The Autonomy of Law and the Formation of Network Standards

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I. The Internet as a technical phenomenon and as a communication medium

In the recent discussion on Internet law and regulation it has often been argued that technical standards have a significant impact on the variety and diversity of the Net's communication flows.[1] This Article extends this argument, focusing on the ability to constrain Net communication through "code" and "architecture" imposed by network technology, i.e., by a source of rule-formation and rule-making beyond the traditional law of nation-states. Although I am generally sympathetic to the position that a novel "Lex Informatica"[2] poses new legal and political challenges for nation-states, it should, however, be clear from the outset that the attention for "code" and "architecture" is something different to a paraphrase of the ever-expanding role of technology in modern society. This has to be emphasized because the discourse of "the technological",[3] which was already a prominent subject in the anti-modernist debate during the Weimar Republic, still casts a shadow on the contemporary legal discussion about the role of technical standards on the Internet. Lawrence Lessig, for example, confronted with a strict anti-governmentalism of

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[1] See, e.g., *Joel R. Reidenberg*, Governing Networks and Rulemaking in Cyberspace, 45 EMORY LAW JOURNAL 911, 917 (1996); *Andrew L. Shapiro*, The Control Revolution, New York 1999, p. 14, 15 et seq.; *Lawrence Lessig*, Code and other Laws of Cyberspace, New York 1999.

[2] *Joel R. Reidenberg*, Lex Informatica: The Formulation of Information Policy Rules through Technology, 76 TEXAS LAW REVIEW 553, 554, 566.

[3] For the relationships between technology and politics see, e.g., *John P. Mc Cormick*, Carl Schmitt's Critique of Liberalism. Against Politics as Technology, Cambridge 1999, p. 4, 31 et seq.; *Stephen Holmes*, The Anatomy of Antiliberalism, Cambridge 1993, p. 42, 44 et seq.; in a broader perspective *Stefan Breuer*, Anatomie der Konservativen Revolution, Darmstadt 1993, pp. 70 – 78.

cyber-libertarians in the mid-nineties, argues in *Code and other Laws of Cyberspace* that the Internet is regulated by "code", i.e. "the software and hardware that make Cyberspace what it is".[4] "Code" itself is embedded in an environment of economic power and corresponding political interests. In a nutshell *Lessig* paints a picture in which the Internet is developing towards an intolerable density of control by powerful coalitions of technical experts and economic enterprises. This view may be convincing in some respects, but with his accent on "code", Lessig comes very close to the anti-modernist reaction to the growing significance of film and radio in the early 20th century,[5] inasmuch as both strands are based on the misconception of a technological superstructure steering the (media) world and its further evolution.

To avoid this or any other renewed conceptions of "the technological" it may be fruitful to begin our legal considerations with some very brief reflections about the nature of the Internet. The starting point for any outline of the Internet has to be the fact that the Net is not a homogenous subject (or object) with stable boundaries. As Michael Froomkin points out, the Internet is not one thing, but the interconnection of many things.[6] Arguing along these lines Yochai Benkler has usefully suggested distinguishing between "the physical infrastructure, logical infrastructure and content layers" when law is involved in framing digitally networked environments.[7] I basically agree with these suggestions, but to be more precise in a theoretical sense I would neither use the term "infrastructure" for the technological layer of the Net nor the concept of a "communication system",[8] as, for example, Lawrence Lessig does. The Internet is an intelligent network, i.e., the technology is not limited to a service function for content. Consequently, in contrast to other early electronic communication media like telephone or television, a hierarchical relationship between content and technology does not exist on the Internet yet it is exact this hierarchical relationship the word "infra-structure" presupposes. Furthermore, it seems to be compelling to draw a strict distinction between different communication me-

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[4] *Lawrence Lessig*, Code and other Laws of Cyberspace, New York 1999, p. 6.

[5] See e. g. *Ingeborg Villinger*, Wo liegt Berlin?, in: Rudolf Maresch (ed.), Medien und Öffentlichkeit, München 1996, pp. 248 – 259.

[6] *Michael Froomkin*, Habermas@discourse.net: Towards a Critical Theory of Cyberspace, 116 HARVARD LAW REVIEW 751, 778 (2003).

[7] *Yochai Benkler*, From Consumers to Users: Shifting the Deeper Structures of Regulation, 52 FEDERAL COMMUNICATIONS LAW JOURNAL 561, 568 (2000); see also *Lawrence Lessig*, The Future of Ideas, New York 2001, pp. 23 – 25, where he distinguishes between content, code, and physical layer.

[8] *Lessig* (supra note 7), p. 23.

dia (oral speech, writing, printing, electronic media) and their corresponding technological environments.[9] As a new medium of communication, the Internet is much more constituted through a novel open hypertext structure than through any closed system character. In other words: The internet's novel open hypertext structure precludes any adequate description of it in terms of closed systems. [10] This is also true for the physical and logical layers of the Net. As the digital format, i.e. the binary coding of information, is not restricted to digital telephone-networks, but also extends to digital broadcasting and other digital media (e.g. satellite systems). The Net as a technological phenomenon is thus more of a linguistic proxy for a "bundle of communications tools",[11] a flexible "network of networks",[12] than the realization and representation of a "technological system".

When referring to the Internet as a technological network of networks, we are referring to the basic technological processes of getting information from a sender to receivers in a fully decentralized network of interconnected local computer systems. The technological structure of the Internet has two main components: hardware and software. In the era of computer networks the concept of technology can no longer exclusively be reserved to physical entities, e.g., bodies, objects, or physical machines. Computer networks therefore alter the concept of technology because, from that state onwards, technology foremost realizes itself in (non-classical) symbolic machines, machines that have no other function than to make symbols accessible to symbols.[13] Therefore *software* ("code" or the "logical layer")

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[9] The difference between technological environment and different communication media is introduced in *Niklas Luhmann*, Die Gesellschaft der Gesellschaft, Bd. 1, Frankfurt 1998, pp. 190 – 412, 302; see further *Michael Hutter*, The Commercialization of the Internet, in: Christoph Engel/ Kenneth H. Keller (eds.), Understanding the Impact of Global Networks and Local Social, Political and Cultural Values, Baden-Baden 2000, pp. 73 – 92; *Dirk Baecker*, Networking the Web, in: Engel/Keller (eds.), supra, pp. 93 – 111, 96, distinguishes between the Net as a social phenomenon, a phenomenon of communication, and the Net as a technical phenomenon.

[10] See, e.g., *Jay David Bolter*, Writing Space, The Computer, Haypertext, and the History of Writing, Hillsdale 1991; *Mike Sandbothe*, Pragmatische Medienphilosophie, Weilerswist 2001, pp. 182 – 205.

[11] *Shapiro* (supra note 1), p. 14.

[12] *Eli Noam*, Beyond Liberalization: From the Network of Networks to the System of Systems, in: Wolfgang Hoffmann-Riem/Thomas Vesting (eds.), Perspektiven der Informationsgesellschaft, Baden-Baden 1995, pp. 49 – 59.

[13] See *Gotthard Günther*, Das Bewusstsein der Maschinen, Baden-Baden 1963, pp. 69 – 70; *Luhmann* (supra note 9), p. 529, 530.

has to be considered an essential (immaterial) component of a novel information and communication technology. The core components of software are data transfer protocols, routing systems, programming languages, scripting languages for web applications and so on, in other words, all the software codes and network designs that are employed to keep the information and communication flow on the Internet viable and to enable local computer systems to navigate through a sea of known and unknown linking possibilities. Technical standards regulating this realm of the Net are, for example, the Transfer Control Protocol (TCP) and the Internet Protocol (IP) in the public domain. The core component of *hardware* is the computation power of electronic microchips and, closely related to chip-power, the power, speed and efficiency of processors (CPU's), hard-drives, disk-drives, controller cards, interfaces, access servers, and network technology (telephone lines, broadband, fiber optic lines etc.). Standards and standardization play an important role on the hardware side, but for the purposes of this Article we will pass over hardware itself and focus on the role of technical standards on the software side. (As the concept of technology becomes less stable in the era of computer networks, it should be remarked that the distinction between hardware and software, the difference between the "physical" and the "logical infrastructure" layer, is a more or less a relative one. This is because the physical side of computer and network technologies itself is mainly based on software, i.e., the mathematical foundation of computing and programming).

Around the technological structure we find a different mantle of communicative "content". Content (or better: communication) refers to the information-surplus, to information which is different from internal routing software and technical coding. Every piece of information that could be transferred into digital form can become a component of communication on the Net, and communication is regularly the reason why the Internet is utilized. Thus, content encompasses all kinds of "information goods" that are distributed through the Internet and particularly through the World Wide Web, like web pages, music, pictures, movies, stock quotes etc. Taking a closer look, communication or content transmission on the Internet may either have the character of mass-communication (Internet Radio, Web-TV), of telecommunication (e-mail, Internet telephone), the character of commercial transactions (e-commerce), or become manifest in new hybrid forms of private/public fora (e.g. book critics on amazon.com; consumer tests on epinion.com). Though content is a very important area for law and politics (property rights, freedom of speech, data protection, electronic signature, transnational coding of contract obligations etc.), technical standards are normally not subject to rule-formation and rule-making on the content level. Rather, they have to be agreed upon on the level of technology in order for the content level to function.

II. The normative quality of network standards

1. Network standards – rules for the "networkness" of the Net

In the economic literature, technical standards are sometimes defined as rules or conventions that determine how specific and repeating technical problems ought to be solved,[14] for example, through a rule that prescribes that electric plugs and boxes generally be equipped with two contacts. However, if one takes a closer look one will find very different types of technical standards. Paul A. David, for example, in a paper concerning formal economic modeling,[15] roughly distinguishes between four categories or classes of technical standards.
First, David names the class of technical reference or quality standards. Reference standards are primarily defined as measurements against which the relative extent of some quality dimension is compared. This class is exemplified in the grades of consumer products, for example the quality or grade of wheat or wine. This class also encompasses definitions, terminologies, labeling or classification schemes such as chemical properties. It is essential for quality standards that they function as an orientation tool only in one dimension, e.g. that they apply only to one pro-duct group, such as wheat or wine.

The second general class in David's systematization refers to technical standards that provide information in the form of "sharply drawn dichotomies".[16] A combination of a numerical and a categorial reference is considered to be essential for this class in order to classify objects on the basis of a "minimum admissible attribute."[17] An example that David gives is the typical environmental standard (e.g. the amount of allowable CO 2 emissions). Labeling standards assuring some minimal level of quality in products (e.g., the proportion of chicken allowable in a "beef frankfurter").

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[14] See, e. g., *Joseph Farrell/Garth Saloner,* Converters, Compatibility, and the Control of Interfaces, 40 JOURNAL OF INDUSTRIAL ECONOMICS 9, 9 (1992); *Phillip Genschel*, Standards in der Informationstechnik, Frankfurt/New York 1995, pp. 25 – 31.

[15] *Paul A. David*, The Internet and the Economics of Network Technology Evolution, in: Christoph Engel/ Kenneth H. Keller (eds.), Understanding the Impact of Global Networks and Local Social, Political and Cultural Values, Baden-Baden 2000, pp. 39 – 71, 46 et seq.; see further *Sören Delfs*, Innovation – Standardisierung – Recht (Das Beispiel Internet), in: Martin Eifert/Wolfgang Hoffman-Riem (eds.), Innovation und rechtliche Regulierung, Baden-Baden 2002, pp. 171 – 213.

[16] *David* (supra note 15), p. 48.

[17] *David* (supra note 15), p. 48.

Third, David identifies technical standards that provide information required to assure compatibility between components within mechanical or electronic machines. This is the class of technical design interfaces, such as those between sparkplugs and automotive engine cylinders. This category also includes hardware standards that enable interaction between machines and their environment through interfaces, as, for example, a keyboard layout working as an interface between a personal computer and an individual user.

The fourth functional class contains technical standards that supply information required to assure compatibility between components within telecommunication or computer networks. The substantive function of technical standards here is to enable or facilitate a permanent information and communication flow between local components of a network. This class of standards – a Besen/Farrell call them "compatibility standards",[18] is obviously the one of greatest interest for the technical structure of the Internet. Compatibility standards are decisive for the internal interoperability the "networkness"[19] of the Internet; without standards that secure the interoperability of local components of a network, the Internet would only be a sum of disconnected local computer systems. For the purpose of this paper, we call this category of technical standards "technical network standards", or briefly "network standards". The concept of network standards introduced here is used in a rather broad sense and encompasses all sorts of software codes and network designs essential for the coordination and co-operation of technical components which, in sum, is named the Internet, regardless whether these standards are used in the public or in the private domain. Network standards in the public domain are, for example, the Transfer Control Protocol (TCP), the Internet Protocol (IP), the Hypertext Transport Protocol (HTTP), the Hypertext Markup Language (HTML), and the platform-independent programming language (JAVA). Network standards also include every kind of software codes that comprise a computer operating system or applications of the latter including "middleware" (e.g., Player, Browser). Even the source code of Microsoft Windows operating systems is a code-based software technology, i.e. a network standard located in the private domain.

2. *The economic and social function of network standards*

This classification implies that the primary economic and social function of network standards is coordination and co-operation at the technological level of the Internet,

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[18] *Stanley M. Besen/Joseph Farrell*, Choosing How to compete: Strategies and Tactics in Standardization, 8 JOURNAL OF ECONOMIC PERSPECTIVES 117, 117 (1994).

[19] *Shapiro* (supra note 1), p. 16.

providing a set of possibilities for technical interoperability among independent components. Therefore the social and economic function of network standards can not be reduced to building secure expectations or ground rules to create trust and confidence in network markets, which is the basic assumption of the "new institutionalist" strand in economics (Coase, Williamson et al.). This is not to deny that one of the functions performed by rules and conventions is to reduce transaction costs through a certain degree of stability of expectations. However, as Michael Hutter has shown, this sort of economic efficiency is only of secondary significance in network markets.[20] The secondary role that this sort of economic efficiency plays for technical standards fits with an observation in network economics that the economic function of network standards is primarily to enhance interoperability.[21] Seen from this point of view, network standards are strategic information goods for networks to increase exponentially the number of net users and realize "increasing returns".[22] Thus, network standards can be conceived of as products of the competition between different technological trajectories. This is why they are considered to be "more complex and present in more than one dimension" in comparison to other technical standards.[23] The TCP/IP routing protocol, for example, defines specific performance characteristics for communication on the Net with effects on each layer and a multitude of components. In this respect a routing protocol may even be comparable to a diplomatic protocol, from which the term "protocol" is borrowed. Therefore the strategic development of network standards, primarily through private companies, takes on functions which structure technological developments, functions that may be compared with or even qualified as *normative* functions. This leads us to the question what kind of normative quality is inherent to network standards. Are they even law?

3. Are network standards law?

It is not contested in legal literature that the dissemination of Internet technologies and network designs confronts legal theory and policymakers with a new source of

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[20] *Michael Hutter*, Efficiency, Viability and the new Rules of the Internet, 11 EUROPEAN JOURNAL OF LAW AND ECONOMICS 5 (2001).

[21] *Carl Shapiro/Hal R. Varian*, Information Rules: A Strategic Guide to the Network Economy, Boston 1999, p. 229.

[22] See *Brian Arthur*, Increasing Returns and the New World of Business, 74 HARVARD BUSINESSS REVIEW 100 (1996); *Carl Shapiro/Hal R. Varian* (supra note 21), pp. 173 – 225 et seq.; *Kevin Kelly,* New Rules for the New Economy, New York 1998, pp. 23 – 38.

[23] *David* (supra note 15), p. 49.

rule-formation and rule-making, one beyond the customary domestic or international legal regulatory processes.[24] However, what kind of normative quality rules like network standards may have is controversial. Starting with the distinction between the Net as a technical phenomenon and the Net as a medium of communication, one may generally distinguish network standards from social rules, norms or conventions. As a consequence, the class of *social* rules could then solely be retained for the context of *human* communication, action or behavior. On the other hand, it is apparent that a lot of parallels between both types of rules exist. The function of network standards is to reduce uncertainty, stabilize mutual expectations and not at least generate viable solutions for coordination and cooperation within certain technological trajectories needed for the establishment and growth of novel network markets. These effects come very close to what authors like Hobbes, Bentham, Max Weber or Niklas Luhmann identify as the function of modern law, and hence one could insist that there are significant parallels between the function of network standards in the technological layer of the Internet and the function of legal rules in social communication systems.

Three different basic views may be identified in the recent legal discussion on the relationship between technical standards and legal rules. First, there are scholars claiming that law has always been an instrument for the regulation of *social* relations, that law provides *social* rules and is to be applied solely to the context of *human* communication and interaction. It is therefore not transferable to *technical* artifacts like software code, network or web design.[25] This distinction would then create a strict separation between network standards, on the one hand, and the category of legal rules, on the other. The increased significance of network standards on the Net from this point of view would not indicate the emergence of a new type of rule-formation beyond the traditional nation-state regulation, but rather the dismantling or shrinking of the *normative* order and its "Eigenwerte" ("intrinsic values") in general. Jean-Marie Guéhenno has developed this thesis in the direction that, in the era of computer networks, law is transformed into a purely economic factor of the reduction of uncertainty, downgraded to a mere "procedural practice" to reduce transaction costs.[26]

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[24] These trends are described for various societal fields in *Gunter Teubner* (ed.), Global Law without a State, Aldershot 1997.

[25] See, e.g., *Joseph H. Sommer*, Against Cyberlaw, 15 BERKELEY TECHNOLOGY LAW JOURNAL 1145, 1151 (2000).

[26] *Jean-Marie Guéhenno*, The End of the Nation-State, Minneapolis 1995, p. 58.

While this approach would reject any comparability between network standards and legal rules, another group of scholars accepts a distinction between government regulation and the rule-formation through network standards – but without denying the normative quality of the latter. From this perspective technical standards and legal rules are "overlapping rule systems"[27] that may either supplement each other or, in some circumstances, be substitutes. This means that standards may themselves establish normative ruling. This is an approach Joel Reidenberg has developed in a series of articles, arguing that network standards and other rules of the novel "Lex informatica" should be classified as a distinct source of rules, an extra rule structure that bypasses customary legal regulatory processes within a jurisdiction. While the traditional legal approach is based on government-issued decisions within relatively stable territorial boarders of nation-states, the jurisdiction of network standards is the transnational network of networks itself. While the substantive content of rules in a customary legal regime derives from statutes, government interpretation and court decisions, the primary source of rule-formation is the technology and the social process by which customary uses evolve. "Technologists design the basic infrastructure features that create and implement information policy defaults. Although states may influence the decisions made by technologists through legal restraints on policy issues, the technologist otherwise enact or make the technical standards, and these users adopt precise interpretations through practices."[28] This position does not deny a role for the government, but it gives primacy to Internet technology as its own source of rule-formation.

A third strand of thought is close to the Reidenberg position, but apparently wants to give up the difference between network standards and legal rules. In a cautious version, scholars within this strand argue that network standards are not a neutral means, but placed in the center of various power struggles on the Net and therefore should be subject to political and legal decision making. Andrew L Shapiro, for example, discusses the need for a new "politics of code",[29] a notion which primarily wants to clarify that, contrary to the claims of cyber-romantics, the Internet is not by nature a technology of freedom. Lawrence Lessig goes even further. He argues that the Internet is regulated by software codes, by which Lessig has not only the technology as such in mind but also the function of network standards as socie-

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[27] *Reidenberg* (supra note 2), p. 566.

[28] *Reidenberg,* (supra note 2), p. 567; close to that position *Karl-Heinz Ladeur*, Rechtliche Regulierung von Informationstechnologien und Standardsetzung, COMPUTER UND RECHT 1999, pp. 395 – 404, 398; see more generally *Joerges/Ladeur/Voß* (eds.), Integrating Scientific Expertise into Regulatory Decision-Making, Baden-Baden 1997.

[29] *Shapiro* (supra note 1), pp. 13 et seq.

tal constraints.[30] This means that for Lessig "code" is primarily embedded in an environment of economic and political power. Similarly to Shapiro, it seems that Lessig's concern is to ensure that technical standards be based on fundamental values protected to a considerable degree by constitutional law. Although this sounds more differentiated, the message of *Code and Other Laws of Cyberspace* is nevertheless that "code is law",[31] not only in the sense that Code is a part of law, but even in the sense that it is "its most significant law".[32] If this position is right, we will have to give up the distinction between law and technical standards in a new "Cyberlaw".

III. The relationship between law and practical knowledge

A discussion about the legal status of network standards should neither start with a given understanding of "the normative", as Jean Marie Guéhenno proposes, nor by abrogating the difference between law and network standards, as Lessig seems to suggest. Rather should we accept the differences *and* the functional equivalents between legal rules and network standards. This would allow re-arranging the relationship between legal rules and network standards in a manner that is not as open to criticism as the view that claims the novelty of "code" is an informational power. A position that declares self-regulation through "code" to be *the* decisive novel legal development in "Cyberlaw" fails to see that an infrastructure of conventions and social rules emerging out of spontaneous processes of rule-formation has always played an important, even constitutive role both for modern law and the successful implementation of government regulation. This paper tries to avoid shortcuts like the above mentioned and attempts to find a more productive approach of enquiry to the relationship between legal norms and network standards. The paper first elaborates a theoretically based understanding of the autonomy of law (1). It then explains the concept of practical knowledge (2 and 3), a concept which ought to give a better framework for analyzing the differences network standards possess to other pre-legal and practical knowledge based conventions and rules (4).

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[30] *Lawrence Lessig*, Reading the Constitution in Cyberspace, 45 EMORY LAW JOURNAL 869, 896, 897 (1996).

[31] *Lessig* (supra note 1) pp. 6, 63 – 108.

[32] *Lessig* (supra note 7), p. 35.

1. The autonomy of law from the perspective of systems theory

The starting point for systems theory is that the legal system functions as an *autonomous* network of specific communicative content,[33] i.e., as a network producing and reproducing a specific communicative "meaning",[34] a valid normative reality, which is customarily called "the law". Systems theory takes the insight that reality is socially constructed for granted, an insight that has since Wittgenstein emphasized the fact that social reality is not a given thing, an "object" out there, but something which has to be spoken about, something that has to be described through communication media.[35] But as one uses communication media like oral speech, writing, or printing to outline descriptions of social phenomena, one intervenes in the phenomena that are described. This is very obvious in social sciences which are primarily based on academic papers and academic books. Thus, for systems theory, communicative networks produce and reproduce themselves through communication from communication, constructing a nexus of ongoing communicative events, in which the psychic systems of human beings interpenetrate in and through meaningful communicative contributions.[36] As any other communicative network the legal system is based on heterarchic, connectist, relational, neighborhood-like linked processes of self-production (i.e., elements, e.g., words) and self-organization (i.e., structures, e.g., speech acts/sentences). This is what is meant by the term self-referential closure of communicative networks, which Luhmann describes as autopoietic reproduction of social systems.[37] Seen from the macro-level of a collective order, in constitutional and administrative law usually described as the nation-state, the assumption is decisive that the rupture with the traditional society and its semantics, centered around the metaphysical idea that all social (and natural) life is bound by a great chain of being, has brought up a new post-modern configuration of the collective order: the emergence of an a-centric arrangement of different autonomous communicative networks that are not a priori "integrated" in

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[33] See *Niklas Luhmann*, Das Recht der Gesellschaft, Frankfurt/Main 1993; *Gunther Teubner* (ed.), Autopoetic Law, Berlin 1988; *Jiri Priban/David Nelken*, Law's New Boundaries, Dartmouth, 2001.

[34] For "meaning-systems" generally see *Niklas Luhmann*, Social Systems, Stanford California 1995, pp. 59 – 102.

[35] See, e.g., *Richard Rorty*, Philosophy and the mirror of nature, Princeton 1979; and, from a hermeneutic perspective, *Gianni Vattimo*, Jenseits der Interpretation, Frankfurt/New York 1997.

[36] *Luhmann* (supra note 34), pp. 210 – 254.

[37] *Luhmann* (supra note 34), pp. 34 – 36.

a higher unity and identity. Contrary to ideas of unity and identity systems theory supports a model of difference and "interwoveness", a model of different communicative networks such as science, economy, politics, religion, mass-media, and law, and the intricacies of their mutually instituted links, interfaces which systems theory calls "structural couplings".[38] The autonomous social systems are bound to different binary codes and communication media and create specific bodies of knowledge and systems memories. The consequence is that society dissolves into different societal value spheres, or spheres of rationality. A non-physical world of *relations* and *connections* has arisen beyond any matter or substance, creating autonomous social systems whose inherent lawfulness is generated by the self-amplifying dynamics of recursive self-reference.

This point may become clearer if we consider the different scientific paradigms systems theory attempts to combine. Systems theory in general is located in the realm of *cybernetic* explanations. Cybernetics favors an explanation by constraint, or by negative selection, but not by causality. It is therefore important to realize that systems theory distinguishes basal self-reference from causality and that the emergence of distinct types of communicative networks in this scheme follows only from self-reference, not from causality.[39] "Only living systems can be reproduced by life, and only communicative systems by communication."[40] However, if systems theory describes the relationship between the law and other social or psychic systems (consciousness), it also uses causal explanations, in particular elaborated in the concept of "structural coupling". The interplay between the concepts of "autopoietic closure" on the one hand and the complementary concept of "structural coupling" on the other hand is not without inconsistencies and unsolved problems within systems theory similar to Kant's arrangement of causality and freedom.[41] But despite these unsolved inner-theoretical problems, it is beyond doubt that, for instance, the rules and doctrines of the legal system in the past have highly been influenced by the interwoveness of law and politics. With the expansion of the welfare-state, political decision-making, as evolved for instance during the New Deal in the United States, even became an increasing prerequisite for the self-referential

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[38] *Luhmann* (supra note 9), p. 92 et seq., 776 et seq.

[39] *Gregory Bateson*, Steps to an Ecology of Mind, Chicago 2000, pp. 399 et seq.; *Luhmann* (supra note 34), pp. 448 – 449, 40 – 41; *Baecker* (supra note 9), p. 95.

[40] *Luhmann* (supra note 34), p. 448.

[41] A case study of "structural coupling" and its theoretical problems is presented by *Michael Hutter*, Structural Coupling between Social Systems: Art and Economy as Mutual Sources of Growth, 7 SOZIALE SYSTEME 290 (2002).

processes of the legal system. Modern law also has always had to adapt to the needs and purposes of a money driven market-economy, e.g. by generating institutions like property rights, different forms of contracts, the formation of limited liability companies, the creation of intellectual property rights and so on. Other causal interdependencies are obvious as well: The systematization of modern civil law in the continental European tradition is based on academic books and printed statutes. The ubiquitous dissemination of books and statute books is unthinkable without the invention of the printing press, but mass publication depends on the progress of science and technology, while the growth of national and transnational book markets itself is not imaginable without the establishment of compulsory public education, the foundation of universities, the education of the administrative staff and so forth.

To put these propositions in a slightly modified way, systems theory of law does not start with the conception of a territorially bound legal system primarily based on national government regulation, statutory law, and national court decisions. This does not mean that systems theory would deny the significance of government regulation etc., but takes the autonomous reproduction of the legal system, which itself is seen as a global network not constrained by territorial boundaries, as its starting point. With the transition from traditional society to modernity, various communicative networks with different communication media and bodies of knowledge have emerged. In this novel arrangement, the legal system represents one communicative network amongst others, different from politics, economy, or science. The role of law is to secure specific functions for other communicative networks, stabilize expectations, generate trust and confidence and maintain coordination and co-operation between actors. As a consequence, systems theory stresses ideas such as difference (not identity), process (not state), dynamic stability (not pre-ordained order), and heterogeneity (not homogeneity). But systems theory insists on a conception of autonomy that does not mingle autonomy and autarky either, as the environment is always a necessary correlate of self-referential operations. The concept of an autonomous legal system, for example, views law as a recursively closed communicative network in the sense that only the law can decide what is lawful and what is not, what is valid or void. But the autonomy of law does not imply that law is a self-sufficient enterprise, independent from its environments and their respective factual contexts.

2. Rules based on practical knowledge

For the purposes of this paper, what most notably characterizes the relationships between the legal system and its environments is the fact that legal communication is to some considerable degree parasitic on conventions and rules of practical knowledge. By practical *knowledge* I mean a range of practical *skills*, not abstract

scientific knowledge in the sense of western rationalism.[42] By *practical* knowledge this article primarily refers to a sort of knowledge that is difficult to learn apart from practicing it, like the acquired knowledge of how to sail a boat or fly a Boeing 747. It is a type of "relational knowledge", in which the flexible (cognitive) and more stable (normative) components, practise and rules, are mixed up. Practical knowledge is settled in locally changing environments, based on knowledge that varies from place to place, performed in never precisely identical situations, often "requiring a quick and practiced adaptation almost second nature to the practitioner".[43] The dependency of practical knowledge on a *local* and *situation*-based rule-formation, mere usages or customs may be more or less tight, but conventions and rules of practical knowledge are in any case less abstract, less general and less universal than de jure formalized legal rules.

The main source of conventions and rules of practical knowledge are communities or neighborhoods, not universal legal or moral rules, such as freedom, or equality. Practical knowledge is – seen from a general macro-sociological perspective – a dispersed, fragmented knowledge, a local resource of practical skills in constantly changing environments. Practical knowledge is reproduced either in networks of inter-organizational or inter-personal relationships. Thus, practical knowledge could neither be directed by general and abstract rules of a shared practice of communication, as the discourse theory of law asserts, [44] nor by a territorially bound democratic culture based on common experience and ground values in the sense of "the cultural heritage of a nation".[45] Practical knowledge describes a *common* and not a private knowledge; it is not the property of individual actors, but it is neither produced in heaven nor in academic philosophy. A *pre*-existing framework is concerned, but this "framework" itself can only be conceived of as flexible, self-changing pools of common knowledge which are spread to the different communi-

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[42] With its foundation in modern mathematical science (Galilei, Descartes, Hobbes, etc.) see, e.g., *I. Bernard Cohen*, Revolution in Science, Harvard 1985, pp. 105-175.

[43] *James C. Scott*, Seeing like a State, New Haven and London 1998, p. 316; *Karl H. Hörning*, Experten des Alltags, Weilerswist 2001.

[44] *Jürgen Habermas*, Between Facts and Norms: Contributions to a Discourse Theory of Law and Democracy, Cambridge 1996, see pp. 104-131.

[45] *P. Samuelson/ R. Davis*, The Digital Dilemma: A Perspective on Intellectual Property in the Information Age, Washington 2000, p. 5, http://www.sims.berkeley.edu/~pam/papers/digdilsyn.pdf .

cative networks of a disaggregated collective order.[46] Contrary to the holistic tradition of some established philosophical or political theory, practical knowledge is a collective knowledge that emerges within networks of *relationships* between organizations and persons acting within different communities or neighborhoods.

Seen with the eyes of the legal system, the conventions and rules of practical knowledge emerge from processes of self-organization outside the context of internal legal communication. These conventions and rules initially have to be formed outside the boundaries of legal rule-making. From here they might produce an independent body of normative practice. The common ground rules for merchants in medieval Europe, the "Lex Mercatoria", is an historic example for a "transnational" body of law independent from the law of the land;[47] and the banker's letter of credit as codified in the Uniform Customs and Practice for Documentary Credits ("UCP") would be an example of contemporary autonomous self-governance, independent of the law of the state.[48] But conventions and rules of practical knowledge may also be incorporated into the legal system through adaptation and further refinement by court-decisions and thus become a component of legal communication within or between national boundaries. For instance, rules based on practical knowledge today fall within the field of private law in the United States and most civil law countries as "standards of care", "negligence of professionals", "customs of merchants", or "unfair methods of competition". In German administrative law the public danger concept of police law, similar to the American concept of police power,[49] could be pointed to. Here as well, the attribution of loss to a perpetrator is dependent on "rules of reason" based on "canonized examples".[50] These examples

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[46] For a theoretical approach to social conventions as a prerequisite of legal rules see *Karl-Heinz Ladeur*, Negative Freiheitsrechte und gesellschaftliche Selbstorganisation, Tübingen 2000, pp. 72 – 80; from an economic point of view see, e. g., *Robert Sugden*, Spontaneous Order, 3 JOURNAL OF ECONOMIC PERSPECTIVES 85 (1989); *Steve Fleetwood*, Order without Equilibrium: A Critical Realist Interpretation of Hayek´s Notion of Spontaneous Order, 20 CAMBRIDGE JOURNAL OF ECONOMICS 729 (1996); more generally see *Scott* (supra note 43), pp. 309 – 341; for a discussion of the role of spontaneous rule-formation on the Internet see, e.g., *Mark A. Lemley*, The Law and the Economics of Internet Norms, 73 CHICAGO-KENT LAW REVIEW 1257 (1998).

[47] See *Harold J. Berman*, Law and Revolution. The Formation of the Western Legal Tradition, Cambridge 1983, pp. 333 – 356.

[48] *Sommer* (supra note 25), p. 18 et seq.

[49] See, e.g., *G. Wickersham*, The Police Power: A Product of the Rule of Reason, 27 HARVARD LAW REVIEW 297, 316 et seq. (1914).

[50] *Karl-Heinz Ladeur*, Das Umweltrecht der Wissensgesellschaft, Berlin 1995, pp. 11 – 15.

show that rules of the legal system are parasitic on conventions and rules of practical reasoning to a considerable degree. The result is an asymmetric coupling of law and practical knowledge: The legal system can neither create nor maintain the knowledge infrastructure it is based upon, although the production of relatively robust pre-legal rules may even be indispensable for the law to generate normative binding effects in fast changing environments.

3. Scientific and practical knowledge

The relationship between legal rules and rules of practical knowledge has an interesting parallel in the scientific system. Here different types of scientific knowledge occur as well, especially re-examined in the growing literature on the ethno-methodology on science.[51] The ethno-methodology of science claims that abstract scientific knowledge is embedded in a constantly changing environment of actual scientific practice; especially Michael Polanyi's philosophical treatment of the relationship between "impersonal" and "personal knowledge" indicates that the self-image of modern science as a mathematically based objective science is a rather one-sided one.[52] Polanyi shows that this self-image is true to the degree that scientific knowledge is generated through a self-contained system of reasoning, i.e., that no given authority except scientific reasoning itself can tell science under what conditions meaning is to be treated as knowledge (episteme).[53] In modern mathematically based science, findings are logically derived from initial assumptions (axioms), and in this respect scientific knowledge is universal, and completely impervious to context. The Pythagorean theorem, $a^2 + b^2 = c^2$, for example, is true for all right triangles everywhere and forever. To this extent scientific knowledge is based on abstract, formalized, general, objective, and timeless (logical) knowledge. These general features of modern science, by the way, led Max Weber to formulate his thesis about the unique character of modern law and its "formal rationality", a rationality in Weber' s view characterized by the formulation and application of abstract rules by a process of logical generalization and interpretation.[54]

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[51] *Scott* (supra note 43), p. 425; *Ian Hacking*, The self-vindication of the Laboratory Sciences, in: Andrew Pickering (ed.), Science as Practice and Culture, Chicago 1992, pp. 29 – 64.

[52] See generally *M. Polanyi*, Personal Knowledge, Chicago, 1964; an overview of Michael Polany's thought is given by *J. H. Gill*, The Tacit Mode: Michael Polanyi's Postmodern Philosophy, New York 2000.

[53] *Luhmann* (supra note 34), p. 478.

[54] *Berman* (supra note 47), pp. 545 – 558, 548.

Although the ethno-methodological strand of modern theory of science does not deny the self-referential autonomy of the production of scientific knowledge, it stresses the significance of the practical dimension of every cognitive activity. The realm in which knowledge is discovered and reproduced is bound to a "society of explorers",[55] grounded in the power of practical knowledge, or "tacit knowing".[56] The notion of a "society of explorers" particularly wishes to call attention to the horizontal dimension of science, to the flexible rules of the cognitive search, the continual cross-checking and validating of each and every claim to have found the truth. From this perspective the authority of scientific opinion remains essentially mutual, established *between* scientists, organized in "chains of overlapping neighborhoods".[57] This horizontal character entails accentuating the fact that even scientific knowledge has to be reproduced and validated through overlapping communicative networks of scientific communities and cannot, therefore, be separated from the more pluralistic and flexible rules of practical knowledge that constantly have to adapt to transient and shifting situations. This is even true for the implementation of technologies. Problems accompanying the development and implementation processes of technologies have to be solved through practical experiments and models, but cannot be deduced from abstract theoretical considerations to be found in scientific books. And it exactly this horizontal, network-like structure which is existent in the relationship between legal rules and the rules of practical knowledge as well. Just as scientific knowledge has to be implemented through experiments, the normative autonomy of law is dependent on the support of a more flexible practical knowledge.

4. Variation, alteration, and transformation of practical knowledge

Practical knowledge is also needed for the evolution of digital network technologies. It is particularly needed for technical solutions both for ensuring the interconnectivity of single computer-units and the interoperability of computer networks forming the technical layer of the Internet. This has an increasing significance for network standards that are mainly produced within different net communities and "net-cultures" (e.g., Microsoft, Linux). This means that the state and nature of practical knowledge itself is going through a process of variation, alteration, and transformation insofar as rules of practical knowledge on the Internet become a means of

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[55] *Michael Polanyi*, The Tacit Dimension, Gloucester 1966, pp. 53 et seq.

[56] *Polanyi* (supra note 55), pp. 3 – 25.

[57] *Michael Polanyi*, Knowing and Being, Chicago 1969, 56; see also Gill (supra note 52), pp. 63 et seq.

strategic choices of and between competing net communities and "net-cultures". The increasing significance of network standards is therefore at the same time making changes in the way the law communicates with pre-legal sets of rules embodied in practical knowledge. In order to better understand this process and to see the difference that the relation between law and network standards makes, one should distinguish between different types of modern law. However, owing to space restrictions, these issues are only sketched very briefly here.

a) With some simplification and abbreviation inherent in every generalization, it can be said that as far *liberal* law refers to practical knowledge, these rules are primarily derived from local *experience*. Local experience itself is embedded in common knowledge pools, settled in the aggregated "wisdom" of evolving communities, a more or less deeply rooted common experience, more or less mixed up with common habits, customs and traditions of citizens, associations, guilds and so forth;[58] in this latter respect practical knowledge in the layer of liberal law is tightly connected to moral rules and customs. But it is a type of practical knowledge that is bound within the practice of inter-personal relationships, basically accessible to everybody, a knowledge that a reasonable man should perceive by experience. The "standard of care", for example, which is incorporated in US-American tort law, refers to such an *objective* type of knowledge and not a state of mind in a subjective sense. Although practical knowledge is accompanied and sometimes even constituted by and through shared world views, it is not a static knowledge. Quite the contrary, it is, as shown above, embedded in different factual contexts and varies or changes incrementally as its environments alter. To sum up: liberal law rests upon sets of pre-legal rule-formation that are produced within the natural "life-worlds" of locally evolving communities.

b) With the take-off to industrial mass production in the late 18th century, a new type of pre-legal rule emerged: technical standards. Technical standards played a decisive role for the new inventions, in particular for supervising and securing the operational safety of steam-engines used in factories, ships and railroad engines. Furthermore, technical standards fulfilled important functions for ensuring the interconnectivity of railroad gauges and electricity-networks, and during the late 19th century technical standards also latched on to communication media: the typewriter and the advancement of standardized file and registry systems like the Shannon file-registry become the founding pillars of the "rational bureaucracy".[59]

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[58] A case-study of what I have in mind is *Robert C. Ellickson*, Order without Law, Harvard 1991.

[59] See *Cornelia Vismann*, Akten: Medientechnik und Recht, Frankfurt/Main 2000, pp. 269 – 299.

This new type of technical standard also altered the forms of pre-legal rule-formation. The more industrialization moved forward, the more the pre-given "natural" structures in which rules of common knowledge had been formed by common experience lost their foundations; and with this shift the traditional forms of rule formation were replaced by specific "artificial" knowledge pools produced and reproduced within industrial organizations. The technical standards securing the operational safety of steam engines in 19th century Prussia, for example, very quickly became a subject of rule-making by private industry associations like the *VDI* (Association of German Engineers) and the *DÜV* (Association for Technical Supervision).[60] This institutionalization of partly self-organized technical supervision was accompanied by splitting the rule structure of early Prussian police and business law into a relation between legal norms promulgated and interpreted by public administration, on the one hand, and technical rules generated by private associations, on the other.[61] This dualistic order that has structurally been seen even in its transnational aspects was almost identical with Reidenberg's "Lex Informatica" and its relationship to legal rules. This also means that the practical knowledge of Prussian police and industry law was dependent on the practical knowledge of engineers, a specific, technical, purpose-based knowledge that empowered legal rules with mechanisms to flexibly adapt to rapidly changing steam-engine technologies. With respect to the public-private dichotomy, this represents an early emergence of "private government". However, this kind of private government was set up to maintain technical standards that primarily had the function of harmonizing and unifying industry-standards and, consequently, entire mass production industries.

c) Following this line of argument, the novelty of network standards on the Internet lies in the fact that they intensify the dis-aggregation and fragmentation of practical knowledge and signify a further increase of its complexity. The pre-given (natural) structures, where the rules of common knowledge have been formed by experience, continue to lose their foundations. Analogous to the layer of industrial law, the traditional forms of inter-personal relationships are replaced by very specific knowledge pools based on the innovative force of new digital technologies and network standards emerging within different network markets, business cultures and net communities. This means relationships between persons are substituted by relationships between organizations. Another parallel to industrial law is that practical knowledge is partly intermixed with scientific knowledge; the mathematical foundations of programming, for instance, take the place of the knowledge of (steam) engineering communities. And finally, the digital environments of Internet-

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[60] *Rainer Wolf*, Der Stand der Technik, Opladen 1986, pp. 31 – 159, 99 et seq.

[61] *Wolf* (supra note 60), p. 120 et seq.

communication also bring about changes of pre-legal rule-formation. As network standards are always a result of decisions made amongst a plurality of alternatives, an outcome of selection under the condition of complexity and contingency, practical knowledge becomes a product of strategic choice, for example, in the decision for or against open source code. At this point an interesting difference to the layer of industrial law occurs: While the dualistic system of (private) technical standards and (public) legal rules in business and police law emerged within a framework that aimed at forming universal industry and safety standards, network standards often exist in the plural form bound to different, yet competing communities. The practical knowledge relevant for network standards is embedded in different business networks (software-programming, web-designing, etc.). As a result, technological trajectories and development paths are now being made by different corporate cultures such as Microsoft, the company that dominates the commercial mainstream net culture. From this follows further that certain zones of practical knowledge, once accessible as a commons, are now replaced by private knowledge pools of private firms or net communities. This is in particular the case when network standards are protected as proprietary standards, when private property on the Net is strengthened by an extensive patenting system and a wide range of copyrights.[62]

IV. Network standards between evolutionary viability and self-blocking effects

1. Self-regulation of network standards

We now need to turn our attention to the implications these theoretical considerations have for re-defining the role of government regulation and policy making. Special consideration must be given to the growing significance of self-regulation implied by network standards. Network standards are either generated by market-driven forms of self-regulation by private enterprises (e.g. Microsoft), through co-operation between private companies (e.g. AOL, Nokia, Sony) or through independent standardization bodies (e.g. W3C, IETF, ICANN, ISOC).[63] Rule-making by public authorities or regulatory bodies (e.g. FCC, EC-Commission) is by comparison rather the exception.[64] The predominance of self-regulation also highlights the

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[62] These issues are discussed by, e.g., *Jessica Litman*, Digital Copyright, Amherst 2001; *Lessig* (supra note 7), pp. 250 – 261; *Yochai Benkler*, Coase's Pinguin, or, Linux and the Nature of the Form, 112 YALE LAW JOURNAL 369 (2002); *Thomas Vesting*, Common Knowledge in the "Information Age", RCS Discussion papers, Florence 2001.

[63] See *Hutter* (supra note 20), pp. 5 – 22; *Delfs* (supra note 15), pp. 199 et seq.; *Froomkin* (supra note 6), pp. 20 et seq.

[64] An exception is, for instance, the regulation of compatibility-standards for digital TV in §§ 52, 53 German broadcasting law. For the corresponding situation in the U.S. see, *Daniel*

decisive role of practical knowledge. In the same way in which the binding capability of liberal law depends on distributed pools of common knowledge, and in the same way industrial law is linked to shared zones of practical engineering knowledge, network standards on the Net are related to practical knowledge pools of different corporate cultures and net-communities. Thus, it becomes evident that regulation of network standards by public authorities is imaginable only as co-regulation, comparable to a type of co-operation and co-regulation that has been exercised for controlling the operational safety of steam-engines in the 19th century. The fact that the development of digital communication technology is proceeding so rapidly lends credence to this hypothesis. The highly-specialized and, so to speak, monthly updated (practical) knowledge the Net demands for maintaining and improving its technological environments creates a time-pressure that demands time-saving devices such as the quick implementation of rules through processes of self-coordination and self-regulation.

2. Regulation by the law of the nation-state?

A consequence of the above considerations is that an appropriate concept for the formulation of regulations for network standards has to be different to the continental tradition of "state law". The emergence of network standards particularly reveals the relativity of the state's monopoly of legitimate violence for establishing binding rules. Traditional continental European legal thought has always (often by reference to Hobbes) stressed the element of "sovereign decision" and has given favor to a model of law as coercive orders, associated with the decision monopoly of the state for producing binding (legal) rules. From the continental European point of view, the binding effect of rules is ultimately made dependent on the state enforcing the law. This perspective is still widespread in some strands of legal theory, and it is also still widespread amongst scholars in fields in which technical standards play an important role as, for instance, in German administrative law, particularly in the domain of environmental law.[65] In environmental law in Germany the entire discussion about technical standards, for example, standards securing the safety of nuclear power plants, is roughly reduced to aspects of procedural constitutional requirements concerning the process of establishing technical rules. Yet a classification of technical standards based exclusively on observing the processes of standard-making under aspects such as legislative mandate, administrative

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L. Rubinfeld/Hal J. Singer, Open Access To Broadband Networks, 16 BERKELEY TECHNOLOGY LAW JOURNAL 631 (2001).

[65] See, e.g., *Rudolf Steinberg*, Der ökologische Verfassungsstaat, Frankfurt/Main 1998, pp. 185 et seq., 287 et seq.

order, or legal ruling, is likely to miss the crucial point. Network standards for digital communication technologies are an outcome of self-organization, processes in which public authorities or regulatory bodies have a lack of practical knowledge and can at best co-operate with private enterprises to combine different rationalities. But it is clear and obvious that the political system is neither a center for standardization-expertise, nor for planning the innovative competition of different technological trajectories on the private domain (e.g., Microsoft/Linux), nor for framing the technical structure of the Net which is placed in the public domain (e.g. TCP/IP- Protocol, HTTP, HTML etc.).

In contrast to the self-description of nation-state law, it would therefore be necessary to emphasize that the Internet as a new medium of communication rests on a functioning self-organization of its technical environment. The emergence of the Net is accompanied by a new type of practical knowledge which is rooted in diverse corporate cultures, their business-networks or within net communities such as the open source movement[66]. The knowledge generated and bound within these organizations and networks gives way to a new type of "peer production"[67] that could neither be substituted by the state, nor by political decision making, nor by public administrations or state-independent public authorities and regulatory bodies. It would not make sense, for example, to demand a general worldwide or European regulatory regime of network standards based on global constitutional values. Even assuming such a thing were theoretically possible, it would have to be adjusted to the different transnational inter-organizational and network-like relationships of enterprises, net communities and their rapid changing environments. Every attempt which seeks a new balance between "internal" self-regulation on the Net and "external" government regulation has to take these knowledge-based constraints into account, constraints that are not just the constraints of "globalization". It especially makes no sense to oppose the necessity of generating and adapting practical knowledge by referring to abstract "democratic values" derived from "discourse" or "constitutions" and the related discourse and constitutional theories.

3. Self-blocking of technology and market developments

On the other side of the equation it is conceivable that competition for viability between different business and net cultures may produce dangers of self-blocking of

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[66] See *Eric S. Raymond*, The Cathedral and the Bazaar, Cambridge 1999; *Volker Grassmuck*, Freie Software, Berlin 2001, http://mikro.org/events/OS/text/freie-sw.pdf.

[67] *Yochai Benkler*, The Institutional Ecosystem, 44 COMMUNICATION OF THE ACM 84, 88 (2001).

technology and hinder market developments as well. Since the basic element of the network economy is information and since information products and services are produced and distributed almost exclusively via networks, the "economies of scale" become "economies of networks".[68] In the economics of networks, which is different from the economics of physical goods, the value of information commodities recedes into the background, while the real or virtual connection of the individual elements to a network take center stage. Thus network markets are determined by positive feedback and are subject to the law of "increasing returns".[69] The positive feedback lines of the network economy lead to extremely dynamic markets, which tend to form temporary monopolies. The relatively stable oligopolistic markets of mass produced goods are replaced by markets which – due to network effects – tend to extreme reactions and may even lead to the economic destruction of all competitors. In the network economy there is a dynamic development which strengthens the market segment with the greatest success, resulting in a tendency to monopoly formation by the larger network with its extended potential of connection options. Such an effect occurs, e.g., when a software producer inserts program elements of a computer operating system into applications or middleware and uses a strong market position in a market segment characterized by network effects in order to occupy other market segments ("crossover"), ultimately linking more and more strands and knots of a network to its own corporate technology and culture ("leveraging").

Thus, it is rather unlikely in the network economies that, for example, several big providers of computer operating systems can survive in one market segment, for instance, in the segment for personal computers. It is, on the contrary, more likely that the market tips at a certain point, letting the last remaining competitor who no longer reaches the critical mass disappear. This phenomenon is described in the literature with reference to the experiences made with the blockbuster-driven Hollywood film industry as the „winner-takes-all-market"-effect.[70] The dominant or even monopolistic market position which results from this effect may only be a temporary one, but it can certainly result from a disproportional advantage, which the first mover is able to secure by lock-in-effects or simply by virtue of coincidence. The markets of the network economy are characterized by lasting instability, in which initially insignificant historical events can produce an increased diver-

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[68] *Carl Shapiro/Hal R. Varian* (supra note 21), p. 173.

[69] *W. Brian Arthur*, Increasing returns and the New World of Business, 74 HARVARD BUSINESS REVIEW 100 (1996); *Shapiro/Varian* (supra note 21), p. 173 – 225; *Kevin Kelly*, New Rules for the New Economy, New York 1998, pp. 23 – 38.

[70] *Shapiro/Varian* (supra note 21), p. 177.

gence influencing the entire technological development and ultimately allowing only one company to emerge as the victor.[71] This successive extension of the dominance of a company is highly problematic to the extent that products cannot be separated from network standards, while network standards are themselves inseparable from the technology and the corporate culture based upon them. The victor thus not only suppresses all other companies, but also all other standards and technologies. The technological and economic development then becomes dependent upon a single source of innovation.

V. Towards a second order-regulation of network standards

1. Openness and interoperability as meta-rules

The regulation of network standards has to be based on a new transnational (public) media law which may incrementally emerge out of networks of transnational academic discussions, mutual observations of national (constitutional) courts and of a mutual influencing of government regulation and policy making.[72] Since the Internet is a medium of communication (and not a communication system), I am rather doubtful whether the idea of a "Cyberlaw" or "Internet-law" really makes sense either on a national or a transnational level. But as an advocate of *public* interests, a new autonomous body of transnational (public) media law should promote the diversity of technological paths, business-cultures and communities on the Net. A new transnational (public) media law should impose a duty to maintain and enhance a wide range of potential surplus knowledge on the Net, i.e., the perpetuation and creation of a diversity of knowledge pools,[73] comparable to the argument invoked for the protection of bio-diversity in discussions on environmental policy rules.[74] Therefore, the most important task for a new "Internet-law" is to ensure the innovative capacity of the Net by securing a variety of technical network

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[71] Stressed particularly by *W. Brian Arthur*, Competing Technologies, Increasing Returns and Lock-In by Historical Events, 99 THE ECONOMIC JOURNAL 116 (1989); see also *W. Brian Arthur (ed.)*, Increasing Returns and Path Dependence in the Economy, Michigan 1994.

[72] As a case study for a national jurisdiction and its feedback effects on the trans-national legal discussion on Internet issues see *Joel Reidenberg*, Yahoo and Democracy on the Internet, 42 JURIMETRICS 261 (2002).

[73] For more details *Thomas Vesting,* The Network Economy – a Challenge for a New Public Law (Beyond the State)*,* in: Ladeur (ed.), Public Governance in the Age of Globalisation, London 2004; *Lessig* (supra note 7); *Karl-Heinz Ladeur*, Postmoderne Rechtstheorie, Berlin 1992, pp. 176 – 213, 207.

[74] See, e.g., *David* (supra note 15), p. 69.

solutions and to guarantee their openness and interoperability. An enlarged national and transnational (public) media law ought to keep the entire Net open for processes of self-transformation and innovation. Moreover, it should maintain the diversity and changeability of linkages between different technology paths and their related business or net cultures as a capacity for further development. Such a regulatory scheme would encompass the preservation of a public domain as a realm in which a public ("open") Internet culture and their practical knowledge pools can evolve spontaneously.

In this respect, a new transnational public (media) law could learn a lot from national constitutional law in general and from the established national broadcasting laws in particular. In broadcasting law obligations of openness and interoperability have reached a relatively precise character. This applies not only to England,[75] France[76] or Germany,[77] but also to the United States considering the US-Supreme Court's First Amendment "fairness doctrine" .[78] The "fairness doctrine" has a relatively elaborated public interest requirement for broadcasting, for instance, in the requirement of equal time to different political spokespersons.[79] These requirements could be interpreted as a reaction of constitutional law to find a normative equivalent for the loss of a naturally given (spontaneously or self-organized) common knowledge pool accessible for everyone. Since broadcasting law can no longer directly refer to a given infrastructure of a homogenous and transparent public sphere, it has to prescribe procedures in which practical knowledge can be generated, e.g. through securing political pluralism on television as a source for creating a representative public opinion which itself has important orientation-functions for the self-organization processes of the political system (e.g. elections). Although the obligations of openness (diversity) and interoperability (pluralism) in broadcasting

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[75] *Barendt, Eric*, Broadcasting Law, Oxford 1995, pp. 32 – 49 et seq.

[76] *Guéhenno, Jean-Marie*, Legal and Constitutional Protection of Freedom of Speech in France, in: Philip S. Cooke (ed.), Liberty of Expression, Washington 1990, pp. 65 – 77.

[77] BVerfGE 12, 265; 57, 320; *Thomas Vesting*, Prozedurales Rundfunkrecht, Baden-Baden 1997, pp. 150 – 159, 168 – 175.

[78] Red Lion Broadcasting vs. FCC, 395 U.S. 367 (1967); *Benkler* (supra note 7), pp. 565 – 568; *Cass Sunstein*, Republic.com, Princeton and Oxford 2001, pp. 141 – 166; *Tarik Tabbara*, Kommunikations- und Medienfreiheit in den USA: Zwischen demokratischen Aspirationen und kommerzieller Mobilisierung, Baden-Baden 2003.

[79] Red Lion Broadcasting vs. FCC, 395 U.S. 367 (1967) "fairness doctrine" for broadcast media; BVerfGE 12, 265; 57, 320 ("freeflow of information"), sceptical about the modern First Amendment jurisprudence, Reidenberg (supra note 72), p. 272.

law are usually targeted at the program, i.e., the communicative content (and not the technical structure), broadcasting law contains a set of normative rules which a new transnational (public) media law should adopt for developing a normative self-description that would regard openness and interoperability as the principal public interest for the regulation of technical network standards.

2. Co-regulation of network standards

From a pragmatic point of view, the preservation of openness and interoperability of network standards may not be reduced to the *function* of "securing expectations", i.e., the contra-factual stabilization of normative expectations.[80] The future of Internet technologies will bring about great uncertainties about the viability of different paths of technical development, and to this extent the regulation of spontaneous network standard formation, may be designed as a contribution to the reduction of uncertainty or the establishment of trust in economic relationships within network markets. In addition to that, a new conception of network standards regulation also has the "positive obligation" to observe the processes of self-regulation of network standards and ask whether these processes preserve or reduce the variability and flexibility of linkages and connections between different network technologies. A new regulatory approach therefore has to observe and, if necessary, actively to promote the viability and productivity of self-co-ordination and self-co-operation through co-regulation on different institutional levels. The function of network standard regulation should consist in promoting *productive* forms for different types of self- and co-regulation, which even may (but rather as the exception) include the setting of constraints by public authorities on both the national or transnational levels.

Thus, the task of a new regulatory concept must consist above all in observing the innovation-driven self-modification of Internet technology on a secondary level (regulation of self-regulation). As legal obligations on the Net have to be generated under conditions of distributed *subjective* decision-making rights, i.e., subjective rights that are primarily held by private companies, a second-order regulation has to adapt to the pluralism of law. The nation-states especially have to accept processes of spontaneous rule-formation beyond the traditional (democratic) procedures of rule-making and respect spheres of autonomous governance on the Net. This also means that the legal status of network standards cannot be restricted to the *de jure* formalized requirements of nation-states by which "informal" technical standards are transformed into legal rules. The traditional doctrine of the sources of law, which claims "democratic legitimacy" deriving only from rule-making proce-

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[80] *Luhmann* (supra note 33), pp. 124 – 164.

dures within nation-states, fails to account adequately for the gain in significance of "spontaneous law production" and self-regulation in the field of network standards.[81] This perspective would not allow simply identifying law and technical standards, but it may legitimize accepting the normative (quasi legal) character of technical standards. Such a position would be very close to Reidenberg's description of the functions of the new "Lex Informatica" and from here, it should be possible to apply openness and inter-operability as meta-rules for a second order regulation of network standards. On this understanding the following issues become regulatory questions. When public authorities are involved in the formulation of standards, what procedural requirements must be observed for the standards to have binding effects? In which domain of the technical layer of the Net where open standards have to be introduced are private solutions feasible? At which nodes and linkage points do standards have to be placed in the public domain?

3. Strategic setting of priorities in network standards regulation

These and similar issues are in the center of anti-trust law today (e.g. the essential facilities doctrine). Although one may have some doubts about the capability of anti-trust law to solve the new problems of technical standard formation, taking recourse to anti-trust rules seems to be fruitful inasmuch it cannot be ruled out that the constant quest for novelty in network markets in turn may produce self-blocking effects and unproductive path-dependencies. Therefore, the approach advocated here, far from denying the necessity of anti-trust regulation on network standards, favors a competition of institutions that would strive for the best practice in securing openness and interoperability on the Internet. A plurality of public institutions, regulatory authorities and courts in the future should, therefore, observe the formation of network standards and, if necessary and where justified, intervene in processes of standard self-regulation. To identify priorities in technical standards regulation, it may be fertile to distinguish between (at least) three different layers in which network standards have an impact on content or in which central nodes and linkage points (e.g. portals, navigation systems, search engines, interfaces) have to be given closer scrutiny that hitherto, linkage points that in the future might possibly be promoted by new forms of network standards regulation.

Let us first take a look at the layer in which network standards produce a gain in capacity and speed of information flows. This layer primarily refers to the shift from analog to digital network standards in the fields of terrestrial, fixed-line and

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[81] See *Gunther Teubner*, Global Private Regimes: Neo-spontaneous Law and Dual Constitution of Autonomous Sectors in World Society?, in: Karl-Heinz Ladeur (ed.) Globalization and Public Governance, London 2004.

mobile telecommunication or broadcasting networks. The introduction of the Integrated Digital Network Standard (ISDN), e.g., has extended the capacities of fixed-line analog telecommunication networks and will – in combination with the support of the Advanced Digital Standard (ADSL) – transform the Internet into a more flexible communication tool in future. Correspondingly, the switch to the digital Universal Mobile Telephone Standard (UMTS) in Europe increases capacities and allows, among others, the introduction of new mobile Net services. This increase in capacity and speed of data transmission may raise issues related to the productivity of self-regulation in respect to technology selection. This was, for example, an issue discussed in the early stages of introducing ISDN. In the interest of protecting the productive function of competition, the process of identifying the best technology itself may thus become subject to oversight and regulation by public authorities,[82] but a growth in the capacity of data transmission regularly increases available options and, aside from the serious problems of information overload which are not subject to this paper, has no discriminatory impact on content.

The second layer concerns the more or less neutral growth in capacity and speed linked to effects on interoperability. Growing capacities of data transmission produce an extension of linking possibilities and bring about new problems of co-ordination and co-operation *between* different network technologies. This becomes clear if we focus on the Net as a new medium of mass communication. Since the Internet will extend to the sectors of traditional broadcasting and other mass-media (e.g. newspapers, magazines), a development today usually described as "convergence",[83] the strategic selection of network standards and their institutionalization through self-regulation will produce indirect effects on the diversity of communications options. If, for example, digital TV is launched as a technology based on network standards which are not compatible with standards used on the Internet, this might reduce the richness of possible choices within the network of networks as well: while the HTTP standard allows constantly switching between different applications while watching Web-TV, this option is not implemented in certain architectures of the DVB standard for digital television. But without the necessity of compatibility it is hardly probable that processes of cross fertilization between different technologies will emerge. Thus, the specific task of network standards regulation in this layer should consist in securing, maintaining and enhancing the variability and flexibility of linkages between different network technologies.

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[82] *Karl-Heinz Ladeur*, Innovation der Telekommunikation durch Regulierung, in: Wolfgang Hoffmann-Riem (ed.), Innovation und Telekommunikation, Baden-Baden 2000, pp. 57 – 76.

[83] See, e.g., *Shapiro* (supra note 1), p. 14.

The necessity of ensuring interoperability in this layer becomes clearer if we reverse the argument. The reduction of interoperability always implies a reduction of communication options, whereas a variety of technologies and business or net-cultures would multiply dependencies and thus generates new possibilities of autonomy.[84] For this hypothesis the function of online services provide an instructive example. Online providers like AOL or T-Online are vital for the accessibility and openness of the Internet as a medium of communication (content). But online-services select and pre-structure content in a process of filtering, by the design of their websites, by navigation tools or by search engines.[85] The range of possible options and the diversity of content thus are dependent on access-options, so that a further reduction of communicative diversity is likely if network effects lead to a decrease in the number of access providers. This decline of possibilities could be compensated for by a strategy of standard regulation that would enable more technologies like digital TV or new mobile Internet services to perform equivalent access functions to the Net. The more possibilities that are offered, the more restraints in information flows produced in one technology path could be circumvented by switching to another. Therefore, network standards directed towards interoperability would be an incentive to generate or stabilize the survivability of competing network technologies.

The third layer in which proprietary network standards in combination with economic power inhibit competition and openness is crucial. Although monopolies in dynamic network markets are only of temporary duration, the reduction of possible options is inherent in the economies of networks. This is especially worrying with respect to the market power of Microsoft and other quasi industrial network technologies based on proprietary standards (e.g., Sun Microsystems). The domination of personal computer operating systems by one producer may not be unacceptable in general, but it is likely that this enormous market power will unfold greater and greater discriminatory capacities in the future. The domination in one market (e.g. operating systems) allows extending dominance to related markets either by combining components of different technologies (e.g. Internet browser, media-player) or by influencing the establishment of related markets through the formation of

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[84] This argument is stressed - in another context - by *Gunter Teubner*, Societal Constitutionalism: Alternatives to State-centred Constitutional theory?, in: Christian Joerges, Inge-Johanne Sand und Gunther Teubner (eds.) Constitutionalism and Transnational Governance, London 2004.

[85] See, e.g., Sunstein, arguing that Internet communication is leading to "fragmentation" with considerable dangers for "democracy", *Sunstein* (supra note 77), pp. 3 – 23, 51 – 88.

strategic alliances. Highlighting links to websites which serve an alleged common economic interest (e.g., sublets of companies which have a share in the strategic alliance) is only one possible strategy with immediate effects on the diversity of communications options. Referring again to the dynamics of networking, it is conceivable that in the near future the media-player, for example, will not only function as a quasi neutral access medium to content, but as a strategic means to influence content perception as well. At this point communication flows on the Net and network technology will be mixed up, which is only another wording for the fact that the medium is the message. Thus, in the layer of "middleware", the necessity of requirements to place network standards in the public domain as well as to rearrange the relationship between private and public (open) knowledge pools are pressing issues.