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FOREWORD

ORGANIZATIONAL CODE: A COMPLEXITY THEORY PERSPECTIVE ON TECHNOLOGY AND INTELLECTUAL PROPERTY REGULATION

*Andrea M. Matwyshyn**

A technology revolution has changed our world in the last quarter century and fundamentally altered our social relationship to information exchange; we have been through a great information transformation. Our new technology tools bring positive consequences for human development by expanding the scope of what an individual can accomplish. However, this expansion has complicated our ability to govern on the person-society border. By doing so, it has highlighted the importance of parsing the ways that regulation is generated in our complex¹ social system and, particularly, by whom.

One source of regulation in our current system derives from what have been termed “architectures of control.” Architectures of control refer to hierarchical impositions of social values that occur through legal code on the one hand, and computer code on the other hand,² what has been termed by Lawrence Lessig as “East Coast Code” and “West Coast Code.” Both East Coast and West Coast Code impose a top-down order that, unless carefully constructed, can easily stifle innovation and the evolution of the technology-mediated marketplace of goods and ideas.

However, architectures of control only present one part of the dynamic regulatory portrait of our technology-mediated complex social

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1. Complexity, in general, is the science examining the interrelationship, interaction, and interconnectivity of various elements within a system and between a system and the environment in which it exists. The hallmarks of complex adaptive systems are distributed control, connectivity, co-evolution, sensitive dependence on initial conditions, emergent order, a state not in equilibrium, and a paradoxical condition of both order and chaos. Complex systems are characterized by a large number of similar but independent actors who persistently move, respond, and evolve in relation to each other in an increasingly sophisticated manner to generate emergent order. *See, e.g., MITCHELL RESNICK, TURTLES, TERMITES AND TRAFFIC JAMS (1997); JOHN H. HOLLAND, HIDDEN ORDER: HOW ADAPTATION BUILDS COMPLEXITY (1995).*

2. *See* LAWRENCE LESSIG, *CODE (1999)*.

system. Equally, if not more important, are bottom-up³ regulatory forces:⁴ dynamic strategic interactions of actors in our system generate their own type of regulation of the system, regulation that might be termed “organizational code.”⁵ Stated another way, our ability to

3. At least one noted legal scholar has highlighted the importance of considering bottom-up norms and legal emergence. See Margaret Jane Radin, *Online Standardization and the Integration of Text and Machine*, 70 *FORDHAM L. REV.* 1125, 1135-37 (2002). However, most Internet regulation scholarly work to date has focused on top-down governance. See, e.g., Lawrence Lessig, Foreword, *Cyberspace and Privacy: A New Legal Paradigm?*, 52 *STAN. L. REV.* 987 (2000); Yoichi Benkler, *Intellectual Property and the Organization of Information Production*, 22 *INT'L REV. L. & ECON.* 81 (2002); Jonathan Zittrain, *Internet Points of Control*, 44 *B.C. L. REV.* 653 (2003); Pamela Samuelson, *Privacy as Intellectual Property*, 52 *STAN. L. REV.* 1125 (2000); Mark Lemley, *Place and Cyberspace*, 91 *CAL. L. REV.* 521 (2003).

4. For various applications of complex systems theory to other legal contexts see, e.g., David G. Post and David R. Johnson, “*Chaos Prevailing on Every Continent*”: *Toward a New Theory of Decentralized Decision-making in Complex Systems*, 73 *CHI.-KENT L. REV.* 1055 (1998) (arguing that legal theory would be enriched by paying attention to algorithms derived from the study of complex systems in contexts such as competitive federalism and the “patching” algorithm). See also, e.g., Susan P. Crawford, *The Biology of the Broadcast Flag*, 25 *HASTINGS COMM. & ENT. L.J.* 603 (2003); Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 *TEX. L. REV.* 863 (2004); Susan W. Brenner, *Toward a Criminal Law for Cyberspace: Distributed Security*, 10 *B.U. J. SCI. & TECH. L.* 1 (2004); Robert A. Creo, *Mediation 2004: The Art and the Artist*, 108 *PENN ST. L. REV.* 1017 (2004); Jim Chen, *Webs of Life: Biodiversity Conservation as a Species of Information Policy*, 89 *IOWA L. REV.* 495 (2004); Scott H. Hughes, *Understanding Conflict in a Postmodern World*, 87 *MARQ. L. REV.* 681 (2004); Daniel A. Farber, *Probabilities Behaving Badly: Complexity Theory and Environmental Uncertainty*, 37 *U.C. DAVIS L. REV.* 145 (2003); Erica Beecher-Monas & Edgar Garcia-Rill, *Danger at the Edge of Chaos: Predicting Violent Behavior in a Post-Daubert World*, 24 *CARDOZO L. REV.* 1845 (2003); J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 *GEO. L.J.* 757 (2003); Daniel S. Goldberg, *And the Walls Came Tumbling Down: How Classical Scientific Fallacies Undermine the Validity of Textualism and Originalism*, 39 *HOUS. L. REV.* 463 (2002); Thomas R. McLean, *Application of Administrative Law to Health Care Reform: The Real Politik of Crossing the Quality Chasm*, 16 *J.L. & HEALTH* 65 (2001-2002); James Salzman et al., *Regulatory Traffic Jams*, 2 *WYO. L. REV.* 253 (2002); Jeffrey G. Miller, *Evolutionary Statutory Interpretation: Mr. Justice Scalia Meets Darwin*, 20 *PACE L. REV.* 409 (2000); Patricia A. Martin, *Bioethics and the Whole: Pluralism, Consensus, and the Transmutation of Bioethical Methods into Gold*, 27 *J.L. MED. & ETHICS* 316 (1999); J.B. Ruhl, *The Co-Evolution of Sustainable Development and Environmental Justice: Cooperation, Then Competition, Then Conflict*, 9 *DUKE ENVTL. L. & POL'Y F.* 161 (1999); Thomas Earl Geu, *Chaos, Complexity, and Coevolution: The Web of Law, Management Theory, and Law Related Services at the Millennium*, 66 *TENN. L. REV.* 137 (1998); Jeff L. Lewin, *The Genesis and Evolution of Legal Uncertainty About “Reasonable Medical Certainty,”* 57 *MD. L. REV.* 380 (1998); J.B. Ruhl, *The Fitness of Law: Using Complexity Theory to Describe the Evolution of Law and Society and its Practical Meaning for Democracy*, 49 *VAND. L. REV.* 1407 (1996); Gerald Andrews Emison, *The Potential for Unconventional Progress: Complex Adaptive Systems and Environmental Quality Policy*, 7 *DUKE ENVTL. L. & POL'Y F.* 167 (1996).

5. Organizational code differs from computer code as a method of regulation. Whereas computer code regulates on the individual level through stealthy imposition of the value of a creator, organizational code regulates on the person-society border and is inherently socio-behavioral in nature, arising out of aggregate behaviors.

govern, particularly through technology and intellectual property law, is impacted by structures of order that are spontaneously arising out of the technology-mediated information exchanges of individual actors within our system. Global patterns are emerging⁶ from the aggregation of these individual behaviors that could not have been forecast simply by understanding the behavior of one particular actor in the system. Integral parts of this organizational code are legal behaviors. For example, organizational code includes the behavioral, strategic, and legal norms of actors in response to changes in substantive law, the role of the transactional bar in shaping the comparative power and strategies of actors within the system, and evolving contracting norms.⁷

For our legal system, it is this emergent organizational code that most complicates governance in the post-information transformation era. Technology has catalyzed the pace of emergence in our system, stressing preexisting tensions in our legal frameworks and creating new tensions. Emergent structures that morph at the lightning pace of technology are more difficult to govern than the more slowly morphing structures of the past. As demonstrated by cases such as *MGM Studios, Inc. v. Grokster* and the fervor of our social debate over the appropriateness of patenting code and genetic matter, our courts and legislatures continue to grapple with technology and intellectual property issues with, at best, mixed success. They struggle to merely stay abreast of technological innovation while not stifling its development.

To craft legal paradigms that can withstand future iterations of technological innovation, legislators and judges should recognize and embrace organizational code as a tool of governance; they should leverage the naturally occurring structures of our technology-mediated complex social system. By harnessing emergent technology and intellectual property behaviors, legal tools can assist in socially engineering⁸ our complex social system toward generating order rather

6. See, e.g., STEVEN JOHNSON, *EMERGENCE: THE CONNECTED LIVES OF ANTS, BRAINS, CITIES AND SOFTWARE* (2001).

7. Borrowing terms from Eric Raymond, organizational code can be said to be order developing through a babbling “bazaar,” which permits norms to percolate to widespread acceptance, while legal code and, frequently, computer code develop order through a “cathedral” style where norms are hierarchically imposed. See ERIC STEVEN RAYMOND, *THE CATHEDRAL AND THE BAZAAR*, available at <http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/> (last visited May 3, 2004).

8. In computer security, social engineering means using offline means of human interaction to obtain critical technology security information, usually passwords. See, e.g., Sarah Granger, *Social Engineering Fundamentals, Part I: Hacker Tactics*, available at <http://www.securityfocus.com/infocus/1527> (last visited May 3, 2004). But here I use social engineering to refer to processes of using means to “trick” certain legal construction into being built to enable the system to govern itself in a more socially beneficial manner.

than chaos. Law can be used to gently nudge the aggregate behaviors of the complex system toward more successfully harmonizing the competing legal, business, and social interests within it. This type of carefully built set of legal constructs that works to positively shift organizational code can be termed an “architecture of growth.”

Architectures of growth are emergent constructs themselves. They arise from the organizational code of legal frameworks that facilitate long run commercial cooperation among actors in the system. Each of these component legal frameworks is adaptive in nature; each one “tricks” the system into self-correcting and generating organizational code that pushes the system toward predictability without stifling innovation or harming consumers.⁹ Therefore, architectures of growth should emerge in tandem with and out of the natural emergence processes of organizational code in the system.

The task legislators, judges, and technologists face in generating architectures of growth is truly daunting: it requires regulating a complex social system that is frequently layered on top of other complex systems. For example, when we attempt to craft any type of Internet legal regime, we are really attempting to regulate the emerging organizational code of at least two complex systems: the Internet itself and our social system. The Internet has demonstrated itself to be a complex system. It is composed of numerous independent actors, acting in clustered groups, at least in the context of the Web,¹⁰ frequently following local rules¹¹ and demonstrating increasingly complicated visible patterns of natural organization of behaviors and norms. Therefore, guiding the interaction between this complex system and our social system necessitates understanding the history of two conjoined but different bodies of emerging organizational code.

Generating architectures of growth also requires monitoring whether organizational code is consonant with or competes with architectures of control. Coexistence of architectures of growth and architectures of control results in a self-correcting system that is capable of maintaining predictability while absorbing new organizational code generated by innovation. A conflict between the two architectures, or an absence of

9. Organizational code includes both market and non-market strategic decisions of actors within the complex adaptive system. For a discussion of non-market strategy, see, e.g., S.L. Jarvenpaa & E.H. Tiller, *Integrating Market, Technology, and Policy Opportunities in E-Business Strategy*, 8 J. STRATEGIC INFO. SYS. 235 (1999).

10. ALBERTO-LASZLO BARABASI, LINKED (2002).

11. For example, outside of terms of use, online communities often have additional community rules of conduct. See, e.g., AOL Instant Messenger Web Chat Rules & Etiquette, available at <http://www.aol.com/community/rules.html> (last visited May 3, 2004).

an architecture of growth, results in a system driven by stop-gap legal measures. Such an approach always remains one step behind the bleeding edge of innovation, stumbling society non-adaptively in the direction of doctrinal chaos.

In summary, in order to generate a social system that both facilitates innovation and provides safety nets of consumer protection, technology and intellectual property policy problems should be approached as organized complexity problems.¹² Recognizing the naturally occurring patterns of organization arising from strategic legal behaviors, we can guide the emergence of the organizational code in our system by generating architectures of growth. Architectures of growth offer a means of letting the system steer itself toward order without over-determining the exact contours of what that order should look like. Only a flexible system of this type, sensitive to the natural structures of complex systems, will be able to both nurture and govern a generation of future technologies that are currently nascent only in the minds of their creators.

12. For further discussion of complexity theory, see, e.g., Y. BAR-YAM, *DYNAMICS OF COMPLEX SYSTEMS: STUDIES IN NONLINEARITY* (1997); BARABASI, *supra* note 10.

