Complex Copyright: Mapping the Information Ecosystem

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Introduction: A Hitchhiker’s Guide to the Information Ecosystem

The catchphrase “the information ecosystem” has become a cultural meme describing the global electronic infrastructure through which massive quantities of digitized information continuously flow in our increasingly wired society. As we spend progressively more time connected to the electronic flow, we ourselves become actors in this ecosystem. Copyright law, which is the focus of this book, affects a substantial portion of the information ecosystem: original, creative, nonfunctional expression. It governs the production and dissemination of not only obviously expressive works—such as works of art, literature, drama, and music—but also less obviously expressive works—such as software, information databases, and maps. Much of the discussion of copyright law herein revolves around American copyright law, but copyright laws of other nations receive references where appropriate.

Means of reproducing, distributing, and using such works have existed in varied forms from the inception of the written word. The ability to disseminate all forms of information expanded exponentially with the invention of the printing press, then again with the development of modern media such as films, radio, sound recordings, and television. As digital technologies replace analog technologies, the contents of many disparate media for information transmission, from novels to newspapers, movies to magazines, are reduced to homologous electronic bits that can be transmitted instantaneously over global networks and copied with ease. This transformation has created a host of problems for intellectual property law generally and copyright law in particular. The expansion of digital media has adversely impacted the profitability of many copyright industries, cutting into sales of physical products such as sound recordings, movie disks, newspapers, and reference works.\(^1\) Attempts to adapt copyright law to the digital environment have touched off heated disputes over issues like file sharing, digital rights management, Internet streaming, and database protection, to name only a few.

\(^1\) Nicholas Carr, The Shallows: What the Internet is Doing to Our Brains 92–3 (2010).
To date, most of these controversies have played out within the traditional, philosophic framework pitting private property rights against the public domain. Analogies to real property portray limited choices between the private enclosure and the commons. An emergent thread in the copyright debate, however, rejects the analogy of intellectual property to real property. Adopting the ecosystem as metaphor, it suggests that intellectual property systems should be viewed as parts of an “information ecosystem” comparable to the ecosystems found in the natural environment. Under this view, intellectual property law, including copyright law, might profit from the application of concepts developed in environmental law. If the copyright system works like an ecosystem, the goal of copyright law should be to encourage sustainable development of creative resources in a way that provides incentives to creators, yet preserves the resources essential for new creations.

The project of this book is to push the phrase “information ecosystem” past meme and metaphor and into the realm of taxonomy. Copyright systems and environmental ecosystems do not merely resemble each other, but, in fact, are members of the same category of systems—complex adaptive systems—which are nonlinear, dynamical systems, capable of evolving over time in response to changes in their environments. A large body of interdisciplinary theory and empirical research about such systems has developed over several decades, promulgated by a number of institutes and university centers, the most prominent of which is the Santa Fe Institute. Initially growing out of chaos theory, complexity theory eventually subsumed chaos theory and related areas such as network theory. Scholars in the hard and soft sciences have sought to identify fundamental characteristics of systems as diverse as natural ecosystems, the human brain, political and cultural institutions, free market economies and stock markets, and the Internet. When Tim Berners-Lee, the originator of the World Wide Web, called for a new branch of science devoted to study of the Web, he initiated a new field of complexity study. This book suggests that most copyrightable works are created and disseminated through networks of complex adaptive systems and

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4 For an engaging, readable account of the development of complexity science, see ROGER LEWIN, COMPLEXITY: LIFE AT THE EDGE OF CHAOS (1992).
that, consequently, complexity theory provides a useful lens through which we can analyze those systems and the impact of copyright law on them.

There are a few definitional hurdles that must be surmounted with regard to the meaning of the phrase “information ecosystem” and its component word “information.” The phrase, as generally used, is little more than an analogy drawn between the complex systems that comprise the natural ecology and the systems by which information is created, stored, published, distributed, and used. Technology writers sometimes restrict it to physical technology: the networks, computers, smartphones, and other hardware that enable the instantaneous, global transmission of information. Other writers, including legal scholars, more typically construe it to include not merely the technology, but also the digitized content, the producers, distributors, and consumers involved in the creation and global distribution of the content, and the legal regimes that govern those activities. This book adopts the latter approach, which emphasizes the interconnectedness and interdependency of the many component systems involved in information creation and dissemination. Copyright law comprises one subsystem within the larger information ecosystem. The complexity framework proposed herein might also prove useful as applied to the different kinds of information governed by patent, trademark, or other intellectual property laws, but those speculations are beyond the scope of this book.

The definition of “information” is itself variable with context. My aging, but treasured, Webster’s Collegiate offers several variations: (1) the communication or reception of knowledge or intelligence; (2) knowledge obtained from investigation, study, or instruction, including (3) facts and data but also (4) signals or characters representing data, (5) sequences of nucleotides or digital bits that produce specific effects and (6) quantitative measures of the content of information. Others have defined it as anything that lowers uncertainty or, alternatively, as the output of any process. Richard Dawkins, who originated the term “meme,” described the meme as a unit of cultural information. For purposes of this book, “information” comprises all forms of transmissible knowledge that might either be subject to protection under copyright law or excluded from it for various policy reasons. Copyright not only protects certain works from appropriation, but also contains

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doctrinal limitations that assure that some information resides in the public domain, free for use by anyone, either because it has fallen out of copyright protection or because it is a kind of information, like ideas or facts, that is specifically excluded from copyright’s ambit. Copyright law enables a universe of copyright-related systems, such as copyright-based industries.

Given these broad definitions, one might ask whether a mental construct like the “information ecosystem” captures the realities of the production, distribution, and use of copyrighted works. Copyright is, after all, a human-constructed system, unlike a natural ecosystem. To take an initial, high-level pass at this question, before delving deeper into complexity principles, it may be useful to “hitchhike” along with an actual copyrighted work from inception to dissemination, mapping out the paths it takes through creation, reproduction, distribution, adaptation, and use over time. A sketchy hitchhiker’s guide to copyright reality may disclose whether more extensive mapping of the correspondences between the information ecosystem and natural ecosystems is likely to be fruitful.

The phrase “hitchhiker’s guide” once meant, quite literally, a travel guide for hitchhikers. Today, it is more likely to call to mind Douglas Adams’s popular science fiction fantasy The Hitchhiker’s Guide to the Galaxy. It is tempting to follow that work from the moment of inspiration while Adams lay in an Austrian field in a pleasantly drunken state, to its production as a radio show, and its subsequent adaptation into a series of books, sound recordings, television episodes, and a film. The copyright complications involved in these transmogrifications of the original work inspired Adams to explain the many inconsistencies among the different versions of the tale thus:

This was done for complex reasons of copyright.

If you wish to understand these reasons, and I would suggest to you that you do not, then you should first limber your brain up with a little gentle quantum Mechanics, work out on Relativity, try really pumping lobe iron on a Unified Field Theory and then take a short cooling rest. Now you should be ready to think about copyright law, but suddenly find that you’ve got some much more interesting things to think about.9

The copyright galaxy has, however, undergone a digital upheaval since Adams wrote those words. Copyright law has become, if anything, more complex and confusing. As the global information network has expanded, copyright law has

also come to impinge on the day-to-day activities of ordinary information users in previously unimaginable ways.

Consequently, a journey through the copyright system with a more recent multipart creation, the Harry Potter books by J.K. Rowling, will more accurately portray the current copyright universe. The description that follows involves educated guesswork based on a general knowledge of publishing processes and copyright law, since the exact contents of the copyright licensing arrangements involved are, not surprisingly, unavailable to me. It should, however, provide a reasonably useful overview of the complicated processes involved in the production, dissemination, and use of such a popular copyrighted work.

According to Rowling, the idea for the books “simply fell into [her] head” in 1990 while she was delayed for four hours on a crowded train from Manchester to London. After several years spent writing the first book of the series, *Harry Potter and the Philosopher’s Stone*, she found an agent who, in 1996, succeeded in placing the book with its first publisher, Bloomsbury Publishing. With that placement, the wizarding world entered into the systems by which novels are published, distributed, read, and adapted. The manuscript would have worked its way at Bloomsbury through the usual publishing processes including editing, illustration, design of the physical format and materials of the book and its jacket, typesetting, printing, binding, and preparation for shipment. A marketing campaign would have been devised. A number of legal agreements would have been negotiated, undoubtedly including contracts with the illustrator, advertising outlets, book distributors, and, most importantly, of course, the contract in which Rowling gave Bloomsbury a copyright license to publish and distribute the book in the United Kingdom. Advance copies were distributed to book reviewers.

Up to this point, the book followed paths similar to that of many other novels that lie largely within the control of the author and the publisher. But here the book began to arc out on an unexpected trajectory, based on the responses of readers to the first appearance of the book. Formal reviews were generally favorable. More importantly, word of mouth began to spread among children, parents, and general readers. Children who rarely read anything were fascinated by the imaginary world of Hogwarts. Fan clubs formed. Fan sites, blogs, podcasts, and fan fiction appeared on the Internet. Academics organized symposia. The strength of the readers’ responses enabled Rowling to contract publishing rights out to different publishers in many countries. Potter mania grew with every successive book in the

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series as readers anxiously awaited each new development in the wizarding world. In other words, positive feedback from millions of readers who spontaneously organized themselves into social networks with enormous market impact tipped the books over the edge from mere success to unprecedented phenomenon. The Potter books have now sold hundreds of millions of copies, been translated into over 60 different languages (including a translation from British English to American English), and adapted into a very successful series of films.\footnote{Guy Dammann, \textit{Harry Potter Breaks 400m in Sales}, \textit{The Guardian} (Jun. 18, 2008), http://www.guardian.co.uk/business/2008/jun/18/harrypotter.artsandentertainment /.} They have produced spinoffs in the form of toys, video games, costumes, Bertie Bot’s Every Flavor Jelly Beans, and the like, which have made the Potter trademark worth billions.\footnote{Harry Potter Brand Wizard, \textit{Bloomberg Business Week}, (July 21, 2005), http://www.businessweek.com/innovate/content/jul2005/di20050721_060250.htm.} It is, however, copyright law, not trademark law, which originally established the rights that made Rowling the first billionaire author\footnote{Julie Watson and Tomas Keliner, \textit{J.K. Rowling and the Billion-Dollar Empire}, \textit{Forbes.com} (Feb. 26, 2004), http://www.forbes.com/2004/02/26/cx_jw_0226rowlingbill04.html.} and all things Potter such a lucrative enterprise. Copyright laws, with an assist from contract law, set the rules of the game.

National copyright laws confer on authors like Rowling a bundle of rights which, with some variations among countries, may allow authors, or their assignees, to control reproduction, distribution, adaptation, public performance, and public display of their creative works. International treaties like the Berne Convention for the Protection of Literary and Artistic Works\footnote{WIPO.Int, \textit{Berne Convention for the Protection of Literary and Artistic Works}, Sept. 9, 1886 as revised and amended through Sept. 28, 1979, available at http://www.wipo.int/treaties/en/ip/berne/rtdocs_wo001.html (last visited May 9, 2011).} and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs)\footnote{WTO.ORG, \textit{TRIPS: Text of the Agreement}, Apr. 15, 1994, available at http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm (last visited May 9, 2011).} set minimum standards for copyright protection among member nations, allowing authors like Rowling to enforce these rights in dozens of countries. Copyright establishes the legal framework under which the copyright owner can, for the lengthy duration of the copyright, license any of her rights to others or bring lawsuits against those who infringe on one or more of the rights in the bundle. Not surprisingly given the high stakes, Rowling, her publishers, and Warner Brothers studios have already been involved in a number of legal actions around the world, defending against claims that she copied the works of others, enforcing copyrights against
unauthorized uses, and seeking to prevent unauthorized early distribution of books in the series.\textsuperscript{16}

Even the brief overview of the journey a single novel takes from creation through publication and distribution, and beyond, evidences an extremely complicated process potentially involving thousands (even millions) of people interacting in intricate networks. Those networks carry not only the information contained within the pages of the book itself, but also the additional information—including marketing and pricing information, sales information, and even new works like films—engendered in response to the books. Of course, the journey taken by the Potter books is hardly typical for all copyrightable works, or even for first novels. Less successful novels may garner more limited reader response, sell far fewer copies and, ultimately, wind up in remainder bins. As publishers often point out when seeking stronger copyright protections, picking the winners and losers in the business is fraught with uncertainty. Moreover, the copyright universe comprehends many other kinds of works that may follow entirely different, if equally complicated, pathways from creation through publication, distribution, and use.

The Potter films, for example, involve hundreds of people—directors, actors, screenwriters, film editors, camera crews, costumers, to name only a few—in a collective production process whose outputs are distributed globally in a number of media to millions of consumers. The newspaper reporter who writes an article on the Harry Potter success story collects data from her sources, writes her article, and releases it into a production system that reviews, compiles, formats, prints, and distributes many articles, by many different authors, in the form of a series of compilations, which may appear in both print and electronic forms and be distributed locally or globally. The lawyers and judges drafting publication contracts and arguing or deciding the Potter lawsuits are participants in an exceedingly complicated legal system, applying copyright rules that may vary considerably with respect to different kinds of works and their authors. The decisions in the cases resolving those legal issues are collected, compiled, and published through still another, quite lucrative, system dominated by several

multinational publishing corporations. The software that powers Potter-themed games follows yet another set of production and distribution paths.

Increasingly, informational works may take a number of different paths that depend on copyright law but may actively avoid copyright restrictions. The writers of the many Wikipedia articles about Rowling and her books, for example, contribute to a cooperatively produced online encyclopedia, which follows its own production rules set by wiki software and terms of use contracts. Wikipedia’s digital, noncommercial content is issued under Creative Commons and GNU General Public licenses17 that eschew many of the restrictions imposed by copyright law in favor of free sharing of information. Numerous authors in a variety of media now release their works under such licenses.

Wikis are also among a number of new avenues for producing and distributing copyrightable works that entirely avoid traditional bricks and mortar distribution systems in favor of direct artist to consumer transactions over the Internet. Musicians like Radiohead and Wilco have, for example, successfully released recordings online directly to consumers prior to or contemporaneously with the distribution of physical copies. Millions of photographers freely share billions of photographs on Flickr. Members of social networking sites disseminate their own copyrightable works (text, photos, and the like), and share the works of others, on sites like Facebook and YouTube. Authors increasingly self-publish over the Internet. While these efforts shortcut traditional distribution pathways, the process still involves sophisticated technologies and numerous interactions.

Obviously, the substantial chunk of the information ecosystem affected by copyright law consists of many different kinds of production systems that share information with and respond to each other, as well as to economic markets, social networks, and technologies, in innumerable ways. Established legal rules, like copyright law and contract law, govern many of the interactions, but other kinds of rules, such as social norms and business practices, are also in play. Despite these accepted rules, copyright systems are also capable of producing unexpected behavior like the feedback loop that caused the Potter phenomenon.

By way of comparison, we can take a quick overview of a natural ecosystem that figures more prominently in the next chapter: the prairie ecosystem that formerly

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17 The GNU (GNU is not Unix) Project was founded to develop free Unix-like operating system software accompanied by a license designed to keep the software copyright-free. GNU Operating System, *What is GNU?*, http://www.gnu.org/ (last visited May 9, 2011). Creative Commons offers a number of alternative licenses tailored to allow freer uses of copyrighted works. Creative Commons, *Share, Remix, Reuse – Legally*, http://creativecommons.org/ (last visited May 9, 2011).
dominated the plains of North America. The plains soil contains microbes essential to support thousands of species of grasses that, through photosynthesis, utilize sunlight to create organic material, remove carbon dioxide from the air and release oxygen into it, and, as they decompose, return their organic matter to the soil, in a feedback loop that produces rich, black prairie earth. The grasses both feed and depend on: pollinators like bees, butterflies, and bats; herds of bison, deer, and other grazers whose foraging and wastes stimulate growth; burrowers like prairie dogs and voles whose tunneling reinvigorates root systems. Intricate predator–prey relationships exist between the species that eat grass (rabbits, mice, prairie chickens, bison) and those who eat the grass eaters (foxes, coyotes, snakes, hawks, vultures, humans). All of these are also fundamentally dependent on weather systems that provide not only sun and rain, but also the wind that scatters grass seeds and the lightning that unpredictably sets the prairies ablaze from time to time, clearing the way for new growth and discouraging infiltration by trees and shrubs.\textsuperscript{18}

Unlike the copyright system, the prairie is a natural system of which humans are only one part. But like the copyright system, the prairie ecosystem consists of complicated, interdependent subsystems that self-organize and evolve over time. It follows some known “rules” (such as the process of photosynthesis), but also produces unexpected behaviors, like prairie fires. Even a quick tour reveals similarities in structure and behavior between the copyright-related systems that produced the Rowling books and environmental systems like the prairie, despite the fact that copyright systems are entirely a human creation while the prairie is a natural system in which human beings are implicated. They resemble each other, in their particularity, far more closely than either resembles a fenced field or a public common. In fact, they share characteristics typical of all complex adaptive systems: intricate architecture, nonlinear behavior, emergence, and adaptiveness.

Chapter 1 explains these basic complexity concepts, illustrates them with examples from both natural and human-created systems, and shows how they might apply to copyright-related systems. The chapter concludes that copyright systems seem to exhibit the characteristics typical of all complex adaptive systems. The “information ecosystem” may not be merely a convenient analogy, but may, rather, reflect the fact that copyright systems and ecosystems are fundamentally the same kind of system. That conclusion provides the foundation for two related arguments explored in the rest of the book: first, that like any complex adaptive system, copyright systems can and should be subjected to empirical analysis and,

\textsuperscript{18} See Aimee Larrabee and John Altman, \textit{Last Stand of the Tallgrass Prairie} 13--37 (2001). This book is the source for subsequent discussions of the prairie ecology.
second, that, if copyright law is to encourage creativity, which emerges from the complexity of the human brain, it must be flexible enough to accommodate chaotic elements that are essential to the creative process.

The argument for empirical study is the lengthier of the two discussions, pursued in Chapters 2 and 3. Chapter 2 reviews the debate over the proper scope of copyright law that has, for three hundred years, been conducted for the most part on abstract philosophical grounds that rely heavily on reasoning by analogy to real property. The debate has devolved to a bipolar conflict between private property and the commons that does not accurately reflect the complexity of copyright systems. Empirical research into the actual effect of copyright law on the production of copyrighted works generally, or on specific copyright systems such as book publishers or the movie and recording industries, has been fairly sparse until quite recently. The focus on mere rhetoric, rather than actual proof, leaves the door open for copyright industry lobbyists who have historically exerted tremendous influence over copyright legislation, contributing to the expansion of copyright’s scope and duration over the years.

Chapter 3 summarizes some of the empirical research on copyright that has been done to date. It then outlines a new approach to understanding the copyright system: holistic systems analysis based on extensive empirical research within a framework informed by complexity theory. Both quantitative and qualitative research methodologies may prove useful. Copyright scholars can do more than merely hitchhike along on imaginary journeys with a representative work or two like the Rowling books. They should be mapping out the ecology of copyright, describing the varied paths taken by the veritable cornucopia of copyrightable information. They should identify and, where possible, quantify the inputs, outputs, and processes involved in copyright production and dissemination. They should test the theories justifying copyright law against copyright’s actual impacts and reconsider copyright theory in response to copyright reality.

Chapter 4 fleshes out the argument concerning the linkages between copyright, creativity, and the chaotic elements that are central to the sustainability of complex adaptive systems. Complexity science teaches that the most robust complex systems maintain a state poised between order and disorder—rather poetically referred to as the “edge of chaos.” Chaotic elements provide the flexibility essential to sustainability. The human brain is a complex adaptive system and recent research in brain sciences indicates that creativity may occur at the edge of chaos. If copyright law’s mission is, as claimed, to induce the production of creative works, the law should create an environment that ensures to creators not only a measure of economic support, but also freedom to engage with their culture,
and with other creators. Copyright law should not impose overly rigid restraints on creative processes that are inherently unpredictable.

Finally, Chapter 5 considers how a complexity-based framework might influence lawmakers’ approach to copyright law, offering a few general cautions and some specific suggestions to free up the data needed for empirical investigations and assure that the law itself responds over time to the results of those investigations. Since copyright systems, unlike environmental ecosystems, are constructed by humans and governed by human-made laws, we may hope to exert some degree of control over them, subject always to the law of unanticipated consequences. Copyright law, itself, may constitute a complex adaptive system that must be periodically retuned to remain near the edge of chaos.

The copyright system, born and bred for print technology, faces a technological revolution in its environment. Digitization and global networks have heightened the interdependence of copyright production systems, markets, and the laws that govern them. The old broadcast model of one-to-many communication is replaced with many-to-many global connectivity. The individual creativity of one author sparks the collective creativity of thousands more. Can copyright law successfully adapt to this new environment? Or will technological and social changes push copyright law, as a conceptual system, to a tipping point beyond which it ceases to be a viable means to encourage creativity?

In The Hitchhiker's Guide to the Galaxy, Douglas Adams dreamed up a universe in which the Earth and all its life forms comprised an enormous computational matrix designed to identify the Ultimate Question. His fictional musings may not have been far off the mark. The controversial, but putatively nonfictional, Gaia hypothesis suggests that, in fact, the Earth is a homeostatic complex adaptive system, a giant living organism, in which life maintains conditions favorable to its own survival through self-regulation. (The competing Medea hypothesis suggests that life seems to be actively pursuing its own demise.) The information ecosystem may be merely one of many complex adaptive subsystems operating within a larger global system. An understanding of complex adaptive systems, supplemented by research into real copyright-related systems, may provide drafters and scholars of copyright law with conceptual tools that facilitate the crafting of flexible copyright laws that can support a sustainable information ecosystem. To put this in systems terminology, an ideal copyright law would create a self-regulating, homeostatic system in which market demand would create a feedback loop driving the creation of culture. Douglas Adams to the contrary notwithstanding, we have few more interesting things to think about.