

# CONSTRUCTING COMMON POOLS IN THE CULTURAL ENVIRONMENT

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This paper introduces a research project that will examine intellectual property rights systems and intellectual property pools as socially constructed environments. At this stage, we present the theoretical framework for our study and begin to sketch a roadmap for examining particular types of structured pooling arrangements that involve intellectual property rights. We anticipate conducting numerous case studies across a variety of intellectual disciplines. We welcome comments and suggestions about the framework and roadmap as well as potential case studies.

## Introduction

In this project, we will explore the role of intellectual property in constructing/designing open environments through pooling arrangements. This paper develops a theoretical framework for our project.

Copyright and patent pools are examples of constructed environments. With considerable variance across contexts and specific arrangements, pooling arrangements create socially constructed open environments within which creators, inventors and innovators may engage in a variety of productive and interactive activities. These environments are not hermetically sealed, however. The environments are enmeshed in larger, more complex systems of natural and socially constructed environments.<sup>1</sup> Patent and copyright laws construct particular environments with default boundaries. Pooling arrangements represent contextually driven deviation from the default, at times leading to improvements that would not be attainable without the initial set of exclusionary rules, but also at times leading us to question whether the pooling arrangement is created to overcome the exclusionary rules. Of course, as we explore briefly below, pooling arrangements may exist for additional reasons as well.

### 1. Openness and the construction of environment

Before discussing intellectual property (Part 2) and pooling arrangements (Part 3), it is helpful to explain first what we mean by open and closed environments and then how such environments are constructed.

#### 1.1 Openness as applied to resources

What exactly do we mean by openness? There is little ambiguity in most everyday contexts (i.e., an open door), but openness can be a confusing concept when used to describe a particular attribute of a resource.

When we say that *something* is *open*, we are generally referring to a *thing*, a *resource* that can be described, possessed, and used.<sup>2</sup> Openness describes our capacity to relate to a resource by accessing and using it. Thus, openness describes the extent to which there are barriers to possession or use. So at one extreme, there are no barriers at

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<sup>1</sup> In future work, we will examine both the "interior" space and the boundaries with the "exterior" that pooling arrangements create. The "interior" is open in the sense that members can borrow and share resources, but what does the interior/exterior boundary "look" like? It varies by context, and it is interesting to examine the variations and causes for structural differences.

<sup>2</sup> Much of this section draws from ideas in Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 **Minn. L. Rev.** 917 (2005) and Michael Madison, *Law as Design: Objects, Concepts, and Digital Things*, 56 **Case W. Res. L. Rev.** 381 (2005).

all to possession or use, and at the other extreme, there is an insurmountable barrier to access and/or use. In between the extremes, openness (restrictiveness) varies according to the barrier costs (in terms of money, conditions, or other restrictions).

Barriers to possession or use of a resource may be natural or constructed.<sup>3</sup> A resource may be open naturally because its characteristics prevent it from being possessed, owned or controlled by anyone. For example, for most of the earth's history, the oceans and the atmosphere were natural commons. Among other reasons, exercising dominion over such resources was beyond the ability of human beings and was unnecessary because there was no indication of scarcity. A resource also may be open as the result of social construction. Laws or rules may prohibit ownership or ensure a certain degree of openness. For example, copyright law grants protection over expression but excludes ideas to maintain open access and use of ideas. Moreover, short of formal legal rules, openness may arise through norms and customs among owners and users.

Often, openness simply reflects resource management. The degree to which a resource is open generally depends upon human decisions about how to manage the resource. Decisions may be made through centralized or decentralized processes based on many different criteria. For example, a field may be openly accessible and usable because a single property owner decides to manage it as such, or because those people who live proximate to the field determine collectively to do so, or because the government says so, etc. Private, public, common or other property rights may support certain decision making processes and management options; meanwhile, these processes and options may be tempered by regulatory institutions.

Openness is also a reflection of power and its distribution among potential possessors and users. Openness reflects power in that it is measured by the degree of control over the terms of access and use of a specific resource. Such control is exercised by human beings on human beings; it is relational, and it relies on social institutions.<sup>4</sup>

In sum, openness is a functional variable that describes the degree to which possession and use of a resource is controlled, and it is a relational variable that describes the structure of relationships among potential resource users. Generally, human institutions determine both the *degree of openness/control* (absolute or limited to certain variables of access or control) and the *assignment of control* (who gets control and how do we expect it to be exercised).

## 1.2 Openness as applied to an environment

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<sup>3</sup> This and the next paragraph are adapted from Frischmann, *An Economic Theory of Infrastructure*, supra note 2.

<sup>4</sup> MARGARET JANE RADIN, *CONTESTED COMMODITIES* (1996).

Applying the concept of openness to environments requires some definitional maneuvers and metaphorical twists that may require further exploration. At this point, our aim is to generate a workable framework from which we may proceed to examine pooling arrangements.

The world we live in is comprised of multiple, complex, overlapping, and interdependent (resource) systems with which we interact and that ultimately constitute our environments—the natural environment is one type and socially constructed environments are another. For our purposes, an *environment* is *a system of interconnected and/or interdependent resources*. (We might refer to this as a resource environment.) Most traditional definitions of “environment” do not make reference to resources per se. Nonetheless, our focus is on the setting within which people interact with their environment and in doing so engage in productive and/or consumptive activities or practices; we are interested in the complete set of resources (however categorized) that comprise the “surroundings,” “setting,” or “context.” The openness of an environment may vary considerably and may be evaluated in different ways. Openness (restrictiveness) is ultimately a matter of degree. We may define a subset of “essential resources” for which common access and use is necessary for the environment to be open.<sup>5</sup>

## **2. Constructing environments through intellectual property law**

Scholars from many fields have examined the human phenomena of sharing and exclusion, or more broadly, cooperation and competition. In the field of intellectual property, the sharing/exclusion and cooperation/competition dichotomies present especially interesting and challenging puzzles. Those who create, invent, innovate, and participate in similar intellectually driven, productive activities necessarily borrow from or share with others. It is impossible to divest oneself from that which one has been exposed to, and inevitably, the intellectual products of past and contemporary “producers”(which we will use as a shorthand to refer to creators, inventors, innovators, thinkers, and so on) serve as inputs into each of our own productive activities. So, we necessarily borrow and share.

But at the very core of intellectual property is the right to exclude without which some producers would abandon their efforts for fear of free riding (unlicensed sharing) by competitors. Without some exclusion, (sharing-driven) competition would undermine incentives to invest in the production, development and/or dissemination of some resources in the first place. [*add familiar public good story*]

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<sup>5</sup> Frischmann, *An Economic Theory of Infrastructure*, supra note 2.

Intellectual resources<sup>6</sup> exhibit a set of characteristics that suggest a tendency to regard the resources as *naturally open*. Due to their nonrival nature, intellectual resources are naturally sharable in the sense that the resources can be accessed, possessed and used by multiple users at the same time.<sup>7</sup>

Intellectual property laws then may be seen as social institutions constructed to allocate rights to control access to and use of *some* intellectual resources. That is, intellectual property laws enclose some intellectual resources, making what would be naturally open, less open or more restricted. Yet intellectual property laws also circumscribe the very rights allocated, limiting the restrictivity and preserving some degree of openness, and critically, intellectual property laws do not enclose *all* intellectual resources.

## 2.1 The “Natural” Intellectual Environment

Perhaps the notion of a “natural intellectual environment” makes little sense or is too reliant on metaphors that do not fit, but we believe it is an important place to start.

Our goal is to describe the backdrop, the setting, the baseline from which intellectual property laws reflect a socially constructed deviation. From an abstract and relatively broad perspective, intellectual property laws can be seen as a targeted intervention that is aimed at a sector of activities and practices and particular subsets of intellectual resources; participants in debates about intellectual property laws argue about how well targeted the interventions really are, impacts across sectors, the relative “size” of the subsets, and the existence and desirability of expanding intellectual property laws. Nonetheless, a significant range of activities, practices and intellectual resources remain outside the (intended) scope of intellectual property regimes.

Not all intellectual resources can or should be intellectual property. Most people, if not everyone, will agree with this basic principle, although their reasons may vary. In fact, this might be the most important lesson taught in intellectual property courses. Learning what is excluded from the patent and copyright systems is as important as learning what is included.

The intellectual property regimes exclude many different types of intellectual resources based on many different criteria and doctrines. Our purpose here is not to catalogue them or fully describe what intellectual resources are not enclosed within the systems. Some would describe the complete set of non-enclosed resources as the public

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<sup>6</sup> Intellectual resources refer *broadly* to products of the mind. Intellectual system(s) refers broadly to the social systems by which human beings generate, distribute, interact with, and relate to intellectual resources. There are many overlapping (sub)systems that operate within market and non-market contexts.

<sup>7</sup> For nonrival resources, the marginal costs of allowing an additional person to access the resource are zero. This opens the door to widespread access, possession and productive use of the resource. *See* Frischmann, *supra* note 2.

domain.<sup>8</sup> In fact, a vast amount of intellectual property scholarship has explored the contours of the public domain and debated whether the public domain is shrinking and subject to persistent enclosure efforts—the so-called Second Enclosure Movement.<sup>9</sup> The public domain then can be seen as a vast pool of resources openly accessible and openly usable without seeking the permission of anyone else.

As Julie Cohen has argued, this (sort of) conception of the public domain may lead to a meaning too closely tied to geographic place—that is, of the public domain as a separate place.<sup>10</sup> Cohen argues persuasively for a more contextual understanding of the “common in culture” that is informed and shaped by cultural practices; she develops the notion of a “cultural landscape” within which we all exist and within which and with which we engage in cultural practices. Our conception of environment(s) relates to Cohen’s cultural landscape model as it similarly integrates a more dynamic and contextual understanding of intellectual resources.

- We might say that the “natural” intellectual environment encompasses all that we *inherit* and *experience*.
  - We inherit the natural physical environment; live within, use, interact with, and change it; and pass it on to future generations. Similarly, we inherit, live within, use, interact with, change, and pass on an intellectual environment (comprised of many overlapping (sub)environments if one would like to distinguish culture(s), science(s) and so on).
  - Experience constitutes an important intellectual resource that simultaneously relates human beings to their inherited and evolving environment(s) and constitutes a resource that may shape the intellectual environment. Experience (or perception or observation) is not enclosed within intellectual property regimes except when expressed and embodied in a particular qualifying form.

The backdrop from which intellectual property regimes emerge and build is complex and rich. At this point, we have not developed an adequate description. It should suffice to say that the natural intellectual environment consists of a vast pool of

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<sup>8</sup> See Pamela Samuelson, *Enriching Discourse on Public Domains*, 55 **Duke Law Journal** (forthcoming 2006); Pamela Samuelson, *Mapping the Digital Public Domain: Threats and Opportunities*, 66 **Law & Contemp Probs.** 147 (2003); James Boyle, *Foreword: The Opposite of Property?*, 66 **Law & Contemp Probs.** 1 (2003); James Boyle, *The Second Enclosure Movement and the Construction of the Public Domain*, 66 **Law & Contemp Probs.** 33, 68 (2003); David Lange, *Recognizing the Public Domain*, 44 **Law & Contemp Probs** 147 (1981). See generally Symposium, *The Public Domain*, 66 **Law & Contemp Probs.** 1 (2003). See also Michael Madison, *Legal-Ware: Contract and Copyright in the Digital Age*, 67 **Fordham L. Rev.** 1025 (1998) (using the environmental metaphor of “open space”).

<sup>9</sup> Boyle, *supra*; Samuelson, *supra*; Symposium, *The Public Domain*, 66 **Law & Contemp Probs.** 1 (2003).

<sup>10</sup> Cohen, Julie E., “Copyright, Commodification, and Culture: Locating the Public Domain” . *THE FUTURE OF THE PUBLIC DOMAIN*, L. Guibault & P.B. Hugenholtz, eds., pp. 121-166, Kluwer Law International, 2006 Available at SSRN: <http://ssrn.com/abstract=663652>.

open intellectual resources within which and with which we experience life and engage in a wide variety of activities and practices.

## 2.2 Intellectual property regimes as semicommons arrangements<sup>11</sup>

Intellectual property regimes are socially constructed institutions that allocate rights to control access to and use of *some* intellectual resources—hereinafter, we'll refer to this subset of intellectual resources as *intellectual works*. The design, allocation, and circumscription of these rights reflect social choices about how to manage or delegate management of intellectual works.<sup>12</sup> In essence, intellectual property regimes structure relationships among potential resource users and requires/facilitates transactions between owners and other potential users.

Intellectual property regimes create a complex mix of commons and private rights, semicommons arrangements.<sup>13</sup> Frischmann and Mark Lemley explain how (1) on one hand, the private rights components of intellectual property laws are designed to internalize some externalities; improve supply side incentives to invest in the production, development, and dissemination of intellectual works; and thus improve markets for intellectual works; and (2) on the other hand, the commons components are designed to

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<sup>11</sup> Further, the semicommons model works not only at the institutional and "collective" levels (pools, CROs, open source, etc.) but also at the level of the individual "work," "patent" (or "claim"), and even "mark" (if we wanted to address TM), through the strength/leakiness of the definitional rules. It sounds strange to talk about a "work of authorship" as a semicommons, but given the abstraction inherent in the idea of "a work," it's the same kind of social construct, and we have the same kind of ability to manipulate the salience and porosity of the boundaries. You can repeat the exercise with patents and patent claims. This is a clearer application of Madison's "things" paper and also connects with Frischmann and Lemley's Spillovers paper.

<sup>12</sup> See Brett Frischmann & Mark Lemley, *Spillovers*, **Columbia Law Review** (forthcoming 2007).

<sup>13</sup> According to Henry Smith:

In a semicommons, a resource is owned and used in common for one major purpose, but, with respect to some other major purpose, individual economic units--individuals, families, or firms—have property rights to separate pieces of the commons. Most property mixes elements of common and private ownership, but one or the other dominates. A person has private rights to the moving spot of the highway that her vehicle occupies, but a highway is considered to be a "commons" because that is its more significant aspect. Similarly, a parcel subject to an easement for emergency services is considered to be "private." In what I am calling a semicommons, both common and private uses are important and impact significantly on each other.

Smith, Henry E. (2000). "Semicommon Property Rights and Scattering in the Open Fields," 29 **Journal of Legal Studies** 131-169. The various relationships between the common and private uses of intellectual property are explored in Heverly, Robert A. (2003). "The Information Semicommons," 18 **Berkeley Technology Law Journal** 1127-1189.

promote spillovers.<sup>14</sup> They then explore the private and commons components of both copyright and patent law.

For our present purposes, it is sufficient to note that the semicommons design of intellectual property regimes reflects social choices about how the intellectual environment(s) should be structured. Intellectual property regimes, like other resource management regimes, determine both the *degree of openness/control* and the *assignment of control* (who gets control and how do we expect it to be exercised). Intellectual property regimes establish default arrangements that structure relationships among people with respect to specific resources (intellectual works), and thus in a sense, determine the openness/restrictiveness of that environment.

### 2.3 The patent law (default) environment

*{add basic description}*

*legal contours and semicommons structure:* As Frischmann and Lemley explain in *Spillovers*:

Patent law, like copyright, is a semicommons that promotes both ownership of rights and spillovers, though the particular ways in which patent law permits “leakage” differ significantly from copyright law. Patent law has a much shorter duration than copyright, permitting inventions to enter the public domain more quickly, and also excludes some inventions from protection with stronger requirements for protection. Once an inventor does obtain protection, however, they obtain a right that is much stronger and less leaky than copyright law.

Patent law promotes spillovers in several ways. Patents generate externalities by facilitating learning and disclosure. Indeed, patent law (unlike copyright law) requires the patent owner to teach the public how to make and use the invention, and this is often identified as a central function of the patent system, though in practice it is considerably less important than the incentive effects of the system. Patents lead to temporal externalities—spillovers upon the expiration of the patent. Because inventions tend to have more staying power than creative works, those temporal spillovers are quite significant. The overwhelming majority of the social benefit associated with the telephone (and for that matter the paper clip) occurred after the basic patents on those technologies expired.<sup>15</sup>

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<sup>14</sup> See Brett Frischmann & Mark Lemley, *Spillovers*, **Columbia Law Review** (forthcoming 2007).

<sup>15</sup> *Id.* (footnotes omitted).

*Add description of different sub-environments?—different industries; patent portfolios; thickets }*

## **2.4 The copyright law (default) environment**

*{add basic description*

*legal contours and semicommons structure:* As Frischmann and Lemley explain in *Spillovers*:

Copyright is a system designed to generate both incentives and spillovers. Copyright law creates a semicommons arrangement—a complex mix of private rights and commons. The private rights component of copyright law—specifically, the Section 106 rights to reproduce, display, perform, distribute, and make derivative works —provides incentives to create and disseminate works by facilitating transactions and lowering the costs of excluding competitors from using the expression. Critically, the supply side incentives that copyright affects extend beyond the initial investment in creation to investments in development and dissemination of content. It is not just creation but publication, dissemination, and productive use of works that must also be encouraged. Like traditional property rights, copyright facilitates transactions over certain uses of creative expression and certain sets of relationships between creators, disseminators, and consumers. It thereby enables rights holders to appropriate some of the surplus generated by their investments in creation, development, and dissemination. In this fashion, the private rights component of copyright law improves investment incentives through the operation of the market mechanism, in a sense using the market to achieve a broader set of economic and social ends.

The commons component of copyright law promotes spillovers. Through a variety of leaks and limitations on the private rights granted, copyright law sustains common access to and use of resources needed to participate in a wide variety of intellectually productive activities. Many of these activities generate socially valuable spillovers: value realized by consumers, users and third parties that is external to a creator’s decision to produce the work and to any transactions involving the work. For example, due to its limited duration, copyright has generated temporal externalities. A work that enters the public domain is free for public use, and the value derived from such use is external to the creator’s decision to produce the work and to any transactions involving the work. Similarly, due to copyright’s limited scope, copyright generates externalities that accrue to other creators, even competitors, as these entities can freely use various unprotected elements of a work, such as an idea, theme, or functional feature. Copyright’s limited scope may also generate

externalities in complementary technology markets as companies design and build products like DVD players and iPods that facilitate the enjoyment of copyrighted works. Finally, copyright produces externalities when consumers make productive (re)use of the works they consume. Creating and consuming creative expression of different types develops human capital, educates, and socializes in a manner that benefits participants (that is, creators and consumers) and nonparticipants.<sup>16</sup>

*Add description of different sub-environments?—different industries; collective organizations; extremely low qualification criteria and absence of formalities leads to massive proliferation of rights; orphan works }*

### 3. Understanding pooling arrangements

Patent and copyright laws construct particular environments with default boundaries. Pooling arrangements represent contextually driven deviation from the default, at times leading to improvements that would not be attainable without the initial set of exclusionary rules, but also at times leading us to question whether the pooling arrangement is created to overcome the exclusionary rules.<sup>17</sup>

In more functional, descriptive terms, we would like to be able to distinguish between (1) pooling arrangements that arise as solutions to collective action, coordination, or transaction cost problems that exist apart from intellectual property rights (and perhaps would not be solvable without intellectual property rights), and (2) pooling arrangements that arise as solutions to collective action, coordination, or transaction cost problems that exist only because of the intellectual property rights themselves (for example, to overcome an anti-commons problem). The first type might involve instances of cooperative behavior where members construct an open environment where resources are pooled and productively used by members. It also might involve collective management organizations and coordination in the setting of standards, instances where members cooperate for a limited specific purpose. The second type might involve arrangements that are essentially networks of cross-licenses designed to sustain individual members freedom to operate and in that sense open an otherwise overly restrictive environment, but not designed to facilitate cooperation in the more involved sense of sharing and collaboration.

Pooling arrangements may exist for additional reasons as well, of course. Most obvious is the case of members colluding to restrict competition. We would like to be

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<sup>16</sup> *Id.* (footnotes omitted).

<sup>17</sup> One normative concern of this project is to examine when a patent or copyright pool is simply a reflection that we would be better off without patents or copyrights in the first place (start with an open access commons) and when it is a reflection that we are better off with a constructed commons arrangement that could not be established without the underlying rights to exclude (e.g., a membership commons or club). Of course, these are not the only possibilities.

able to distinguish pooling arrangements that operate as cartels. At a rather basic level, one important distinction is that the actual functional purpose of cartels is different from the arrangements noted above; that is, cartels are not designed to create an open environment where resources may be shared and productively used by members or to sustain individual members freedom to operate. But the difficulty antitrust officials face is identifying legitimate and illegitimate arrangements because the latter may be disguised as the former.

Another type<sup>18</sup> of pooling arrangement that we would like to examine concerns arrangements designed to bridge the gap between systems of intellectual production. The research environments for industry, government, and academia, while very different, are interdependent and intersect in complex ways. Intellectual property rights play an increasingly important role in mediating the relationships between these systems and in facilitating pooling arrangements among actors that wish to build better bridges between the systems.<sup>19</sup> Depending on the context, it may be the case that this type of pooling arrangement turns out to be an example of the first type—an arrangement designed to solve a coordination problem, the second type—an arrangement designed to overcome an anti-commons problem, or both.

#### **4. Patent and copyright pools**

Intellectual property pools can be defined in broad or narrow terms. We adopt the following broad definition: An intellectual property pool is an arrangement by which two or more parties structure their relationships to mutually benefit from the shared exploitation of their intellectual property. The arrangement may involve the creation of a

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<sup>18</sup> We fully expect that our descriptive typology of pooling arrangements may grow to include additional broad categorical types and become more nuanced as we recognize subtypes. We also anticipate that the actual pooling arrangements we study will fall within more than one category.

<sup>19</sup> See Brett M. Frischmann, *The Pull of Patents*, Working Paper (2006) (“Specifically, the current trend envisions universities as active participants in the post-patent commercialization process, and critically, in the part of the process that bridges the gap between invention and innovation. Bridging this gap is critical to the commercialization process and, as Auerswald and Branscomb have argued, a bridge may be collectively built by university researchers, entrepreneurs, venture capitalists, and other interested parties in a sort of collective entrepreneurship.”); Philip E. Auerswald & Lewis M. Branscomb, *Start-ups and Spin-offs: Collective Entrepreneurship Between Invention and Innovation*, in *THE EMERGENCE OF ENTREPRENEURSHIP POLICY* 61, 79-80 (Ed., David M. Hart 2003).

separate entity to manage pooled patents; it may involve a set of cross-licenses;<sup>20</sup> it may involve a set of complex rules regarding membership, or it may be less formal.<sup>21</sup>

According to Lerner and Tirole, “[t]here is now widespread agreement among policymakers and economists that patent pools may benefit both intellectual property owners and consumers, provided that the pools include patents that are complementary or blocking.”<sup>22</sup> Pooling arrangements may provide an effective means for solving the “complements problem,” where producers of complementary patented inputs may inefficiently burden production or utilization (through licensing or holdup) and innovation and commercialization (through the prospect of licensing or holdup).<sup>23</sup> Whether due to royalty stacking in the context of a thicket of rights or holdup in the standard setting context, pooling arrangements may provide an efficient solution that benefits competitors and consumers alike.

While the potential benefits of pooling arrangements are well recognized, so are the potential costs. In particular, pooling arrangements are subject to scrutiny under antitrust laws because of their potential anticompetitive effects. Antitrust considerations aimed at filtering legitimate from illegitimate pooling arrangements may focus on distinguishing pooled assets that are truly complementary assets from those that are only substitutes. Antitrust officials are more comfortable with pools that only include

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<sup>20</sup> Josh Lerner & Jean Tirole, *Efficient Patent Pools*, at 2 (August 5, 2002); (“A patent pool is an agreement among patent owners to license a set of their patents to one another or to third parties.”); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting*, in A. JAFFE, J. LERNER, AND S. STERN EDS., *INNOVATION POLICY AND THE ECONOMY*, vol. 1, Cambridge: MIT Press (2001) (“Under a patent pool, an entire group of patents is licensed in a package, either by one of the patent holders or by a new entity established for this purpose, usually to anyone willing to pay the associated royalty.”).

<sup>21</sup> In future work, we will evaluate the contours of different pooling arrangements with an eye on developing an understanding of the structural differences across arrangements and industries as well as the underlying contextual reasons for such differences. Among other things, we will consider rules pertaining to membership criteria, contribution and use of pooled resources, internal licensing conditions, management of external relationships (licensing conditions—e.g., package or menu; whether independent licensing is permitted), and institutional form. In addition, we’d like to study:

- The degree of collaboration among members
- Sharing of human capital
- Degree of integration among participants
- Whether there is a specified purpose to the arrangement

As these considerations suggest, we are likely venturing beyond mere intellectual property pools into the realm of joint ventures.

<sup>22</sup> Lerner & Tirole, *Efficient Patent Pools*, at 2.

<sup>23</sup> See Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting*, supra. As Shapiro explains, the complements problem and holdup problem are distinct and lead to “a volatile mix of two powerful types of ‘transaction costs’ that can burden innovation.” *Id.* at [draft p. 8].

“essential” patents, meaning those that cover complementary assets and for which there are no substitutes external to the pool. Of course, as Lerner and Tirole explain, many assets can be both complements and substitutes depending upon the context and the licensing fees.<sup>24</sup>

[bridging the gap between (1) the view of pools as collective transactional arrangements designed either to overcome an identifiable complements problem or to restrict competition, and (2) a broader view that entertains the possibility of building an open—collectively accessible and usable—environment, (a collectively built and managed intellectual infrastructure?).]

[Lerner and Tirole’s work on the economics of technology sharing]

[*patent examples*: long history with many to consider; biotech, software, industry standards]

[*copyright examples*. Open source software, music licensing, creative commons, collective management; collective decision not to manage]

## **5. Regulating and facilitating intellectual property pools**

In future work, we will examine different institutions that regulate and/or facilitate pooling arrangements. Antitrust law is the most prominent body of applicable regulation, but we also envision a careful examination of patent, copyright, trademark, and anticircumvention laws to determine their role in regulating and facilitating pooling arrangements.

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<sup>24</sup> Lerner & Tirole, *Efficient Patent Pools*, at 2.