to start thinking through the ramifications (legal, societal, and otherwise) of technology that is able to quickly and accurately create 3-dimensional models of our bodies—because it’s already here.

In the meantime, if you happen to find someone staring at you in the future ... think twice before inviting them to take a picture.

* * *

Stealing a Glance: Eye Tracking, AR, & Privacy

Originally posted on February 22, 2012

The science of tracking eye movements to determine what draws our interest has been around for more than a century. Retailers, product designers, and advertisers use it to figure out how to grab consumers’ attention. Website designers use it when deciding how to lay our content on a page.

But augmented reality eyewear is likely to elevate this psychological curiosity into a full-fledged privacy battleground, for several reasons.

First, unlike virtually any technology that already exists, truly immersive AR depends on knowing exactly what our eyes are looking at. This data will be absolutely indispensable in order for the eyewear to do its job. So it seems inevitable that such devices will collect eye-tracking information, in one form or another.
Second, the information itself has great commercial value. Just like with today’s technologies, any provider of augmented digital content will be eager for hard data on how effective and engaging their content is for consumers. So the temptation to collect and monetize it will prove too tempting for many service providers to resist.

Third, the public’s reaction to internet browser cookies and spyware over the past two decades strongly suggests that consumers will also react negatively to companies archiving their browsing activities in augmented space. Much of the online tracking that goes on today is quite lawful. Regardless, a large segment of the population reacts negatively to the idea that someone else knows what they’ve done online. We see this in the demand for private browsing and the persistent calls for more privacy regulation in the US and Europe. The resulting patchwork quilt of privacy laws and regulations across multiple jurisdictions already leaves many service providers confused about what information they can and cannot collect, and it’s bound to get only more complicated.

Fourth, augmented “browsing” will be an order of magnitude more personal of an experience than is typing words on a keyboard or scrolling through a display on a monitor. It’s one thing for a computer to be logging the addresses of websites you visit. It will be another thing entirely for there to be an electronic record of everything you physically look at. But that’s exactly the type of information that “browser” software inside augmented eyewear will collect. Integrating our digital experience with our immediate physical surroundings is intended to make that experience feel more immersive—more real. But such an “immersive” experience will necessarily feel more personal as well. And the more intimately users experience something, the more deeply they are likely to feel a sense of invasion when someone else intrudes on that experience.

Of course, this viewpoint is just one side of the equation. Augmented browsing software will undoubtedly come with terms of use, click-wrap contracts, and end user license agreements very similar to the ones governing internet browsing and digital content today. There will likely be some level of disclosure—either voluntarily or by legal mandate—that users’ visual experiences are being recorded. And to some extent, we will want augmented browsers to track our eye movements, in order to continuously improve the software’s performance.

Also just like today, however, no matter how many licenses and disclosures are in place, some users will still allege that their privacy is being invaded. This article isn’t intended to suggest where the AR privacy lines should be drawn—only that fights over those lines are inevitable.

Perhaps by then, the fallout of the internet privacy wars will have resulted in some degree of consensus or regulatory brightlines defining what information is and is not private. But if lawmakers are going to clarify privacy principles for the augmented age, they’d better hurry—because mass-market AR eyewear and software are just around the corner.

In the meantime, those companies currently developing this technology would do well to think through the related privacy issues, and have well-defined privacy policies in place from Day One.
6. NEGLIGENCE & PERSONAL INJURY

A. NEGLIGENCE

Augmented Reality Games and Physical Injury

Originally posted on April 17, 2011

I love games. Especially the type that really engage your mind and force you to solve problems creatively. By all indications, I’m not alone. The video game reportedly made $10.5 billion in 2009 alone. At one point, the company behind the ubiquitous Facebook games Farmville and Mafia Wars was valued at $5 billion.

So you can bet that games will be among the first commercially successful augmented reality applications. Indeed, it has been persuasively argued elsewhere that it will be games that take AR into the mainstream.

But designers of AR games have something to worry about that the console-based gaming companies never really did: physical injury. The YouTube trailer for The Witness, billed as “The First Movie in the Outernet, illustrates my point.

(Before I go further, here’s a disclaimer: I don’t know anything about The Witness beyond what’s in this (fascinating) trailer, and I’m sure there’s much more to it. So this post isn’t directed at The Witness specifically—only the questions raised by the trailer that the AR gaming industry should consider.)

As the trailer itself admits, The Witness is much more like mobile version of an online role-playing / mystery game than like anything we’d currently think of as a “movie.” Using AR-equipped video phones, players roam the physical world “collecting data” and “communicating with other players.” Like a walking, talking version of a Choose Your Own Adventure book, the game directs players to different locations based on the choices they make—eventually solving the mystery, or else meeting one of a variety of alternate endings to the story.

But unlike someone playing the console-based Legend of Zelda or the board game Clue, a player of The Witness faces potential dangers in the real world as well. The trailer above shows players in seedy hotels and bars, a disheveled office, climbing stairs in a parking garage during winter, and scurrying through an abandoned warehouse—complete with barking guard dogs—in order to collect the clues necessary to “stay in the game.”

Sure, these scenes are probably amped up for dramatic effect. And there are likely safety measures in place that the trailer doesn’t mention. But don’t they just they just scream with the potential for personal injury? One scene shows a player scanning a room with his phone, looking for clues. What if he gets distracted and trips over something? Will the guard dogs always be there, and if so, will there be a staff member there 24/7 to make sure they don’t bite anyone? Suppose a player gets mugged in one of these abandoned buildings, or falls on poorly-maintained stairs? The possible scenarios for injury multiply with every new setting.

The nature of the gaming experience can amplify that risk. The Witness says that players will need to “overcome their fear,” as “the borders between reality and fiction dissolve completely.” All of which makes the game that much more engaging and enjoyable; suspension of disbelief and an immersive experience are what every good storyteller aims for. But when you’re walking around in the real world, you rely on those “borders between reality and fiction” to avoid hurting yourself.
We don’t need to wait for mainstream AR gaming to see how courts might apportion liability for game-related injuries. Consider the 2000 decision of the Washington Court of Appeals in *Anderson v. American Restaurant Group*. Plaintiff Anderson “suffered injuries when she slipped and fell while running across the bathroom floor at the Black Angus restaurant in Bellevue to retrieve a piece of toilet paper for a restaurant-sponsored scavenger hunt.” Even though a wet bathroom floor is the type of dangerous condition that one might expect to be obvious, the appeals court reversed the trial court’s judgment in favor of the restaurant. “[A] jury could conclude,” the court explained, “that Black Angus should have expected that patrons darting into the bathroom would not discover or realize the danger of a wet floor because they would be focused elsewhere and in a hurry.”

In a similar vein—but with much more severe consequences—is the case of Bob Lord. He was an internet entrepreneur and first-time player of “The Game”—a private, invitation-only, immersive role-playing game remarkably similar to the Michael Douglas movie of the same name. As summarized in this *Seattle Times* article, “The Game” was an annual “adventure scavenger hunt” in which adult players “would scuba dive, rock climb, sing karaoke with a drag queen and fire automatic weapons ... decode the Declaration of Independence inside a prison and befriend a white rat named Templeton, whose shivering little body carried a message.”

The 2002 version of The Game also involved searching for particular GPS coordinates inside “the Argentena Mine complex, a warren of abandoned openings left over from a 1927 silver-mining operation.” Lord had gotten little sleep over the 28 hours before the time he entered the mines. Confused by the Game’s ambiguous directions, he entered the wrong shaft, and fell 30 feet head-first, crushing his vertebrae and becoming a C3 quadriplegic for the rest of his life. When Lord’s family discovered that the Game planners had been warned about mine’s dangers beforehand, Lord sued them, and eventually settled for $10.6 million.

The typical AR game of the near future will almost certainly not involve circumstances as dangerous as those in The Game. But as the *Anderson* case demonstrates, even a condition as mundane and obvious as a wet bathroom floor can become a source of potential liability when game players are sent out into the physical world hunting for clues and competing against other players under short deadlines. AR game designers must take these risks into account when creating their fictional experiences. Although it may present frustrations on a creative level, designers must take all due care not to sacrifice gamers’ physical safety for the sake of an immersive gaming experience.

* * *

**Google Maps Shows the Path to Avoiding Liability for User Injuries**

*Originally posted on July 15, 2011*

Why did Lauren Rosenberg cross the road? Probably not for the purpose of creating case law that will help shield publishers in augmented, social, and other digital media from liability when users of those media hurt themselves. But that’s exactly what she accomplished.

Ms. Rosenberg is a Utah resident. One day she found herself wanting to walk somewhere, so she typed her destination into Google Maps. The results she got back included crossing Deer Valley Drive, a “rural highway with heavy traffic and no sidewalks.” Rosenberg dutifully followed those directions, and wound up being struck by a negligent driver. She sued the driver, but also sued Google for giving her such allegedly dangerous instructions.

**Google won handily**, persuading Utah District Court Judge Deno G. Himonas to dismiss the case as a matter of law. In order for Google to have been liable to Rosenberg for negligence, it must first have owed her some kind of duty. (“Duty“ is a fundamental concept in negligence law; if you don’t
owe someone any duty, then you can’t be negligent in how you perform that duty.) The court found that Google had no duty to ensure that Rosenberg would remain safe while following its directions, and no duty to warn her of dangers along the way, such as that Deer Valley Drive has no sidewalks.

The court’s reasons for its conclusions apply to a far broader range of digital media than Google Maps alone. For example, the court relied on decades of legal precedent holding that mass-market book publishers owe no duty to their readers to ensure that all content in their books is accurate. No less than the U.S. Supreme Court has acknowledged that errors are “inevitable” in the publishing business. Many courts have recognized that holding publishers liable for all injuries that any reader may incur while following imperfect published instructions would be incredibly onerous and create a nearly insurmountable disincentive to publishing anything at all.

Rosenberg tried to distinguish these well-established legal principles by arguing that Google was not a mass-market publisher, but rather a service provider that she relied on to provide one-on-one advice. (Negligence law does often impose on such individualized service providers a higher responsibility to get it right.) After all, Google provided her customized directions base on her specific location and the destination that she typed in.

But the court saw through this argument. It recognized that just because people use Google Maps one at a time does not make the database any less of a mass-market publication:

To claim that Google provided the information only to one individual, and therefore is not entitled to the protections afforded to publishers, ignores the realities of modern society and technology. As Google notes, [Rosenberg’s] Complaint itself states that the information provided on the Google Maps service “is readily available via the internet,” ... and any individual who enters the same starting and ending points will obtain the same walking directions that were provided to Rosenberg. ... Given these facts, it is difficult to imagine that information could be disseminated more broadly to the public. Therefore, Google is clearly a publisher because it makes all of the information on the Google Maps service available to the public worldwide, and the fact that a user of the Google Maps service obtains customized search results does not remove the protections afforded to any other publisher of information to the public. (Pp.7-8).

This may seem like a no-brainer for regular users of online apps and services like Google Maps, but it’s never a guarantee that everyday common sense will translate into governing legal principles, especially as applied to rapidly evolving digital technologies. And if other courts follow Judge Himonas’ lead, the result will be strong legal protections for a whole host of internet-enabled services—from other mapping programs like Bing Maps and Mapquest, to social review and advice sites such as Facebook, Yelp!, and Foursquare, to knowledge-aggregation sites like Quora and Wikipedia, to the exploding number of cutting-edge guiding and experience-enhancement services in the augmented reality industry, such as Layar, Tagwhat, and daqri.

Judge Himonas also explained why it makes good public policy sense to give such broad protection to publishers, whether in digital or any other media. First, as a matter of principle, ours is a society that has always placed a high priority on the free flow of information and the unfettered exchange of ideas. This principle is enshrined in the First Amendment to the U.S. Constitution, and motivates a wide range of legal protections against legal liability based on speech, whether oral or written.

Second, users are ultimately the ones most responsible for their own safety. Just because Google tries to make its maps customizable, accessible, and accurate does not relieve users of the responsibility of looking both ways before crossing the street. Indeed, even without having had a full trial to develop all the facts in this case, Judge Himonas was comfortable in speculating that Rosenberg’s own negligence was the most likely cause of her injuries:
It is unlikely that a pedestrian will be injured while crossing a road, as Rosenberg was here, unless the pedestrian breaches their own duty and disregards the risks to cross the road in front of oncoming traffic.... Google was not required to anticipate that a user of the Google Maps service would cross the road without looking for cars. [Pp. 5-6]

Besides, as the court also noted, the user will always be in the best position to apply internet-provided data to real-world conditions. "Google provided the walking directions from a remote location, while Rosenberg was actually on the scene where she could assess the safety risks before attempting to cross [the road]." This just makes sense. Google Maps’ driving directions have never told me to stop at red lights or avoid things that jump out in front of my car, but I can’t blame Google if I fail to do those things.

But one has to wonder how far this principle will go. At what point will digital information become so inherently trustworthy, and so tied to the user’s real-life, physical surroundings, that the provider of that information should be held responsible for not anticipating or reacting to those conditions? That certainly seems unlikely to happen anytime soon. Even the AR apps currently on the market continue to use standard digital text, photo, and audiovisual content; they just display that content in a way that superimposes it on a video feed of physical surroundings, or by using certain physical features to trigger that content. But existing mechanical vision hardware is still too primitive to perceive and adapt to physical surroundings in any meaningful or reliable way.

Ironically enough, Google itself may someday be the first company to create programs that individuals rely on to react to their surroundings, if Google’s self-driving cars ever become commercially available.

Meanwhile, though, services like Google Maps (and thousands of other internet-enabled apps) have “high social utility” (in Judge Himonas’ words), as demonstrated by our ever-increasing reliance on them in everyday life. Courts, therefore, must be exceedingly cautious not to impose overly burdensome legal duties that dissuade innovators from developing and improving these technologies. Otherwise, the people of the world who don’t look both ways before crossing the street may deprive the rest of us of valuable, life-enhancing digital tools.

**B. AUTOMOTIVE**

No Augmenting Reality While Driving?

*Originally posted on May 12, 2011*

A recent article in MIT’s Technology Review raises several, very practical questions about how the daily use of augmented reality eyewear will affect us. I want to focus here on just one of the issues it raises—the risks of driving while augmenting.

Driver distraction is already widely recognized as an epidemic. Simply talking on your cell phone while driving used to get people up in arms, and it’s still restricted in some areas. But now those who text while driving are the new pariahs. And not without reason. Multiple mass transit disasters and notable deaths have been blamed on texting. Some studies show that texting while driving is more dangerous than driving drunk. Yet large percentages of drivers can’t help but continue to do it.

My home state of Michigan recently became one of several jurisdictions to ban the practice as a primary offense. The Detroit suburb of Troy went one step further to prohibit not only texting and calling, but also “any other activity that can distract a driver and affect their ability to safely operate the vehicle. Activities under this classification include, but are not limited to, eating, grooming,
reading, writing, or any other activity that prevents someone from having control of the vehicle with at least one hand on the wheel."

How would AR devices measure up by these standards? For starters, it seems clear that using an AR app (or any other app, for that matter) on your smartphone while driving is the functional equivalent of texting. You may not be inputting information into the phone, but you've still got your eyes on it rather than the road.

This is only slightly less true if you're a driver peering through your smartphone to augment the view directly ahead of you—say, by checking out the Yelp reviews of places you're driving past, as in this photo. It may be the digital equivalent of looking at signs, a map, or a billboard while you drive, which can be distracting but not illegal (except maybe in Troy). But the app doesn't know you're driving, and can put an awful lot of information between you and what's in front of you.

What about smartphone apps that are designed to be used while driving? Well, just because someone wants you to use it behind the wheel doesn’t make it a good idea. Take this “Augmented Driving” iPhone app, for example. Apparently, it “detects your lane and other vehicles in front of you and provides useful information for your driving situation,” but only “in good lighting conditions during daytime for visible lane markings on highways and country roads and for detection of regular cars. For operation, a fix mount is required.”

But suppose I encounter an “irregular” car on a partly cloudy day? Or I want to see a wider view than what’s visible through my front-mounted, 3.5” screen? Maybe there’s more to this app that I’m not getting, but holding up or mounting your phone so it can see the cars in front of you sure doesn’t strike me as a safe way to drive.

That leaves non-smartphone AR apps that are designed for driving and that truly augment—rather than unsafely minimize or obstruct—the driver’s view. I’ll be honest; I’ve dreamed for years of having an app like that. A Heads-Up display that operates in true Terminator/Robocop fashion, overlaying helpful directions, GPS data, and other wayfinding tools on the world I see through my windshield in an efficient, minimalist manner. That would be groundbreaking.

So it was with no small measure of excitement that I read about Pioneer Japan’s plan to release what is ostensibly the world’s first in-car, AR navigation system.

These pictures portray (almost) exactly what I’ve wished for. You’ll see “targeting” icons that encircle and identify other vehicles without obstructing them, and direction arrows that appear to hover over the intersection in real time and in three dimensions. Unfortunately, it sounds as if the images will be displayed in a dash-mounted video display, rather than over the driver’s actual point of view. So you still have to take your eyes off the road to look at it. Still, that is no more distracting than the GPS guidance systems already available in many vehicles and smartphones, so it poses no apparent legal difficulty (as long as you don’t groom yourself while looking at it in Troy.)

But what happens when my dream of a truly AR navigation system (projected either through eyewear or an augmented windshield) becomes a reality? Finally, drivers will have access to digital wayfinding data without taking their hands off the wheel or their eyes off the road. But will even that necessarily be safe?

The MIT article gives reason to think that AR eyewear may not be; at least, not for all users, and not if the system is poorly designed. Ubiquitous digital information floating around our field of view is bound to have a range of physiological effects on AR users. For some, it may be no more than a minor contributor to ADD; for others, it may be like watching The Blair Witch Project on a queasy
stomach. “Mixing fixed elements into a dynamic real environment could ... lead to ‘simulator sickness’ in some users,” the MIT article reports. This “extra load to our visual processing” could simply be too much for some drivers to handle.

According to the study that this article reports on, the fact that digital data in our peripheral vision remains stationary while the world in front of us moves—kind of like the opposite of reading in the car—could be one factor causing these physical reactions. On the other hand, “the eye rapidly ‘accommodates’ to an image at a fixed location on the retina, rendering it invisible. Keeping interface elements visible could require jiggling them subtly, which might lead to further visual confusion as the user’s brain interprets such movement as movement of their real-world surroundings.”

In other words, using AR headsets while driving creates a potential for causing distraction, no matter how the data is projected. This will pose challenges, but that doesn’t mean that clever AR designers won’t find a way to safely enhance the driving experience.

Indeed, as reported by Mashable, at least one auto company is already working on a very promising enhanced vision system that could “improve safety and advance knowledge behind the wheel, visually identifying important objects in physical space like road signs and the edges of the road you’re on in conditions of poor visibility . . . [and] even bring [in] GPS functions . . . by outlining the exact building you’re going to.” Rather than relying on eyewear, this “HUD windshield uses night vision, navigation and camera-based sensors to gather data relevant to your surroundings as you drive, and ultraviolet lasers project corresponding images onto the windshield surface.”

News like that is enough to give hope that AR could be improving our driving experience in a meaningful way soon. Who knows—in the not-too-distant future, AR windshield systems like this might even be required by law, just like seat belts and scores of other safety features are today.

* * *

**Augmenting Automotive Safety**

*Originally posted on May 27, 2011*

Using AR to make the driving experience safer seems to be a hot idea right now. In his keynote speech at the recent Augmented Reality Event (ARE2011) Conference, Jaron Lanier of Microsoft stressed that automobile injuries are at an unacceptably high level—and that AR can help. My recent post examined the opposite side of the coin, analyzing various AR apps through the lens of current driver distraction laws and asking whether they would actually decrease automotive safety.

At least one technology that I discussed, however, stood out as having a real potential to make driving safer—the **AR windshield**. “Such a system,” reports Mashable, “can improve safety and advance knowledge behind the wheel, visually identifying important objects in physical space like road signs and the edges of the road you’re on in conditions of poor visibility.” And just this past week, Layar’s blog pointed out Autoglass(R) 2020 Vision, “another entrant in the ‘AR windshield’ concept market”:

I ended my prior post by wondering whether hardware like this would improve auto safety so much that it would someday be required, like seat belts and air bags are now. That, and Jaron’s comments, got me thinking about some other positive ways that AR can improve driver safety.

**Transparent walls.** Layar also recently reminded us of this older video (from January 2010) from New Scientist, which demonstrates how a network of cameras synced with an AR windshield could allow drivers to literally see through walls, and thus spots potential dangers lurking around corners:
A system that worked as smoothly as the concept depicted here would certainly be a boon to driver safety, especially in urban settings with lots of blind corners. But how long will it be before the technology is that seamless? Latency and off-kilter images would make the service not only less useful, but also potentially distracting. It would also take quite an investment (of presumably public money) to get a network of cameras installed and to keep them properly aligned.

Traffic lights? Why not traffic walls? Today’s traffic lights are dots of colored light that appear relatively tiny from a driver’s perspective, and are easily obscured by direct sunlight, rain, and obstructions. But the mechanical systems required to create those “tiny” lights are actually huge, and quite expensive. One local news source recently ran a story about the $450,000 price tag that came with a single new traffic light. “The reason a single traffic light costs so much,” the article explained, “is due to the cost of the hardware. Each traffic signal must be custom made. In addition, the cost of steel used to support the lights and the traffic signals themselves have gone up dramatically in recent years.”

When the signals are virtual, however, there are no mechanical or financial constraints on their size. Instead of looking up to find the little dot of light in the sky, a driver viewing an upcoming intersection through an AR windshield could just as easily see a giant red wall stretching across the entire road—translucent enough not to obscure physical objects behind it, but visible enough to make it impossible to miss.

Floating, virtual roadsigns. Why stop at traffic signals? All roadsigns could easily be augmented just as well, and made to float right at eye-level for easy viewing. A “right-hand turn only” sign, for example, suddenly becomes a curved arrow floating in space, rather than a roadside sign or words painted on the asphalt that become blocked by other cars. The same could be done for every one of the messages currently displayed by metal rectangles on poles. So long as this is done in an efficient manner that aids the driver rather than cluttering her view, safety should noticeably improve.

A system of AR roadsigns could also have a wealth of collateral benefits beyond driver assistance. The most obvious is reducing government spending; virtual roadsigns would cost a whole lot less than tangible ones—after the network needed to project them was in place. (And creating that infrastructure would be no mean feat; it would have to be widespread, reliable, and universally adopted before physical signs could be done away with, so this is a long-term vision.) A less tangible, but perhaps more impactful result would be the beautification of our roadways—especially if physical billboards were also replaced by virtual advertisements, a la Minority Report. Imagine if residents, pedestrians, passengers—everyone except the AR-equipped driver—could enjoy the scenic natural beauty alongside the road, unobstructed by a sea of signage?

Virtual Directions. This option overlaps the AR windshield concept a bit, but may be available before that type of hardware hits the market. I’ve already mentioned the Virtual Cable from MVS – an AR navigation system that was on display at ARE2011: The appeal of this solution is its simplicity—a thin red line that’s easy to follow and doesn’t obstruct your view. And it works through a heads-up display projected onto a “dumb” windshield, rather than requiring a more advanced, “smart” windshield with sensors that perceive the road ahead. Something like this may be the next evolution in navigation aids.

Virtual Speed Displays. AR could be a boon to traffic cops as well. At least one U.S. court has already upheld the secret installation by law enforcement of GPS beacons that track a vehicle’s movement. The smarter our cars get, the more likely it will be that they’ll have GPS devices of their own built in. Add AR to the mix, and it’s a short step into a world where traffic cops come equipped with radar guns that display the speed at which a vehicle is traveling directly above the vehicle itself. (Of course, by that point, we may not need police officers to hand out the tickets at all; our speeds would be automatically monitored by a central system that churns out tickets automatically.)
Virtual speed displays could also benefit drivers. It’s not always easy to immediately tell, for example, how quickly a car ahead of you is decelerating. Someone slamming on their brakes might trigger an accentuated warning of some kind to other drivers.

**AR-Equipped Auto Repair.** ARE2011 was flush with examples of companies using AR to assist mechanics and workmen with the assembly and repair of mechanical devices. It may not be long before an auto manufacturer adopts—or the National Highway Traffic Safety Administration or other government body prescribes—a uniform system of markers painted onto auto parts, to allow AR eyewear-equipped mechanics to more easily diagnose and repair automobiles. These are some of the ideas I have on this topic after getting the chance to mingle with the leading innovators in the AR field. Do you have other ideas? How else might AR make our most common, and most deadly, form of motor transportation a little safer?

### 7. **Politics & Civil Society**

**AR Addiction: Could Augmented Reality Get Too Immersive?**

*Originally posted on August 9, 2011*

Can you be trusted to design your own reality?

**Immersed in the Digital World**

Augmented Reality technology is all about customizing the world around us. Through video-enabled smartphone and tablet apps, and soon directly through eyewear, it overlays digital data over our perception of the physical world. The virtual world gets layered directly on top of the real one.

A key buzzword within the AR industry is “immersive.” Immersiveness is a measure of how seamless the integration is between virtual and physical data. The more immersive a user’s experience (or “UX”) is, the less the user consciously perceives the augmented content as being separate from, or inferior in quality or value to, what he sees with his naked eye.

For designers of almost any AR app, the more immersive an app is, the better. In a fully immersive environment, a user perceives the virtual data as being equivalent to, and indistinguishable from, his physical surroundings—in other words, just another part of the landscape. The concept video “Domestic Robocop” gives one vision of what this reality might look like:

**Just Around the Corner**

Of course, no AR company is currently in a position to achieve complete immersion. Hardware limitations make that impossible. As engrossing and useful as the display on a monitor, smartphone, or tablet screen is, it only augments one small rectangle in your field of view, and only as long as you hold the device up in front of you. Looking away from the screen doesn’t take much effort. Even the best AR app is no more immersive than a really good movie would be.

But what about in the not-too-distant future, when AR-capable eyewear is commonplace, and AR content is plentiful? At that point, it will be possible for a user to become totally “immersed” in a digitally enhanced view of the world. Personally, I’d love to have that option. That’s when AR as a medium will finally realize its potential. Walking directions that I can actually walk on, virtual FAQ buttons on physical buildings, and floating boxes reminding me of people’s names are experiences that I can’t wait to have.
Our Addiction-Prone Society

If recent experience with consumer technologies has taught us anything as a society, however, it’s that the more engrossing a technology is, the more likely it is that a certain segment of the population is going to develop an unhealthy fixation with it. Whether you call it “addiction” (a diagnostic term that gets thrown around far too often, but sure makes for catchy headlines) or simply a bad habit, the fact is that people love to immerse themselves in fantasy worlds to escape the doldrums and difficulties of real life. And fully immersive AR will be orders of magnitude more engaging and attractive than even the best of today’s digital content.

We see this type of behavior everywhere today. Gamers will sit in front of their consoles playing massively multiplayer online games for hours and days on end, to the point that just last week someone died from a clot after sitting too long playing Halo 3 on Xbox. I’ve personally seen people dedicate the majority of their non-working hours to online role-playing games like Everquest and World of Warcraft, a phenomenon that has ruined plenty of lives. And there were portions of my college years where the same fate could have befallen me while playing the computer strategy game Civilization—although the internet connectivity of newer games adds a social element that draws players in even further. Not that any of these games are bad in and of themselves. Rather, they’re so good—so immersive—that players with poor self-discipline can easily get sucked into playing them longer than they should.

Of course, the same technology that makes these games possible also makes it orders of magnitude easier to access other habit-forming content, such as porn and gambling.

The AR medium will make all of these experiences more immersive and compelling. For example, the story on “Gaming Addiction” linked to the image above contains an ad for “the Peregrine,” a wearable glove that replaces the video game controller and proclaims itself to be an “interface like no other.” Accessories like that, and the explosive growth of proto-AR gaming systems like the Wii, Kinect, and Nintendo 3DS, demonstrate that AR is the future of digital gaming. And that is because of the unprecedented degree to which these systems allow players to physically immerse themselves in the game world. Likewise, AR (and Kinect) porn and gambling applications are already on their way.

Augmentation or Self-Aggrandizement?

What got me thinking on this topic was an offhand comment by Brendan Scully of Metaio during his presentation at the ARE2011 Conference. Toward the end of a very thoughtful panel discussion on the challenges of designing AR user experiences, Brendan said, “I certainly wouldn’t trust myself to design my own UX.”

This reminded me of some of the cautionary tales that pop culture has already given us about the drawbacks of having complete control over our surroundings. Star Trek: The Next Generation did this frequently (sometimes to a fault) via the “Holodeck,” a holo-graphics room capable of replicating any environment and character imaginable.

In the episode “Hollow Pursuits” (and later episodes), the socially inept character Reginald Barclay literally becomes addicted to living in the artificial worlds he creates there—complete with racier versions of his real-life female acquaintances and diminutive parodies of the men that intimidate him.

Then there’s the classic virtual reality tale “Lawnmower Man,” in which the title character conquers an artificial world and declares, “I am God here!”
The special effects in these shows may be dated, but their message is timeless: the more control we gain over their personal environments and surroundings, the more those surroundings will tend to reflect our own narcissism.

It seems inevitable that at least some AR users will demonstrate the same tendencies, to varying degrees. For most people, AR will probably be a lot like text messaging or Facebook are today—a technological convenience that many people may actually spend too much time with and joke about being “addicted” to, but that leads to few actual cases of bona fide dependence.

But even if it doesn’t amount to “addiction,” the potential for unhealthy behavior through AR will always be present to some degree. Even today, for example, a jilted lover could use an AR app to display an ex-boyfriend’s or ex-girlfriend’s face at the physical location of every past date—reinforcing a vicious cycle of negative emotions. Pornographic content—already ubiquitous and responsible for an array of unhealthy behavior—can be displayed anywhere in ways that standard, two-dimensional monitors won’t be able to match.

As AR hardware and capabilities mature beyond today’s comparatively simplistic communication technologies into a more immersive environment, the potential for abuse will grow accordingly. To those who become accustomed to living in a “Domestic Robocop”-type world, non-augmented reality may start to seem unbearably mundane by comparison. At that point, we could very well see a number of real-world “Reginald Barclays.”

Will government or industry step in to regulate AR content and head off some of these consequences? Perhaps. Although governments have more or less lost the ability to regulate violent content, age restrictions on prurient material remain enforceable, and would certainly be applied in this new medium. Crackdowns on illegal gambling programs may well follow. And just as we see counselors specializing in addictions to such content today, we’re likely to see similar services available for those who lose themselves in their own augmented worlds.

Reasons for Optimism

Just because AR will be immersive doesn’t automatically make it addictive or dangerous. No matter how convincing its digital content is, AR is, by definition, the intersection between that data and the real, physical world. The most exciting possibilities for immersing oneself in AR are also the same features that would take users outdoors. Therefore, augmented content may never have the same tendency to isolate users into online communities and separate them from physical interaction the way that console-based gaming systems with monitor-dependent displays do today. Proto-AR systems like the Wii and Kinect are already heralded as getting gamers off the couch; AR could be the killer app for getting them outside and into the world around them.

Counselors, meanwhile, need not wait for AR-addled patients to start taking the technology seriously. Today’s innovators are already devising ways that AR can be used to counsel patients. Helen Papagiannis, for example, has designed the world’s first AR Pop-Up book for the iPad 2. It’s designed to let users interact with virtual representations of their phobias—spiders, for example—in a visually convincing, but perfectly safe, way.

In sum, then, AR as a technology will be interesting and powerful medium, with the ability to do both good and harm to individual psyches and society as a whole. It will offer ability to psychologically immerse users in artificial content to a degree unmatched by other technologies. But that ability itself is ethically neutral. How it impacts us—and how much it becomes incumbent on others to regulate our use of it—will depend on what we choose to do with it.
Augmented Reality, Political Groupthink, and Civil Society

Originally posted on August 23, 2011

Earlier this month, I wrote about one potential danger of immersive augmented reality—the potential for becoming addicted to it. The chances for dependency will increase, I argued, the more ubiquitous the technology becomes, and the more we gain the ability to customize the augmented displays that we see. Augmentation could then become narcissism and self-aggrandizement.

There are other, related ills that could stem from the same set of conditions.

**Political Groupthink Is Already Rampant**

One such ill is the reinforcement of our pre-existing opinions and the filtering out of anything that is inconsistent with those opinions. In a word, groupthink—a term defined as follows:

Groupthink, a term coined by social psychologist Irving Janis (1972), occurs when a group makes faulty decisions because group pressures lead to a deterioration of “mental efficiency, reality testing, and moral judgment” (p. 9). Groups affected by groupthink ignore alternatives and tend to take irrational actions that dehumanize other groups. A group is especially vulnerable to groupthink when its members are similar in background, when the group is insulated from outside opinions, and when there are no clear rules for decision making.

To be sure, we don’t need to wait for an augmented world to make political groupthink a reality in the United States. Commentators are already bemoaning the sharp rise in political partisanship and rancor, and the corresponding dysfunction of civil society.

The diversity of media channels and news sources makes such polarization orders of magnitude easier than it used to be. Whatever your political leaning, you can find a customized website, satellite radio station, news channel, and talk show host who will give you the news filtered through that perspective. Opposing viewpoints are increasingly things to be mocked, shouted down, or ignored, not to be respected, understood, or even considered.

To see the consequences of this trend, one need look no further than this summer’s deadlock over raising the national debt ceiling. Two parties with deeply entrenched political ideologies played an unprecedented game of chicken while the threat of a sovereign debt default loomed—triggering a downgrade of the country’s creditworthiness and a stock slide, and at least contributing to the likelihood of a double-dip recession.

**Will AR-Enhanced Social Media Undermine Civil Society?**

AR will contribute to partisanship and polarization. And I am not the first person to say so. Back in November 2009, Jamais Cascio published a spot-on piece in the Atlantic called “Filtering Reality: How an emerging technology could threaten civility.” If you haven’t read it, you should.

Cascio saw in AR the potential to “strike a fatal blow to American civil society,” as people use their immersive AR eyewear “to block any kind of unpalatable visual information, from political campaign signs to book covers.” Moreover, as those devices become more able to give us information about particular individuals in our field of view (perhaps based on facial recognition technology, social
media-linked RFID tags, or nanotaggants), we can start blocking those people as well. "You don’t want to see anybody who has donated to the Palin 2012 campaign?" Cascio writes. "Gone, their faces covered up by black circles."

**Diminished Reality**

Again, we can already see the results of similar motivations today. This photo taken in the White House situation room on the day Osama Bin Laden was killed appeared on newspapers and websites across the world. *Di Tzeitung*, a Brooklyn-based Hasidic newspaper, wanted to use it as well—but its religious rules don’t allow it publish photographs of women. Their solution? They simply edited out the two women present in the picture—and didn’t say anything about it to their readers ... until they got caught.

People are already talking about the ability of AR to do the same thing to our everyday lives, in real time. They call it “diminished reality”—augmenting our view of the world not to add more data, but to make things we don’t want to see disappear. Here’s a glimpse at what DR might look like.

DR apps wouldn’t have to be directly related to politics in order to have a negative effect on civil society. Suppose someone doesn’t want to see evidence of poverty in their neighborhood? DR could make those ratty foreclosures look like splendid estates, and the homeless panhandler on the corner appear as if he’s wearing a tuxedo. The less we see of the negative aspects of society, the less motivated we will be to remedy them. Out of sight, out of mind.

There are implications for race relations as well. In 2009, HP stepped in a firestorm of criticism when consumers discovered that its facial recognition technology didn’t work on people with dark skin. Now consider the opposite of that problem: DR apps that recognize a particular shade of melanin, and replace it with another—so that the user can live in their own version of a racial utopia.

**Labels**

Perhaps even more corrosive to civil society than ignoring people with opposing viewpoints, however, is the ability to (literally, in this case) label and objectify people. Cascio asks, “You want to know who exactly gave money to the 2014 ban on SUVs? Easy—they now have green arrows pointing at their heads.”

Even more likely are labels that AR users choose for themselves. Social media is likely to be one of the primary forces driving the adoption of AR. As soon as the technological capacity is there, expect to see Facebook profiles and Twitter feeds floating over their authors’ heads.

Again, we already have real-world precedents. Cascio highlighted one:

After California’s Prop 8 ban on gay marriage passed, opponents of the measure dug up public records of donors supporting the ban, and linked that data to an online map. Suddenly, you could find out which of your neighbors (or the businesses you frequent) were so opposed to gay marriage that they donated to the cause. Now imagine that instead of a map, those records were combined with an AR system able to identify faces.

There are an endless array of other labels that users may want to see hovering over other peoples’ heads as well—including tags identifying religious affiliations, club memberships, socioeconomic background, alumni groups, fraternal orders, or sexual proclivities. That would be as simple as importing one’s Facebook or other social media profile into AR space, something that will certainly happen as soon as technologically possible. And if we choose to see such labels in a real-
time AR display, it’s probably because we either want to associate with, or disassociate from, “those kinds” of people.

Or worse. Recall the case of Michael Enright, the New York college student who, in August 2010, allegedly went out looking for a Muslim to kill. When he asked his cabbie, Ahmed Sharif, if he was a Muslim and the driver said “yes,” it’s charged, Enbright stabbed him several times.

If Enbright had been wearing AR eyewear that tagged Sharif (or anyone else, rightly or wrongly) as a Muslim, he wouldn’t have even had to ask.

With apps like these running in our AR eyewear, literally everyone we meet during the course of a day could come pre-labeled as a friend or enemy—or at least as interesting or uninteresting. What room will that leave for getting to know someone as an individual? For learning from someone with experiences that are different than ours? For taking seriously a viewpoint that doesn’t already fit into our worldview?

Our realities would certainly become “diminished”—in more ways than one

Disagreeing With Dignity

When I was in high school, we often read the Opposing Viewpoints series of booklets, each one of which summarized differing views on a particular subject. I’ve always remembered the slogan printed on those books: “Those who do not know their opponents’ arguments do not completely understand their own.” It’s a good reminder that a truly critical thinker is never 100% convinced that his own perception and understanding of any given issue is entirely complete or correct. Even strong opinions can be further nuanced, modified, reconsidered—or, if nothing else, strengthened—by confronting an opposing viewpoint. And even the most passionate advocate can still acknowledge the basic human dignity and worth of someone who disagrees with him.

Disagreement and debate can—and should—be a respectful, constructive process.

People who understand that concept are a necessary prerequisite to a healthy civil society and a functioning democracy. And at this point in American history, we could use many more such people.

I also hope that you’ll read this post with that frame of mind, rather than dismissing me as a Luddite or alarmist. I am a gung-ho enthusiast of AR and social media technologies, and can’t wait to have a heads-up display in my eyewear. Even I weren’t, it’d be too late to stop them. First-generation AR apps are already here on our smartphones. Government and industry alike are barreling ahead toward widespread and diverse application of AR technologies. Consumer demand and undeniable efficiencies will drive them to become increasingly immersive and ubiquitous.

The only question is how we as individuals will apply these tools, and how we allow them to shape our society. In my view, the more we think through questions like these ahead of time, the better our chances will be of using AR in a mature, constructive manner.

What do you think? Is my critique of AR’s impact on civil society fair? Overstated? What positive impacts could AR have on political or social discourse?
Superimposing digital data on the physical world is not just for the 1%. As more of our innovators, artisans, and marketers experiment with augmented reality, the tumultuous politics of our times are beginning to follow suit.

Protests and Social Change

This year’s Occupy movement broke new ground in various ways that will keep sociologists and political scientists busy for decades. One example is how some of the protestors resorted to free AR apps to keep the public informed about related events and locations. Using Metaio’s location-based AR browser junaio, one AR developer launched an “Occupy channel” that provides locations, contact information, and resources for all the Occupy protests in various cities across the country.

The Occupy Wall Street group in New York took this idea one step further, using junaio to superimpose signs, placards, and related imagery over areas from which they were restricted from physically protesting. A related site called “AR Occupy Wall Street” styles itself as a “call to all AR activists,” and collects a series of protest-themed images from various AR designers.

Of course, the utility of these apps to the overall movement remains an open question. One first has to have a compatible device and software, then download the app (or subscribe to the right channel inside an app), then be in the correct location, then use the app, all before one can encounter the experience that the apps intend to convey. Someone who jumps through those hoops is likely to be someone already sympathetic to the cause—which means these may be the first real-world examples of AR’s tendency to entrench existing political divisions.

Nevertheless, these examples do illustrate AR’s power to crowdsource a movement’s message. They allow individual artists located anywhere in the world to add their own spin on the group’s message—using different perspectives, images, and even languages—in a way that no mere physical demonstration could ever hope to accomplish. If even one of those protest “filters” catches on with a critical mass of individuals, it could change the entire course of the movement.

Campaigning in AR

Just as Barack Obama proved in 2008 that social media could be an effective means of rallying support, so too are political parties beginning to discover AR’s potential value in political campaigns. The Green Party in Germany has partnered with Metaio to launch an app that lets constituents leave comments geo-tagged to specialized billboards and specific physical locations and that represent a certain issue—and to hear pre-recorded statements by party officials about those very issues.

And just in time for the 2012 presidential campaign in the US, AR startup GoldRun recently announced a feature called “Visualize the Vote” that lets users pose for a picture with their favorite presidential candidate-super-imposed over the use’s physical location-then share that photo with their friends.
How Far Could it Go?

As society grows more accustomed to engaging with customizable layers of reality, AR’s ability to affect social change will deepen exponentially. For example, GoldRun also plans to launch a location-based reminder service that automatically alerts you to a particular cause when you come within a certain distance of a related location. (Apple’s recently launched personal assistant Siri can do the same thing upon request.) The first example that has been mentioned is showing you the image of a dog or cat when you walk within a mile of an animal shelter.

But this same technique could easily be applied to any social or political issue. Driving over a bridge might bring you a layer of information about the “pork barrel spending” that went into funding it. Entering a road construction area might prompt data on “your tax dollars at work,” or perhaps information about that company’s safety record. And whether a particular geotagged location sends you negatively or positively spun information could well depend on which political group’s channel you’ve already subscribed to—again reinforcing a tendency toward political groupthink.

Perhaps the most radical vision of AR’s impact on society can be found in Daniel Suarez’s books *Daemon* and *Freedom(TM)*. In that story, members of the AR-driven “Darknet” form a networked society that begins to subvert and supplant the existing political and economic order. Members of the community wear AR eyewear that allows them to see the information on which their Darknet society is based. All manner of virtual information like that described above is available to these people, except in a fully immersive, always-on manner. If someone writes a virtual protest sign on the side of a building, for example, that sign is equally visible to Darknet members as if it had been written with physical paint.

But Suarez’s mediation on how AR would affect society goes deeper than virtual graffiti. Each of these people develop reputation scores that are visible to other Darknet members as numbers floating in midair above their heads. These scores are the cumulative averages of the “rating” that person has received from other Darknet members based on their credibility, honesty, proficiency, and the like. The higher that score—especially as the “base” number of ratings increases—the more trustworthy that individual is considered. It would be like living in a world where everyone judged you by your rating on eBay.

Even more interesting is Suarez’s concept of the power meter. In addition to reputation scores, Darknet members achieve experience levels by accomplishing various tasks—exactly as in a video game. The higher one’s experience level, the more abilities they unlock within the Darknet, and the more data to which they gain access. In order to keep any one person or faction from gaining too much power over others in this way, however, all Darknet members are able to see not only the experience levels of others around them, but also the distribution of power within a given community. If power is concentrated in too few hands, the needle tips to the right. But if it’s dispersed too thinly—i.e., if there are no potential leaders within the group—the needle leans left. The optimal distribution of power is considered to be somewhere in between those extremes.

In this way, Daniel Suarez posited a solution to the inequities protested by the Occupy movement well before that group existed.
8. **CIVIL RIGHTS**

Will the Law Require Augmented Reality for the Disabled?

*Originally posted on March 29, 2012*

More than 50 million Americans – 18% of our population – have some form of disability. The Americans with Disabilities Act of 1990 (ADA) was adopted to ensure, among other things, that no one is “discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation.” (42 U.S.C. 12182.) The law has required public and private entities across the country to make a number of significant accommodations in the way they do business, and modifications to their physical structures, to assist disabled individuals.

By and large, the ADA has received broad, bipartisan support, and has even been strengthened over the years. But it still generates occasional controversy. The Department of Justice, for example, recently provoked criticism by requiring hotels to install costly wheelchair lifts in their swimming pools. And on March 23, 2012, a federal judge in California allowed the Greater LA Council on Deafness to proceed with a lawsuit against CNN for failing to provide close captioning for videos on its website.

What seems clear, though, is that as the technological means for giving disabled individuals equal access to everyday activities becomes more feasible, ADA regulations will start requiring governments and businesses to use them. We who follow the augmented reality industry already appreciate AR’s potential for radically enhancing everyone’s experience of the physical world. As other industry forecasters have already said, that will certainly include the disabled—people for whom reality is already “augmented” in a negative way.

So how might AR technologies be used in the near future to augment life for disabled individuals?

**The Deaf.** AR-infused eyewear has the potential to radically enhance life for deaf individuals by essentially closed-captioning anything and everything in life. Television already provides the most basic example of AR: the on-field graphics in NFL broadcasts. I often describe AR as taking that concept and applying it “to everything, everywhere.”

Combining AR eyewear with speech recognition software would likewise take the concept of close-captioned TV and apply it to everything, everywhere. The person wearing the equipment would see the words of someone speaking to them superimposed on their field of vision in more-or-less-real time. Obviously, technological barriers to such devices still remain. Software would need to improve, and it would need to sync with directional microphones that could isolate the speaker’s voice from the background noise. But the impressive quality of voice recognition products like Dragon Naturally Speaking and Siri bring hope such a product is not far off.

And, of course, voices are not the only sounds that deaf people could benefit from “hearing.” AR devices could be programmed to recognize and alert to the telltale sales of oncoming traffic, traffic control signals, music, alarms—all the sounds that others take for granted every day.

**The Blind.** Games like Inception the App, which “uses augmented sound to induce dreams,” already promise to digitally augment our sense of hearing. AR devices could accentuate the hearing of blind individuals in a way analogous to the visual information it could provide for the deaf. Users could receive audible alerts when they come into proximity with a person, vehicle, traffic control device, sign, or any of a hundred other significant objects. Next-generation versions of such apps as Google
Goggles and Word Lens might be able to read and audibly translate signs and other writings directly into spoken word, without the need for Braille.

An even more radical version of this idea has already been proposed by Dr. Peter Meijer, a senior scientist at Philips Research Laboratories in the Netherlands. Called the “vOICe,” his device promises “synthetic sight” by essentially hacking the brain to accept audio signals as visual images. According to Meijer’s website, “neuroscience research has already shown that the visual cortex of even adult blind people can become responsive to sound, and sound-induced illusory flashes can be evoked in most sighted people. The vOICe technology may now build on this with live video from an unobtrusive head-mounted camera encoded in sound.”

Of course, audio signals are not the only way to enhance life for the blind. Those who read Braille could still benefit from enhanced haptic technology such as that been developed by Senseg. In theory, the feel of virtually any surface could be augmented with additional sensory feedback, including in the Braille language. Therefore, a blind person wearing a haptic glove could “feel” Braille text on any surface, without that writing physically being there.

The Physically Handicapped. Digital information alone can’t do anything to increase the mobility of those with physical impairments. But better databases and wayfinding applications could make it a lot easier to find the accommodations designed to make their lives easier. For example, Mapability, an existing data layer on the Layar browser, helps the disabled locate the nearest wheelchair-accessible venue.

Those With Cognitive Impairments, Learning Disabilities, and Emotional Trauma. One study in Ohio created simulated environments to aid the rehabilitation of those with traumatic brain injuries and other cognitive impairments. Similarly, Helen Papagiannis—a designer, PhD researcher and artist specializing in AR—has written an AR pop-up book designed to let those suffering from phobias directly encounter their fears in augmented space.

The possibilities for AR in the educational field are seemingly endless. Jeremy Roberts at PBS has been on the forefront of augmented education for some time. He presented his ideas at the ARE conference last year, and summarizes them in this video as well. He is particularly passionate about AR’s ability to teach principles of physics through interaction with virtual objects that behave as if they were in the real world. Brian Mullins, CEO of daqri, is another passionate advocate of AR’s potential for education. He speaks often of a Matrix-like world in which knowledge on any desired topic can be instantly downloaded and explained in three dimensions.

Although these techniques offer new worlds of possibilities for all kids, the potential is particularly tantalizing for kids with learning disabilities and other barriers to comprehension. Educators are currently limited in what they can offer by such pesky constraints as budgets, resources, and the laws of physics. AR overcomes those barriers by virtually replicating and allowing students to meaningfully interact with anything they can imagine. Kids who need to learn through particular senses can have their instruction tailored to those needs. There may soon come a time when augmented methods of instruction are on the table at every special-needs kid’s Individualized Education Plan meeting (IEP), a process required by another federal statute—the Individuals with Disabilities Education Act.
PART III - USING AR TO LITIGATE AND ENFORCE THE LAW

9. Litigation Procedure

V-discovery: Litigating in Augmented Reality

Originally posted on April 6, 2011

Mo’ technology, mo’ problems.

Advances in digital and computing technologies can make litigation, like anything else, more effective and efficient. Lawyers have so many more tools at their disposal for crafting and communicating persuasive arguments than they did 10, or even five years ago.

But all this technology is also giving lawyers a whole lot more to do. Generally, any information that is reasonably likely to reveal evidence that could be admissible in court is fair game for discovery during litigation. Increasingly, the digital data stored and exchanged by the people and companies involved in lawsuits are becoming important to the issues being fought over. That means that lawyers and their staff often have to gather “electronically stored information” (ESI) during the discovery phase, in addition to the paper documents and testimony—the phenomenon we call “e-discovery.” Therefore, lawyers end up with even more data to sift through in order to figure out what happened than they used to. A lot more.

“Perhaps no case could be a more monumental example of the reality of modern e-discovery,” says a recent article in the ABA Journal, “than the ongoing Viacom copyright infringement lawsuit against YouTube filed back in 2008. In that dispute, the judge ordered that 12 terabytes of data be turned over”– more than the printed equivalent of the entire Library of Congress.

“Experiences like these,” the article continues, “have left law firms and in-house attorneys scrambling to make sense of the new risks associated with the seemingly endless data produced by emerging technologies like cloud computing and social media.”

How will law firms and litigants cope, then, when augmented reality becomes mainstream, and digital technology leaps off the computer monitor to overlay the physical world? At least three potential problems come to mind.

The first problem will be one of volume. Companies such as Vuzix and Gotham Eyewear are already working on making AR eyewear available and affordable to the general public. If a site like YouTube can amass enough video footage to make the prospect of reviewing it all seem (quite rightly) ridiculous, how about when we’re all wearing AR eyewear that collects and creates (presumably with the option to record) digital data about more or less everything we look at? Will paralegals be sifting through days and weeks worth of mundane, first-person audio and video to find the relevant portions of a litigant’s experiences? As more of our reading takes place on digital devices, we’re already creating troves of data about our activities in browser caches and RAM memory. But how much larger will our digital footprints be when everyday physical objects become opportunities (even necessities) for encountering and creating geotagged data?

The second, and closely related, problem will be locating and collecting all of this data. It’s hard enough nowadays to locate data stored in “the cloud,” which actually means some remote server farm nestled somewhere in the distant hills. Presumably, that data will be stored in even more diffuse ways in an AR world. Whether or not my eyewear will require a centrally broadcast “signal” or
“network” in order to function, it will certainly be interacting with any number of signals sent to and from objects that I physically encounter, leaving digital traces of my physical presence behind.

We're already halfway there. Consider Color, the social media darling of the moment. It gives you access to other people’s photo streams merely by coming into physical proximity to those people. Or Foursquare and other check-in sites, which offer you discounts to businesses near your current, physical location. Once transactions like this become the centerpiece of a lawsuit, will it require lawyers to pinpoint where particular people where when they accessed these apps?

If it becomes relevant in litigation to retrace someone’s steps through an augmented reality, how would one do it? Will it be necessary to actually visit those locations? Or might we all be equipped with personal “black boxes” that keep track of our digital experiences—probably all too often for the purpose of uploading them to lifelogs, or whatever social media has by then become.

A third problem is one of triangulation. Today, ESI may take various forms, but it all has one thing in common: it’s viewable on a two-dimensional screen. That won’t be universally true for much longer. How one perceives augmented reality will depend first on how they’re looking at their physical surroundings. It may not be possible to interpret digital data stored in a server somewhere without knowing exactly where the individual(s) viewing it were located, the direction they were facing, what other data they had open, and so on.

As only one example, suppose there’s a trademark infringement lawsuit in which the plaintiff alleges that a virtual version of his trademark was geotagged onto the brick-and-mortar location of his competitor’s store, leading confused customers to patronize his competitor instead of his own business. (This is a fairly simple extrapolation of all the lawsuits being filed nowadays over sponsored ads in search engine results.) That plaintiff’s claim will rise or fall in part based on how that geotag actually looked to customers. That, in turn, may depend on where the potential customers were when they looked at the logo. Was it visible through the trees, or in the sun? On which AR platforms was it viewable (assuming that there will be multiple service providers)? Did different brands of eyewear render it in the same way? Was it a static display, or did it sense and orient itself toward each individual viewer?

These are just a few of the potential issues; rest assured, there will be others. It all comes with a silver lining, however. Just a few minutes contemplating the complexities of virtual (or “v-”) discovery makes the current fuss over e-discovery seem not so bad after all.

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**Personal Jurisdiction: Can My AR App Get Me Sued in a Foreign State?**

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Picture this: a European software company writes an augmented reality program that allows people to discover information in their respective locales. An end user in New Jersey downloads the app, and is injured while using it. (Maybe it gives her bad directions that cause a traffic accident, or maybe it gives her improper instructions for how to use a product.) She sues the European company in a New Jersey state court.

There are several potential problems with such a lawsuit, of course, and I intend to explore more of them in future posts. But the first question is, has she sued in the correct court? Is the European company subject to the New Jersey court’s authority? Does it have to travel there to defend itself, on pain of a default judgment against it?
This is a question of “personal jurisdiction”—the power of a court to exercise authority over a specific person (or company). As a general rule, state courts may not exercise judicial power over a person or company not located in that state unless the defendant “purposefully avails itself of the privilege of conducting activities within the forum State, thus invoking the benefits and protections of its laws.” U.S. courts have spilled a lot of ink over hundreds of years trying to define the circumstances under which it is “fundamentally fair” for a state court to exercise jurisdiction over a person or company not located in that state.

This is an ever-evolving area of American law. On June 27, 2011, the U.S. Supreme Court waded back into it with decisions in two separate cases—one from New Jersey, the other from North Carolina. Both were products liability cases, filed by plaintiffs in their home states against companies based in other states or other countries. In the New Jersey case, a man injured by an industrial machine sued J. McIntyre Machinery, Ltd., the machine’s UK-based manufacturer. In the other case, North Carolina survivors of a bus crash in France sued the Goodyear subsidiaries companies who made the bus tires. Those companies were located in Ohio, France, Luxembourg, and Turkey.

None of these defendants had ever had any substantial contacts with the States in which they were sued. Instead, the courts relied on the “stream of commerce” theory of personal jurisdiction. Under that approach, as long as a manufacturer places its product in the “stream of commerce” with knowledge that it could, potentially, show up in a particular state someday, then it is fair for that manufacturer to be sued in that State.

The “stream” theory did not hold water in either of these cases. The Supreme Court reversed both decisions, finding it unfair for these companies to be sued in states that they had never “purposefully availed” themselves of. That said, however, the decisions didn’t completely close the door on the theory, either—leaving the door open for different approaches to the theory in future cases. And the cases only got to the Supreme Court in the first place because two separate state supreme courts had upheld the theory. As Justice Kennedy observed in the New Jersey case, the circumstances under which a foreign corporation in state court “is a question that arises with great frequency in the routine course of litigation.”

So it’s quite likely that our hypothetical plaintiff could argue—and perhaps persuade her local state-court judge—that it is fair to drag the European AR company into a New Jersey courtroom, simply because the company allowed its app to be sold in an online app store accessible from New Jersey.

Of course, when your content is available on the worldwide web, it could be downloaded by anyone, anywhere. Should you expect to get sued anywhere that any user of your online content may be? There is a whole separate body of case law in U.S. courts that ask that question. Historically, these cases have tested the fairness of exercising personal jurisdiction over online retailers based on how “interactive” the retailer’s website is. Called the “Zippo sliding scale test” (from the Zippo case that fashioned the test), the approach generally holds that the greater the commercial nature and level of interactivity associated with the website, the more likely it is that the website operator has “purposefully availed itself” of the forum State’s jurisdiction. Under this approach, sites that offer such “interactive” features as downloads, forums, messaging, and the like are more likely than merely “passive” websites to be viewed as “targeting” a particular State where certain of its users live.

The “interactivity” of AR content will depend on the context. Many such apps store information rather passively, even if they do display it in a unique manner. Other allow a much greater degree of user interaction with online content. Under the Zippo sliding scale test, these differences could determine whether the app maker can find themselves dragged into court in a remote jurisdiction.
As online interactions become more commonplace and nuanced, however—for instance, taking place through smartphone apps rather than traditional “websites”—there are signs that at least some U.S. courts are moving past the “sliding scale” approach to personal jurisdiction. The 7th Circuit Court of Appeals, for example, ruled earlier this year that “a defendant [should] not be haled into court simply because the defendant owns or operates a website that is accessible in the forum state, even if that site is ‘interactive.’ Beyond simply operating an interactive website that is accessible from the forum state, a defendant must in some way target the forum state’s market.”

It seems safe to say that most apps and other software programs—even those that interact heavily with data stored online—do not “target” particular geographic markets. They are simply programs that can be run on a user’s device, wherever that user may be located. Of course, there are also many apps designed to point users to local content. Plaintiffs might have a better argument in some circumstances that these services “target” specific markets, especially if they are only available in select areas. But even these sites might not be targeted to a given area specifically enough if they collect local data for markets across an entire country or countries, as many apps do.

But AR apps present unique issues in this context that (to my knowledge) have yet to be answered. By definition, the entire thing that makes AR unique from other means of consuming data is that AR overlays the data on the specific geographic surroundings of the user. The market that the user finds themselves in, therefore, matters a great deal; that location is an essential component of the AR experience. Moreover, superimposing data on the physical world necessarily involves at least some minimal degree of “interactivity” with that data.

Does that mean that all AR experiences are sufficiently “targeted” to that market to support the exercise of personal jurisdiction in the local courts there? Not necessarily—especially not now, when hardware constraints limit the degree of specificity with which an app can recognize physical surroundings and adjust its augmented content accordingly. Most AR apps on the market today offer a new point-of-view for looking at data, but the data can still be displayed just as easily in a traditional, 2-D manner. Take Yelp!, for example; a user can view search results through the standard screen display, or through the “Monocle” AR lens, but the choice of perspective doesn’t change the content itself.

Current AR features may make a difference in jurisdictional analyses, but when AR gets into your eyewear and becomes a truly immersive experience is when these questions will really get interesting. Picture a scenario in which my AR glasses can, for example, perceive a physical sign, retrieve online information from a remote server based on what the glasses perceive, and overlay that information on my field of view, all in real time. If that information ends up forming the basis for a lawsuit, where should I sue? In the state where the company whose servers provided the information is located, or in the state where I experienced the content?

That scenario presents a stronger case for the exercise of personal jurisdiction in the end user’s state than in any of the previous examples. The relationship between the real-time, localized AR experience and the place where the experience happens will not be as random and fortuitous as when products are sold into the stream of commerce, or when a company launches a website that can be interacted with from anywhere. Even though the data may be provided by servers and software located elsewhere, the more that data is intended for use in a particular place, the more reasonable it is to expect the provider of that data to be subject to jurisdiction in that place’s courts.

Some of this analysis is necessarily speculative, because we don’t yet know exactly what real-time, immersive AR technology will look like, or how it will function. But it seems inevitable that, as digital data becomes more closely interwoven with distinct physical environments, jurisdictional consequences will follow.
ABOUT THE AUTHOR

Brian D. Wassom, Esq. is a partner at Honigman Miller Schwartz and Cohn LLP, a full-service corporate law firm based in Detroit, Michigan. He chairs the firm’s Social, Mobile and Emerging Media Practice Group, and has extensive experience advising clients and litigating commercial disputes, particularly in copyright, trademark, publicity rights, digital and print media, entertainment, and related fields of law. Previously, he served as a law clerk to the Hon. Alice M. Batchelder of the U.S. Court of Appeals for the Sixth Circuit.

Brian has become a thought leader in the legal issues surrounding social media and augmented reality through his Wassom.com blog, numerous articles, and frequent speaking engagements and media appearances. He is active in the broader legal community, holding such roles as Review Editor for Landslide, the magazine of the American Bar Association’s Intellectual Property Section; member of the ABA’s Copyright Litigation Subcommittee; and co-chair of the Social Media Committee for his local chapter of the Federal Bar Association. He has been recognized repeatedly as a “Rising Star” by Michigan Super Lawyers, and for Intellectual Property Litigation by The Best Lawyers in America.

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linkedin.com/in/brianwassom
twitter.com/#!/bdwassom

bdw@honigman.com