Chapter #

THE NEXUS OF STANDARD SETTING ORGANIZATIONS, INTELLECTUAL PROPERTY, ANTITRUST AND ACADEMIA.

Standard Setting for the Semantic Web: Legal and Social Issues and Implications

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Abstract: Bioinformatics represents a paradigm shift in basic science research, requiring the interoperability of numerous diverse and distinct databases. The Semantic Web, through its standards, tools and languages, will give research labs, particularly bioinformatics labs, the ability to easily and automatically integrate across the varied biological databases. Although Berners-Lee eschewed proprietary standards in the creation of the web, favoring royalty free standards, there are still numerous legal concerns with regard to the standard setting process, particularly implications for antitrust and intellectual property law. This chapter will describe the social process of creating standards within academic science, and outline some of the legal concerns – particularly related to antitrust and intellectual property issues, making some suggestions that might assist the regulation of difficulties of a legal nature in standardizing data and prevent a legal morass from arising out creating and setting standards for the Semantic Web.

Key words: Standards; Bioinformatics; Antitrust; Intellectual Property; Policy.

1. INTRODUCTION

The growing abundance of web based science data has resulted in the development of diverse tools and algorithms for accessing data. The

Semantic Web, as a methodology for making all data on the web machine-readable, is an ideal technology for e-science. In our view, the standardization necessary to accomplish the goals of an e-science-ready Semantic Web requires the incorporation of intellectual property by a standard setting body into the underlying standards of the Semantic Web, and the promulgation of these standards throughout academic and commercial science. The creation of standards, particularly when they involve intellectual property,[1] can raise antitrust issues,[2] although the courts are somewhat vague as to the extent of the specific antitrust concerns. A further issue is the possibility of standards arising out of academia –both as owners of intellectual property incorporated into the standard, and as actual actors in the standard setting process; the courts have been even vaguer as to the antitrust consequences associated with non-commercial academic actions.

The surprising idea that academic institutions would be involved in creating industry wide computer and software standards that could potentially involve university owned patents that control real and relevant antitrust concerns is a product of a pair of paradigm shifts: Bayh Dole, in introducing intellectual property rights to American academic research as a way to foster innovation,[3] has prompted a shrinking of the public domain, an expansion of academic patent portfolios, and the abandonment of many of the Mertonian norms that supposedly differentiated academia from industry.[4]

Additionally, high throughput research techniques in genomics and proteomics have led to an influx of data, large-scale, real-time collaborations, and computationally heavy applications through on-line research tools and databases. Bioinformatics labs have produced a vast array of databases and tools designed to mine and analyze the data deluge. There is however, rarely any consistency among the interfaces of these tools leading to significant interoperability issues.[5] This situation necessitates the need for technologies such as the Semantic Web to provide interoperability to the vast universe of web-based scientific data.

One of the many interesting issues in the creation of the Semantic Web is an understanding of how technologies and ontologies originate. Scientists in their particular specialisms need to collaborate in standardizing ontologies and other Semantic Web technologies; this is not a simple task: for instance, an ontology that describes a person's directory entry, his location, a friend, his parents and so on and so forth, and has to standardize all these terms. This is fairly straightforward to do in familiar context, however, when setting standards for a specialized scientific context such as that which relates to genomics or proteomics, it is immediately clear that the relations and the definitions are going to be somewhat complicated: one might have to define a link from a protein to its original gene sequence or to

the gene's location on the chromosome or to another protein that it interacts with. Each of these relations has to be specified.

Further, the process of setting standards in relation to genomics and bioinformatics is a complex. When trying to create an ontology one would like the direct participation of the people with the technical knowledge. However, these people are rarely the most knowledgeable regarding the structure of an orderly social process to enable a definitive and consistent consensus to be reached. Additionally, most people are blind to the resulting legal issues that may arise from the setting of standards.

2. STANDARDIZATION

> Standards are critical to the long term commercial success of the Internet as they can allow products and services from different vendors to work together. They also encourage competition and reduce uncertainty in the global marketplace. Premature standardization, however, can "lock in" outdated technology. Standards also can be employed as de facto non-tariff trade barriers, to "lock out" non-indigenous businesses from a particular national market. The United States believes that the marketplace, not governments, should determine technical standards and other mechanisms for interoperability.[6]

2.1 Standards

Standards can be broadly defined as "any set of technical specifications that either provides or is intended to provide a common design for a product or process."[7] These range from the complex - set of application-programming interfaces that defines compatibility with Microsoft Windows, to more simple things like electrical plugs and outlets which have standardized voltage, impedance, and plug shape.

2.2 Need for Standards

With the diversity of interfaces and tools there comes a critical need for standards to create a more homogenous, and efficient environment for scientific research. In addition to the considerable time expended to massage diverse datasets,[8] there are also a concerns relating to the extensive

error that is introduced through the integration process of these assorted data sets.[9]

Winning the acceptance of any standard within a scientific discipline is never easy. Standards have existed throughout science's history, the majority of them a failure.[10] Too basic, more information needed. It can become even more difficult if someone, some university, or some corporation has the intellectual property rights to the standard.

The Semantic Web may help ameliorate many of the general standardization issues, or at least address most of them relatively early, through the use of new technologies that change the way we interface with web-based scientific data. Principally, the Semantic Web aims to change much of the human contribution to data integration. Through the creation of widely accepted standards, the Semantic Web promises to make web based data machine readable and parsable through the creation of "common formats for interchange of data, … [and a] language for recording how the data relates to real world objects," i.e.: metadata.[11]

The Semantic Web is a creation of Tim Berners-Lee, the original inventor of the World Wide Web. It comprises a number of layered and interlinked technologies such as explicit metadata, ontologies, as well as logic, inferencing, and intelligent layers. Present technologies include: XML, RTF and OWL.[12] The key idea in the Semantic Web is that whereas in the original web technologies there is no meaning or semantics associated with hyperlinks connecting different web pages, in the Semantic Web, each hyperlink is in turn linked to a special ontology definition file that defines the type of link or the meaning behind the link. For instance, one might have a link from a person to his directory entry and this link would then in turn be described as a directory entry link. In this way, one can traverse the web in a more meaningful way. Thus, the Semantic Web and its tools promise to be particularly useful for automatic computer parsing and interpretation, and will be especially useful for e-science.

Uniform standards are essential not only because they are required for interoperability, but also because in this instance, as in many instances of new technology and innovation, standards are required to lessen the risk for innovators. Moreover, uniform standards further promote innovation by creating a "technical baseline for incremental product improvement" and development.[13] With the "Semantic Web technologies … still very much in their infancies … there seems to be little consensus about the likely direction and characteristics of the early Semantic Web."[14] Thus, the need for a well designed and rigorous standard setting process that both incorporates the best technology available, but avoids potential societal and legal pitfalls, cannot be understated.

2.3 Types of Standards

There are generally two types of standards employed by standard setting bodies: Open and closed (proprietary) standards. Open standards, i.e. those that are typically favored by many non-commercial bodies and the W3C,[15] are not controlled by any single party: all market participants are free to access the specifications, source code, and APIs to incorporate them into their product. Note however that even so-called open standards are sometimes somewhat proprietary; e.g. many open-source software programs are licensed under the General Public License (GPL) which, while free, does impose (potentially legal[16]) liability and requirements on its signatories.[17] While there are many reasons to favor open standards in developing technologies, including price competition among developers and the resulting consumer surplus,[18] often we have to balance perceived benefits of open standards against consumer welfare that may be better off through the incorporation of better technology available only via closed standards.[19]

Open standards also lend themselves to fragmentation, which may hurt downstream users in the long run. UNIX is a prime example of such an instance wherein many of the different forms emanating from the Bell Labs precursor of UNIX were no longer compatible with each other.[20] Intellectual property rights can, to some degree, prevent this fragmentation.[21] Finally, a requirement for open standards may also be potentially illegal under American antitrust law.[22]

Closed or proprietary standards usually depend on patents owned by either other members of the standard setting body, or individuals and firms outside of the standard setting organization. And while many antitrust issues are limited to issues of closed standards, [23] closed standards are typically of greater benefit to the standard setting bodies as often better technologies rely on patents to recoup the costs of development.[24]

"There is a voluminous literature on the relative value of open and closed standards, especially in network industries, and a vociferous debate over the merits of both approaches."[25]

Often standards may be a hybrid of both open and closed components. The sheer volume of standards may necessitate this result since, especially with complex technologies, standards will often affect *someone's* intellectual property.[26]

2.4 Methods for setting standards

Standards are set by numerous different organizations with varying degrees of compliance, formality and enforcement. Depending on many

different aspects of the standard and the organization setting the standard, they can be viewed as either a burden or a positive aspect within the industry.

Typically though, what tends to happen is that various proposals will spring up and some will immediately catch on and predominate. In other situations, one will see a number of competing proposals - and these will be sorted out by various mechanisms. Sometimes there are meetings where all the participants get together and agree to put together their respective standards into a common standard. At other times government directives may lead to one standard being preferred to another.

The scientific community involved in creating particular technological standards and ontologies obviously receives a lot of credit from the adoption of these standards, in a similar fashion to the way a company would want to receive payments or royalties from the adoption of it's standards. Thus, many vested interests usually come into play when people are arguing about standards.

Another complicating factor, is that for many of these technical areas – the technical areas themselves are incompletely understood at the time the standard is devised. The field evolves while the standard is being defined - and one of the most powerful mechanisms for reaching consensus on standards is for the field to evolve beyond two competing standards. And for the respective opponents of those standards to realize that the field has moved beyond them and that they have to update and perhaps merge their standards. This has happened to some degree in relation to gene expression and protein interaction definitions - where the field is very quickly evolving, and the original definitions were seen as fairly simplistic and although they had to be modified to keep up. In the software industry, where often just the pure technological pace will rapidly cause one standard to be superceeded.

Independent of the process for creating standards, they are only useful if they are accepted throughout academia or industry. To this end, there are numerous ways that standards are created and become accepted by the community at large: (i) Standards can be created through market and network effects, where the standard is chosen primarily by the consumers, the first company to enter the market, or the corporation with the largest market share. (ii) Standards can be created by standard setting organizations with varying degrees of formality; and (iii) the government can impose a set of standards on an industry.

2.4.1 Network Effects

Network effects are often the result of complex social organizations and multifaceted hierarchical structures that result in the consumer, sometimes randomly, choosing one standard over another.[27] For example: In choosing VHS over the Betamax standard, consumers on their own gradually abandoned the superior Beta for the VHS standard. As the market for Beta movies began to shrink, more and more consumers opted for VHS, thus enhancing the network effects driving people over to VHS. Network effects that result in de facto standards lack any defining affirmative collective manipulation by competitors in the field, and as such rarely become an issue with regard to antitrust.

2.4.2 Government standards

Through promulgating regulations, government bodies can apply widespread and enforceable standards on an industry (e.g. telephone interfaces or HDTV). One area of concern here is the advantage that a well placed lobbying group can obtain through the incorporation of their intellectual property into a government enacted regulation, that may spell out government mandated requirements. Moreover, those companies that successfully petition to have their intellectual property accepted as part of the government standard are often immune, under antitrust doctrine from antitrust liability.

2.4.3 Standard Setting Bodies

There are a multitude of different types of standard setting bodies with varying degrees of regulation and enforceability: Standards may be set up by ad hoc consortia that form primarily to choose a unified standard or standards, or they can be set by longstanding bodies such as ANSI or IEEE. Most, if not all standard setting bodies are voluntary in nature.[28]

While SSO's are generally perceived to relieve inefficiencies in the market, primarily by requiring interoperability between different interacting components as well as limiting overlap and waste associated with competing technologies, there are often a number of inefficiencies associated with standard setting organizations that are often not appreciated.

Standard setting bodies are made up of self interested groups and individuals, often unwilling to pay royalties for someone else's intellectual property when they can establish a standard (potentially, substandard) that is not controlled by a third party's intellectual property portfolio and that would be royalty free. In economic terms though, this could potentially be

bad for society. Succinctly: Royalty payments are a transfer payment from the IP owner to the IP user with no net loss or waste to society (If the IP systems functions as it should). Thus, while corporations may be unwilling to pay a royalty for usage of a technology in their standards, that royalty fee has no cost to society as a whole, but the decision to choose a less than optimal standard, precisely because of a royalty fee could be significantly harmful to consumers.[29]

Although there are potential negative effects resulting from the setting of standards, there are also numerous pro-competitive effects resulting from the setting up of interoperability standards through standard setting bodies. Standardization within an industry facilitates price competition between rivals for products that are truly interchangeable because they are based on the same set of standards; standardized interoperability avoids duplication of efforts, such that there are not two or more competing teams that are involved in incompatible and non-interoperable innovations; and finally, standardized interoperability can promote innovation by providing stability to the industry.[30]

3. BACKGROUND OF THE LEGAL ISSUES IN THE U. S. A.

3.1 Patents

The United States Constitution provides for patent rights for inventors in an effort to promote the progress of science and the arts.[31] Patents differ from tangible property in that they are not truly property: rather they are entities, bundles of government granted rights, whose boundaries are designed by Congress, dictated by law, and have the overarching goal, at least in the US, to maximize utility.[32]

To obtain patent protection on an invention, a patentee must, in addition to disclosing her invention and providing detailed descriptions as to the optimal implementation of that invention, prove to the United States Patent and Trademark office that the invention is novel, non-obvious and useful. In return the USPTO grants the patentee the rights to exclude others, including competitors, from making, using or selling the invention in the United States for 20 years. This provides incentives to innovate, disseminate information, and allow for structures that can be used to commercialize inventions (i.e.: licensing patents). It is intended that at the end of the patenting process the invention will be brought to the market for public consumption and benefit.

There are some downsides to intellectual property, including the discouraging of follow-on innovation.[33] Also note that the laws and regulations of intellectual property do not require that the patentee ever license her innovation, potentially tying up technology for the duration of the patent protection.[34]

The usefulness of patents is constantly debated and many distinguish their usefulness among different industries, i.e. drug development vs. software development.

The United States and only a handful of other countries allow for the patenting of software.[35] Some allow such patenting only indirectly, through association with a patented machine.[36] It has been noted that the software industry has been, and continues to be, very successful, seemingly without relying on patents,[37] and some commentators argue that patents in this area may not provide additional incentive to innovate.[38] Many even claim that they are anti-innovative.[39] Still, computer software manufacturers, particularly those that produce the off-the-shelf, utility-type software, apparently rely heavily on intellectual property protections, particularly given the ease of pirating software.[40] The Federal Trade Commission has noted many problems with the level of software patenting in the United States, suggesting that it can "deter follow-on innovation and unjustifiably raise costs to businesses and, ultimately, to consumers."[41] Still, the present situation will not change in the near future and many algorithms and other software components associated with the Semantic Web may be protected through intellectual property rights such as copyright and patent.

3.2 Antitrust

Although the American Federal Courts have never found a definitive statement of policies to define the Sherman Act, the wellspring from which all subsequent antitrust policies arise, one of the main goals of antitrust laws is to make sure that the markets are competitive and promote efficiency.[42] While, somewhat elaborated on by the Federal Trade Commission and Clayton Acts of 1914, the concise Sherman Act of 1890 represents the keystone of antirust law in the United States. The Sherman Act is divided into multiple sections, of most relevance here are the first two: Section one states that "Every contract, combination in the form of trust or otherwise, or conspiracy, *in restraint of trade or commerce* among the several States, or with foreign nations, is declared to be illegal."[43] Section 2 states that "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the

trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony."[44] This section would potentially come into play if a firm unilaterally refuses to license their patent if that allows them to maintain monopoly power, and that monopoly power does not benefit consumers.[45] However, the courts have ruled that in the absence of extraordinary circumstances it would not hold a refusal to license as being anticompetitive.

The Act, while enforced by the Federal Trade Commission (FTC) and the Department of Justice (DOJ), still allows individuals a right to sue others for antitrust violations.[46]

In the past, courts were swayed by the Chicago School of antitrust policies,[47] i.e. where consumer welfare is given a prominent place in the evaluation of monopolistic policies. More recently scholars and courts have begun to take into account other important policies in antitrust issues, including network effects and large-scale innovation concerns.[48] "Innovation becomes more and more the engine that drives consumer welfare … In many ways, innovation is the heart of the new economy."[49]

The courts in a putative antitrust action examine any and every potential restraint of trade through one of two lenses. Actions that are inherently anticompetitive are deemed, without further inquiries, under a 'per se' rule, to be illegal, independent of the purported consumer benefit or social welfare goals.[50] Alternatively, actions that are not inherently anticompetitive in their nature, but are potential antitrust violations are viewed under the 'rule of reason' lens, where courts weigh numerous factors within the context of the entire market to determine whether an antitrust violation has occurred.

While the Sherman Act would seem to apply principally to businesses and to other for profit entities, academic institutions have recently also become targets of antitrust cases. Since the 1970's it has nevertheless been somewhat unclear as to whether the courts had set an antitrust exemption for academic institutions, in particular when they are not involved directly in commercial efforts, such as financial aid. Courts have tended to grant professional and academic organizations a little bit more leeway in antitrust issues, usually viewing any purported antitrust violation, even those commercial in nature, through the rule of reason lens.[51]

4. STANDARDS & ANTITRUST

4.1 Potential Problems

The monopolistic powers granted to owners of intellectual property rights would seem to conflict with the stated goals of antitrust legislation. Nevertheless, the US government has come to the conclusion that "competition [laws] and patents are not inherently in conflict.[52] Patent and antitrust [laws] are actually complementary, as both are aimed at encouraging innovation, industry, and competition." [53]

Thus, according to the FTC and the DOJ, patents do not necessarily confer monopoly power and do not unreasonably restrain or serve to monopolize markets. Moreover, even when it seems that a patent does confer monopoly power, those powers are limited by patent rules and regulation and, as such, antitrust laws and regulations recognize that patents can promote greater completion and significant gains to consumers.

Both the FTC and the DOJ note that patents can have a detrimental effect on competition, and conversely, that antitrust laws can potentially "undermine the innovation that the patent system promotes if overzealous antitrust enforcement restricts the pro-competitive use of a valid patent."[54] Of particular interest are the safe harbor provisions that allow for the licensing of intellectual property without the fear of antitrust implications. Under these provisions, the DOJ and the FTC recognize the pro-competitive nature of intellectual property and the licensing of that property and will, if necessary only analyze IP licensing under a rule of reason framework. This allows for the assessment of both the pro-competitive and anticompetitive issues before coming to any conclusions with regard to antitrust infringement.[55]

Standards with or without associated patents raise numerous issues at the intersection of antitrust and intellectual property.[56] Standards are pro-competitive when they promote innovation or ensure product quality, potentially even improving competition among competitors.

In other situations, however, standards can illegitimately raise prices, facilitate collusion, restrict competition or deny membership to competitors, keeping them out of the market; antitrust regulators are always wary of multiple parties getting together in commercial settings. The following non-exhaustive list describes possible reasons for such concerns.

1. Boycott: Primarily, there is a perception that of all parties who have chosen to accept a standard will endure a de facto boycott by those other competitors who are disfavored by the standard.[57]

2. Vested Interests: Abuses may occur when the standards are devised in line with vested interests of a few of the participants, at the expense of the public, especially when the standards go beyond the needs of interoperability.[58]
3. Coordinated Monopolies: Standards can serve to reduce the differentiation between competing products which might further facilitate and promote coordinated behaviors that would raise antitrust concerns.[59]
4. Consumer Deprivation: Consumers may be deprived of innovation that would have occurred had the particular standard not been accepted
5. Consumer Welfare: Consumer welfare may suffer through the sole incorporation of open standards at the expense of closed standards. Teece and Sherry note that, in terms of overall economic efficiency, royalty payments by members of a standard to an owner of intellectual property associated with the standard is a transfer payment that represents no net cost to society.[60]
6. Consumer Manipulation: Consortia can manipulate consumers into accepting a standard that would create monopolistic powers by hindering innovation in a market that might otherwise progress faster via 'leapfrogging innovation.'[61] Consumers are forced to accept particular standards in the face of an alternative: The costs associated with abandoning one technology in addition to the uncertainty that others will also chose the alternative technology and make leaving one standard a very costly ordeal for any one consumer.[62]
7. Innovation Deterrent: Individual innovating firms are deterred from pursuing some avenues that may not gain industry-wide approval.[63]
8. Anti-Competitive Licensing: There is also the potential for anti-competitive licensing agreements: either restricting the use of the technology or imposing significant royalties on other users.[64]
9. Commercial Advantage: There is a fear of potential unfair commercial advantages and windfalls by individual members of a standards body fraudulently manipulating the standard setting process.[65] Members can gain unfair windfalls either passively, through non-disclosure of a relevant patent, or actively, through lobbying for the acceptance of the relevant patent; and then, when the patent is incorporated into the standard, demanding a royalty from all adopters of the standard. While many would argue that the potential for a patent holder to do this might act as an incentive to have open standards, especially given the impossibility of actual finding such a patent.[66] An alternative view is to claim that the more patents associated with a standard the less bargaining power is held within the hands of each individual patent holder.[67]

Only one appellate court has found the refusal to license a patent to be an antitrust violation.[68]

Given their uncertainty within the skein of antitrust law, many standard setting bodies have vague and wide ranging rules relating to intellectual property to avoid antitrust liabilities.[69] While some antitrust issues are minimized through the usage of vague rules, such rules raise the alternative potential of litigation surrounding the exact interpretation of the rules. Thus, many standard setting bodies are faced with a Hobbesian Choice of either implementing strong and clear rules relating to the licensing of patents[70] and risk antitrust issues, or leave their policies vague and run the risk of litigation among the members of the group.[71]

4.2 ACADEMIA AND ANTITRUST

At first glance it would seem that the Sherman Act is designed for policing commercial entities,[72] and that some entities or actions, particularly those related to academia lack a "sufficiently commercial character to warrant regulation."[73]

The courts have more recently applied antitrust laws against parties that mix educational and/or not-for-profit components with business.[74] Nevertheless, the Supreme Court, in a footnote has noted that:[75] "The public service aspect, and other features of the professions, may require that a particular practice, which could properly be viewed as a violation of the Sherman Act in another context, be treated differently."[76]

This aforementioned footnote[77] has been used on multiple occasions to limit antitrust decisions against non-profits and educational institutions.[78] The judicial system has also, in the past, been somewhat deferential to doctors and professional defendants in antitrust suits.[79] (Outside of busting MD medical cartels. [80]) Most challenges to particular practices of the medical community have been unsuccessful. But the courts have been adamant in asserting that an antitrust claim revolves around the impact of a competitive decision made by a party, independent of any non-economic benefits that may accrue from the infringing action. Recent cases highlight the DOJ ambivalence towards academic institutions within the realm of antitrust[81]

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4.3 University Research Labs – Commerce or Not?

Although the courts have been reluctant to see academia as falling under antitrust regulations, this might change. Research labs are changing to

seem more like than unlike commercial labs.[82] Jennifer Washburn[83] and Derek Bok,[84] among others, note how universities are becoming more intertwined with large corporations. There are growing concerns that this commercialization of academia has resulted in publications delays or data that is kept secret or altered to satisfy corporate backers or patent law regulations.[85]

Thus, overall, it is important to discern where academic science sits in the eyes of public opinion and by extension, the DOJ and FTC.[86] Neither the courts nor the administrative agencies have promulgated any particular rules with regard to academia. Even without complete certainty to academia's place in antitrust, it is important to recognize that academia may no longer be immune to antirust actions resulting from standards created by academic members of standard setting organization. Given that their actions will most probably have effects on commerce and they may even have business interests as their primary goal, how would the government deal with a mixed group of academic researchers and industry members within a standard setting organization? Will there be a necessary minimum number of industry members before the standard setting organization is deemed commercial ? Can industry funded research even be termed academic or non profit?

It is clear from our analysis that the proliferation of standard setting bodies within science will continue as more diverse data is created and the need for interoperability grows. The advent of standard setting for the emerging Semantic Web provides yet another opportunity to test the antitrust waters, i.e. whether standard setting aids or hinders competition.

What remains unclear from this analysis is the effect of the law and judicial doctrine on academic standard setting bodies that may create standards involving intellectual property owned by a member or non-member of the body.

There is endemic confusion, lack of direction and no clear consensus:[87] It remains unclear to as to how the DOJ and the FTC will view academic standard setting bodies whose primary goal is academic advancement, but, given the present shift to an intellectual property aware society, who will also have a secondary goal of IP ownership and potential royalties and profits.

This uncertainty is not good. More so than most industries, academia is very risk averse. Clarity in both rules for standard setting organizations are needed, as well as clarity with regard to the relevant antitrust agencies.[88] The agencies charged with enforcing antitrust need to be explicit as to their position in relation to academic standard setting bodies.

5. POLICY CONSIDERATIONS

What is needed for academia, in light of its participation in the establishment of the Semantic Web, is consistency among all the relevant standard setting bodies.[89] Academics, more than lacking the time, tend to lack the will to involve themselves in subject matter that is deemed outside the scope of their research. It is very important that the Semantic Webs standard setting rules and regulations regarding intellectual property be straightforward and consistent. Academics are also unaware of the antirust issues, issues that are relevant both for their own patent portfolios as well as for those of their institutions.

Given the growing number of patents within academic community, primarily in the sciences, it is important that the Semantic Web standard setting bodies allow for standards to contain intellectual property. Because getting it right the first time is a key component of a successful standard, there ought to be no limitations on the IP status of the standard. Moreover, it is often important that someone own the standard as it prevents fragmentation and future interoperability issues.[90]

That said, there should be clear compulsory licensing provisions built into each standard setting body's rules. These licenses should be enforced independent of whether the patent holder knew of their intellectual property rights at the time of infringement, and independently of whether they disclose it or not. A requirement for membership ought to be the total willingness to abide by compulsory licensing for any and all of their intellectual property. Those who do not abide by these rules might be appropriately ostracized by their scientific community.

Standards do not have to be voluntary in nature. It may be more efficient for the government to impose the standards. This could be through the National Institutes of Health or the National Science Foundation. As the primary granting agencies in the country they can make, it a requirement for receiving funding, that the researcher provide their research data and results within the framework of an interoperability standard. The standard itself does not have to be devised by a government agency. In fact it may receive wider support if it's a grass roots rather than a grass tips sort of standardization process.

Finally, standard setting bodies ought to be as clear and transparent as possible and the rules and regulations ought not to be technically onerous for the members. If the technicalities of remaining in a standard setting group are too difficult to handle, there may be attrition from the group, which isn't good for anybody.

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ENDNOTES

[1] See section 3.1 for a brief introduction to the relevant patent laws.
[2] See section 3.2 for a brief introduction to the relevant antitrust laws.
[3] While controversial, the purported successes of Bayh-Dole has led to its promotion and adoption in numerous other countries as well. Dubbed: "[p]ossibly the most inspired piece of legislation to be enacted in America over the past half-century." http://www.economist.com/science/displaystory.cfm?story_id=1476653 although since somewhat recanted by the Economist in Bayhing for blood or Doling out cash? (Dec 20th 2005);
http://www.economist.com/science/displayStory.cfm?story_id=5327661
Economist Technology Quarterly claims that "[m]ore than anything, this single policy measure help to reverse America's precipitous slide into industrial irrelevance. See, also: Statement of the Honorable F. James Sensenbrenner regarding the H. Con. Res. 319, the Bayh-Dole Resolution March 15, 2006
The Bayh-Dole Act transformed research and development in America. The technology boom that daily changes our lives arises from a combination of basic research, applied research, and ultimately, the commercialization of innovation. The passage of the Bayh-Dole Act obliged U.S. universities, hospitals and research institutions to invest significantly in the process of managing the intellectual property that emerges from research. The revenues arising from these commercial and licensing activities are all directed back into the university community
Anecdotal evidence has supposedly shown and numerous studies have attempted to prove how Bayh-Dole has affected or distorted the academic mission of American universities, or how it has reallocated scarce research away from basic science research, or how it has turned white coated, pure hearted curious scientists into money grubbing corporatists. See, generally, Henry Etzkowitz, Mats Benner Lucia Guaranys, Anne Marie Maculan & Robert Kneller Managed Capitalism: Intellectual property and the rise of the entrepreneurial university in the U.S., Sweden, Brazil and Japan; http://www.epip.ruc.dk/Papers/Etzkovitz.pdf
[4] "The openness that used to characterise university life has given way to a culture akin to that of the business world." Jennifer Washburn, Selling Out: Shouldn't we be pleased that universities are increasingly business minded? *New Scientist* February 12, 2005.
[5] For more on interoperability issues, both legal and scientific see, e.g. Dov Greenbaum & Mark Gerstein A Universal Legal Framework As A Prerequisite For Database Interoperability, 21 *Nature Biotechnolgy,* 21,979 (2003).
[6] A Framework for Global Electronic Commerce: www.w3.org/TR/NOTE-framework-970706.html
[7] Lemley infra note 25

[8] See, e.g., C. Rohlff, New Approaches Toward Integrated Proteomic Databases and Depositories, *Experimental Review of Proteomics* 1,267 (2004).

[9] See, e.g. Richard Dweck, Sifting Through the Standards BIO-IT WORLD (March 10, 2003) http://www.bio-itworld.com/archive/031003/horizons_standards.html

[10] Dweck supra note 9.

[11] http://www.w3.org/2001/sw/

[12] Grigoris Antoniou and Frank van Harmelen *A Semantic Web Primer*, (MIT Press, Cambridge, 2004).

[13] Patrick Curran, Standard Setting Organizations: Patents, Price Fixing and Per Se Legality, *U. Chicago L. Rev.* 70, 983 (2003)

[14] http://infomesh.net/2001/swintro/

[15] http://www.w3.org/Consortium/Patent-Policy-20040205/

See, also: http://news.com.com/2100-1013-993283.html "The basic premise of the policy, a compromise between open-source advocates and proprietary software companies, is that patented technology can be included in standards development as long as it is royalty-free in most cases." But see, Janice M. Mueller, SYMPOSIUM: PATENT SYSTEM REFORM: Patent Misuse Through the Capture of Industry Standards Berkeley Tech. L.J. 17, 623 (2002) ("Standards in ... high-tech industries must be based on the leading-edge technologies. Consumers will not buy second-best products that are based only on publicly available information." 134 Even the W3C, a leading proponent of the Open Source movement, proposed major changes to its patent policy that would permit W3C standards to incorporate patented technology.").

[16] See, e.g., Kerry D. Goettsch, Recent Development: SCO Group v. IBM: The Future Of Open-Source Software, *U. Ill. J.L. Tech. & Pol'y*, 2003, 581 (2003).

[17] Text is available at: http://www.gnu.org/copyleft/gpl.html. See, also http://gpl-violations.org/ (regarding enforecement attempts vis-à-vis the GPL license: "In the situations where violations have been found and action taken enforcement has been successful. This includes out of court settlements with several large vendors and a legal injunction against Sitecom. We strive to resolve issues amicably. When this fails we resolve them through legal actions.")

[18] Daniel A. Farber & Brett H. McDonnell, Why (and How) Fairness Matters at the IP/Antitrust Interface, *Minn. L. Rev.* 87,1817 (2003).

[19] Thus note that "if the standard is not objective or if its purposes are not reasonable, it can be found unlawful because it operates like a boycott in persuading customers not to purchase non-approved products or services. See, e.g., *Wilk v. Am. Med. Ass'n*, 895 F.2d 352, 357-62 (7th Cir. 1990)." Sagers infra note 57. See also Janice M. Mueller, Patent Misuse Through the Capture of Industry Standards Berkeley Tech. L.J. 17, 623 (2002) ("[A]ny per se exclusion from patenting of technical innovation encompassed in industry standards would be unwise . . . More importantly, without patenting's promise of time-limited exclusionary control to permit recoupment of innovation costs, it is unlikely that an optimal level of research and development would occur . . . In the case of standards technology . . .the availability and quality of the standard may depend on the reward provided, or not provided, by intellectual property law. The first-mover advantage simply may not be enough . . . The development of compact disc ("CD") technology and the extensive patent holdings that allowed Philips and Sony to dominate the CD industry (and later, the Digital Versatile Disc ("DVD") market) are a powerful example.") (citations omitted).

[20] See, e.g. Daniel Gifford, Developing Models for a Coherent Treatment of Standard-Setting Issues under the Patent Copyright and Antitrust Laws, *IDEA* 43, 331 (2003) (noting that JAVA was another technology threatened by fragmentation).

[21] Id.

[22] See, e.g. Lemley infra note 25, "Both the Antitrust Division of the U.S. Department of Justice ("DOJ") and the FTC have taken the position in individual cases that an SSO rule

that prohibits members from owning IP rights in a standard may violate the antitrust laws. And at least one court has found that an antitrust claim alleging that an SSO conspired to demand a low "reasonable" royalty rate survived a motion to dismiss. [Sony Elecs., Inc. v. Soundview Techs., Inc., 157 F. Supp. 2d 172, 183 (D. Conn. 2001).]" (Citing in re American Society of Sanitary Engineering, 106 F.T.C. 324, 329 (1985), "wherein the FTC entered into a consent decree with the American Society of Sanitary Engineering that forbade it from rejecting proposed standards solely on the grounds that they were patented.")

[23] Curran supra note 13.

[24] Farber supra note 18.

[25] Mark A. Lemley, Intellectual Property Rights and Standard-Setting Organizations, 90 Cal. L. Rev. 1889, 1902 (2002).

[26] RFID is "rumored to implicate over four thousand" patents. Lichtman, Douglas Gary, "Patent Holdouts and the Standard-Setting Process" U Chicago Law and Economics, Olin Working Paper No. 292, (May 16, 2006) http://ssrn.com/abstract=902646 See, also Teece, *David and Edward Sherry*, Symposium: The Interface Between Intellectual Property Law and Antitrust Law: Standards Setting and Antitrust, *Minn L. Rev.* 87, 1913 (2003)

[27] For an excellent and clear read on this, see: Albert-Laszlo Barabasi *Linked: How Everything Is Connected to Everything Else and What It Means*, (Perseus Books Group, Cambridge, 2002). See for a more technical explanation: Yu H, Greenbaum D, Xin Lu H, Zhu X, Gerstein M. Genomic Analysis Of Essentiality Within Protein Networks, *Trends Genet.* 20, 227 (2004).

[28] See, generally, Alvis Brazma, Maria Krestyaninova and Ugis Sarkans, Standards for Systems Biology, *Nature Reviews Genetics* 7, 593-605 (August 2006): http://www.nature.com/nrg/journal/v7/n8/full/nrg1922.html, for a discussion of some science standard bodies in systems biology, including: MIAME: Minimum Information About a Microarray Experiment (mged.org); The Life Sciences Research group (a consortium of pharmaceutical companies, academic institutions, software vendors and hardware vendors within the Object Management Group (OMG)) http://www.omg.org/lsr/index.html; and, Gene Ontology Ashburner, M. *et al.* Gene Ontology: a tool for the unification of biology. Nature Genet. 25, 25–29 (2000);

[29] Teece and Sherry Supra note 26 at 1931-1932.

[30] Id at 642

[31] Article I, Section 8, US Constitution: "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries"

[32] Although European intellectual property rights are predicated on a 'natural right' the droit d'auteur it would seem that the majority of jurists view American intellectual property from the standpoint of the first, utilitarian theory, that is it is thought of as a distinct and limited bundle of rights granted by the Constitution for the purpose of promoting science and the arts, in the best interests of the general public.

[33] David Balto & Andrew Wolmanm Intellectual Property and Antitrust : General Principles, 43 *IDEA* 43, 395 (2003)

[34] Although see, "The European Commission has taken a decision ordering IMS HEALTH (IMS), the world leader in data collection on pharmaceutical sales and prescriptions, to licence its "1860 brick structure . . . a national standard in the German pharmaceutical industry … IMS's refusal to licence it and derived structures has led the pharmaceutical industry in Germany to be economically locked-in to the brick structure and to foreclosing of the market to competition. The Commission has ruled that the 1860 brick structure, which is covered by copyright, must be licensed on commercial terms . . .The Commission has granted interim measures ordering IMS to license the use of the 1860 brick structure to

its current competitors on non-discriminatory, commercially reasonable terms. The royalties to be paid to IMS will be agreed by IMS and the party requesting a licence, or in case of disagreement, will be determined by independent experts on the basis of transparent and objective criteria." Commission imposes interim measures on IMS HEALTH in Germany (July 3, 2001): http://www.cptech.org/ip/health/cl/cl-eu.html.

[35] Even then, there is no official definition of what a software patent is in the United States, the major software patenting country. Robert M. Hunt & James Bessen, Working Paper No. 03-17/R: An Empirical Look At Software Patents (2004) http://www.researchoninnovation.org/swpat.pdf.

On the other hand, the position of the UK Patent office is that **"**patents are for technological innovations. Software should not be patentable where there is no technological innovation, and technological innovations should not cease to be patentable merely because the innovation lies in software." UK Patent Office, Should Patents be Granted for Computer Software or Ways of Doing Business?: The Government's Conclusions (Mar. 2001) http://www.patent.gov.uk/about/consultations/conclusions.htm.

[36] For example, the European Patent office, on the basis of Article 52, has patented over 30,000 software related products. Robert Bray, The European Union "Software Patents" Directive: What Is It? Why Is It? Where Are We Now?, *Duke L. & Tech. Rev.* 2005,11 (2005).

[37] Id. (noting the open source movement and UNIX as two examples that did not rely on patent protection). Apache, BIND, Linux, Mozilla, Perl, and Sendmail are other common examples. Marcus Maher, Open Source Software: The Success of an Alternative Intellectual Property Incentive Paradigm, *Fordham Intell. Prop. Media & Ent. L. J.* 10,619 (2000). Note, however, that many software companies rely instead on trade secret to protect their software. Also note that open source software is inherently revenue unfriendly, and its proponents often do not represent the mainstream software innovator. "This revenue-unfriendly model is utopian in its design." See, e.g John Carroll, Proprietary software: A defense, 16:35 (Dec. 16, 2003) zdnet.com.

[38] See generally Hunt, supra note 35, at 14.

[39] See, e.g., Statement by Georg C.F. Greve, United Nations World Summit On The Information Society, Patents, Copyrights And Trademarks (PCT) Working Group Of Civil Society, At The Third Inter-Sessional, Inter-Governmental Meeting On A Development Agenda For WIPO (Geneva, 20-22 July 2005) (citing numerous studies that "show that software is an area in which patents are harmful: they stifle innovation and pose a significant threat to competition"). See also *Carroll*, "R&D was actually REDUCED in the presence of a vibrant software patent system." (emphasis in the original).

[40] There is a general fear, though, in developing nations that off the shelf software applications that are protected by patent law will develop proprietary systems "where secret protocols and file formats make it hard to move to a competing solution." If the software was un-patentable and open source software was promoted this may not be the case. See John Carroll, *supra* note 37.

[41] To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy A Report by the Federal Trade Commission, 10, October 2003.

[42] Robert H. Bork Legislative Intent and the Policy of the Sherman Act, *Journal of Law and Economics* 9, 7-48 (1966).

[43] 15 United States Code §1 (emphasis added).

[44] *Id.* The Supreme Court in *United States v. Grinnell Corp*., 384 U.S. 563, 571 (1966) notes that under §2 there has to be a definitive intent to monopolize; and that "the willful acquisition or maintenance of that power [is] distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident."

[45] Balto & Wolman supra note 33.

[46] 15 USC §15.

[47] The Chicago school of antitrust thinking is presently lead by proponents such as Judges Bork and Posner.

[48] Patrick Curran Standard Setting Organizations: Patents, Price Fixing and Per Se Legality, 70 U. Chicago L. Rev. 983 (2003)

[49] Michael J. Mandel, Mike France & Dan Carney, *The Great Antitrust Debate Focus on innovation? Or stick to pricing issues? The outcome is critical*, *Business Week* (June 25, 2000) http://www.businessweek.com/2000/00_26/b3687080.htm, citing the Federal Trade Commission Chairman, Robert Pitofsky.

[50] The contrasting idea of a per se legal use of monopoly power was established by the Supreme Court ruling in United States v Colgate & Co. wherein the court found that some actions such as terminating retailers that failed to adhere to suggested pricing was per se legal, and setting the stage to allow further courts to find other potential antitrust violations as per se legal. 250 U.S. 300 (1919).

[51] See, e.g. *United States v. Brown University*, 5 F.3d. 658 (3rd Cir. 1993). See also, *National Society for Professional Engineers v. United States*, 435 U.S. 679 (1978).

[52] "Intellectual property is thus neither particularly free from scrutiny under the antitrust laws, nor particularly suspect under them." U.S. Dep't Of Justice & Fed. Trade Comm'n, Antitrust Guidelines For The Licensing Of Intellectual Property, (April 6, 1995): http://www.usdoj.gov/atr/public/guidelines/ipguide.pdf.

[53] Federal Trade Commission and US Department of Justice compiled in the Report: To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy A Report by the Federal Trade Commission October 2003

[54] *Id.*

[55] Gifford supra note 20

[56] Although see, e.g. *Schachar v. Am. Acad. of Ophthalmology, Inc.*, 870 F.2d 397 (7th Cir. 1989) ("when a trade association provides information (there, gives a seal of approval) but does not constrain others to follow its recommendations, it does not violate the antitrust laws.").

[57] *Allied Tube & Conduit Corp. v. Indian Head, Inc.,* 486 U.S. 492 (1988).

The conduct of manufacturers of steel electrical conduit, and other interested parties, in attempting to influence a private fire protection association's promulgation of electrical systems product standards so as to prevent the recognition of plastic conduit as an acceptable alternative to steel conduit--by agreeing among themselves to recruit numerous individuals to join the association and vote as a bloc against a proposal to include plastic conduit in the standards--is not immune from federal antitrust liability.

See, generally, Christopher L. Sagers, Antitrust Immunity And Standard Setting Organizations: A Case Study In The Public-Private Distinction, *Cardozo L. Rev.* 25, 1393 (2004).

[58] Gifford Supra note 20 citing *Radiant Burners v Peoples Gas Light & Coke Co*.

[59] Douglas Leeds Raising The Standard: Antitrust Scrutiny of Standard-Setting Consortia in High Technology Industries, *Fordham Intell. Prop. Media & Ent. L.J.* 7,641 (1997).

[60] Teece and Sherry supra note 26.

[61] Id.

[62] Id. Citing the QWERTY keyboard standard.

[63] Gifford Supra note 20.

[64] Id. Note however that "A unilateral, unconditional refusal to license a valid patent cannot, by itself, result in antitrust liability under U.S. law." R. Hewitt Pate, Competition And Intellectual Property In The U.S.: Licensing Freedom And The Limits Of Antitrust, *Presented at the* 2005 EU Competition Workshop, Florence, Italy, June 3, 2005.

[65] E.g. *Rambus, Inc. v. Infineon Techs., AG*, 318 F.3d 1081 (Fed. Cir. 2003).

[66] For example, under the Judicial Doctrine of Equivalence the scope of the claim, i.e., the area that the patent covers, can be extended to concepts not specifically covered in the patent's claim, but yet deemed equivalent. Thus, until a patent is litigated and the doctrine of equivalence is applied, it is nearly impossible to determine exactly what is covered by the patent.

[67] See, e.g. Lichtman supra note 26

[68] *Technical Serv. Eastman Kodak*, 125 F3d 1195 (9th Cir. 1997). Contra, see, *Verizon Communications Inc. v. Law Offices of Curtis V. Trinko, LLP,* 540 U.S. 398 (2004) (not requiring Verizon to deal with its competitors).

[69] Lemley supra note 25

[70] Antitrust enforcement agencies tend not to bring antitrust actions against players who lack restrictive licensing arrangements and will often demand those consortia suspected of antitrust violations to create rules that require non-restrictive and non-exclusive licensing arraignments. Leeds infra note 59.

[71] Curran supra note 13.

[72] *Marjorie Webster Junior College, Inc. v. Middle States Association of Colleges and Secondary Schools, Inc* 432 F.2d 650,654 (DC Cir. 1970) "the proscriptions of the Sherman Act were "tailored . . . for the business world, "not for the noncommercial aspects of the liberal arts and the learned professions. In these contexts, an incidental restraint of trade, absent an intent or purpose to affect the commercial aspects of the profession, is not sufficient to warrant application of the antitrust laws."

[73] Nelson O. Fitts, A Critique Of Noncommercial Justifications For Sherman Act violations *Colum. L. Rev*. 99, 485-87 (1999) (citing legislative history to show congressional intent to not include all actions or entities as actionable under the Sherman Act).

[74] *United States v. Brown University*, 5 F.3d 658 (3rd Cir. 1993).

[75] Although, the court in *Brown* notes that when non-profits "perform acts that are the antithesis of commercial activity, they are immune from antitrust regulation." *Brown* at 665 noting also that the immunity granted to these organizations is "narrowly circumscribed" as it will not be extended to 'public-service aspects' of commercial transactions. *Brown* at 666 Therefore: when there is an exchange of money for services "even by a nonprofit organization, is a quintessential commercial transaction." Id.

[76] *Goldfarb v. Virginia State Bar*, 421 US 773, 788 (1975).

[77] a self described piece of dictum: "We intimate no view on any other situation than the one with which we are confronted today" Id.

[78] Note that in some instances, when the court cites this footnote it may actually leave out the line assigning it to dictum. See, e.g. *Brown* at 671

[79] *California Dental Ass'n v. FTC* , 526 US 756 (1999).

[80] See, e.g. Furrow BR Greaney TL, Johnson SH, Jost TS, Schwartz RL, *Health Law* (West Group, St. Paul Minn. 2000).

[81] *National Society of Professional Engineers v United States*, 435 US 679 (1978), *United States v Brown University* 5 F.3d 658 (3rd Cir.1993) *Jung v Association of American Medical College* 2005 U.S. App. LEXIS 12685 (2005) is as of yet unresolved.

[82] See, e.g. David Baltimore *On Doing Science in the Modern World* The Tanner Lectures on Human Values Delivered at Clare Hall, Cambridge University, March 9, 10. 1992. "Science […] has gone from being the province of gentlemen to being a central force of society; from a financially marginal part of governmental outlays to a significant one; from a minimal part of the academic enterprise to a dominant one."

[83] Jennifer Washburn, University, Inc.: The Corporate Corruption of American Higher Education (Basic Books 2005).

[84] Derek Bok*, Universities in the Marketplace : The Commercialization of Higher Education* (Princeton University Press, Princeton, 2004).

[85] "Data withholding is common in biomedical science" Blumenthal D, et al, Data withholding in genetics and the other life sciences: Prevalences and predictors,*Academic Medicine* 81,137 (2006).

[86] See, e.g. comments by Jennifer Washburn supra note 4: "If we want to rein in the commercialism that is destroying our public research institutions, they must all be held to the same high standards."

[87] Mark A. Lemley, Intellectual Property Rights and Standard-Setting Organizations, *Calif. L. Rev*. 90, 1889 (2002).

[88] Unfortunately it would seem that the FTC will continue to be somewhat of a maverick and unpredictable in its application of antitrust claims.

[89] See, e.g. Lemley supra note 25 ("What is most striking about the data is the significant variation in policies among the different SSO's … There was greater variation, however, with respect to what must be disclosed. . . . [and even though] many **SSOs** . . .required [IP owners] to license their rights on reasonable and nondiscriminatory terms, it isn't clear what those obligations mean in practice.").

[90] See, e.g. Daniel J. Gifford Developing Models For A Coherent Treatment Of Standard-Setting Issues Under The Patent, Copyright, And Antitrust Laws 43 *IDEA* 43,331, 353 (2003).