

# Soft Law 2.0: An Agile and Effective Governance Approach for Artificial Intelligence

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## ABSTRACT

*Artificial intelligence (AI) is the most transformative technology of our era, affecting every industry sector and aspect of our lives. While AI promises enormous benefits, some of which are already manifesting, AI also has the potential to create many risks and problems, some of which are already starting to appear. Traditional command-and-control government regulation, referred to as “hard law,” barely exists for AI, and following the pattern of other technologies, is likely to be adopted incrementally in a trickle that will extend over future decades. Thus, for now, and for the immediate future, AI will be primarily governed by “soft law,” which consists of a variety of instruments creating substantive expectations that are not directly enforceable by governments. The primary problem with soft law is that because it is not enforceable, there are doubts about its effectiveness. This article provides the results of a two-year study on how to make AI soft law more effective and credible. It first summarizes lessons from decades of soft law governance of other technologies, including biotechnology, nanotechnology, information and communication technologies, and environmental technology. Next it identifies, analyzes, and draws observations and insights from over 600 existing AI soft law programs. Finally, building on*

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Despite these setbacks and obstacles, soft law remains an essential tool for the successful governance of AI. The effectiveness and credibility of soft law measures can be enhanced by various indirect enforcement or assurance mechanisms that can incentivize entities to comply with them and build public confidence in their effectiveness.<sup>6</sup> This paper identifies and evaluates a series of potential indirect enforcement measures for AI soft law. We coin the term Soft Law 2.0 to refer to the expansion of soft law beyond substantive requirements to also include processes for implementation and compliance assurance.

Part I describes the essential role that *both* government regulation and soft law will play in the governance of AI. Both types of measures have their limitations but also critical roles to play. For the foreseeable future, the governance of AI will be managed by an ever-evolving hybrid of government regulation and soft law. Part II provides an overview of current soft law approaches for AI, including measures for ensuring implementation and indirect enforcement, to the extent they exist. Finally, Part III describes and evaluates some indirect enforcement mechanisms for soft law that together create a toolbox that form the basis of Soft Law 2.0. This suite of indirect enforcement mechanisms can make soft law instruments both more effective and more credible.

## I. THE ROLES AND LIMITATIONS OF HARD LAW AND SOFT LAW IN AI GOVERNANCE

The successful governance of AI will require a combination of both hard law and soft law to make useful contributions. The interaction of these measures will be a complex, complementary, evolving, and contested relationship.

### A. THE STRENGTHS AND WEAKNESSES OF HARD LAW

The controversy over the relative roles of hard and soft law has been elevated by a series of scandals and disasters that have blemished, if not decimated, the public's trust in industry's

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6. According to one empirical analysis of soft law, the empirical evidence demonstrates that "self-governance is feasible and effective," whereas "our understanding of whether it is normatively acceptable ('legitimate') remains a work in progress." STEPHEN M. MAURER, SELF-GOVERNANCE IN SCIENCE 147 (2017) [hereinafter MAURER, SELF-GOVERNANCE].

ability to police itself. The examples are numerous and disturbing. They include Facebook's complicity in sharing personal data with Cambridge Analytica to manipulate Americans' voting behavior.<sup>7</sup> Volkswagen's cheating on emissions testing to enable its diesel vehicles to emit higher pollution levels than permitted.<sup>8</sup> Theranos' fabrication of results and public announcements to market a diagnostic test capability that did not exist.<sup>9</sup> Boeing's failure to properly validate and ensure the safety of its 737 Max planes that resulted in two crashes and 346 deaths.<sup>10</sup> Even Google's recent firing of a leading ethics researcher for planning to publish analyses that were not well-received by company management.<sup>11</sup>

Each of these high-profile examples, along with others not listed, have collectively eroded the public's confidence and trust in industry's stewardship of emerging technologies and has led to a broad "techlash."<sup>12</sup> This techlash has in turn fueled a push for faster and further government regulation for technologies such as AI and a rejection of industry self-regulation and reliance on corporate ethics statements. Such government adoption of enforceable rules is what is known as hard law.

Traditional government regulation or hard law has many strengths and has an appropriate and necessary role to play in the governance of AI. The greatest strength of government regulation is its legal enforceability, backed by the power and resources of the government to investigate and prosecute

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7. See Nicholas Confessore, *Cambridge Analytica and Facebook: The Scandal and the Fallout So Far*, N.Y. TIMES (Apr. 4, 2018), <https://www.nytimes.com/2018/04/04/us/politics/cambridge-analytica-scandal-fallout.html>.

8. Jack Ewing, *Prosecutors Target Ex-Audi Chief in First VW Emissions Trial*, N.Y. TIMES (Sept. 29, 2020), <https://www.nytimes.com/2020/09/29/business/Volkswagen-Audi-rupert-stadler-diesel.html>.

9. Erin Griffith, *Elizabeth Holmes Is Sentenced to More Than 11 Years for Fraud*, N.Y. TIMES (Nov. 18, 2022), <https://www.nytimes.com/2022/11/18/technology/elizabeth-holmes-sentence-theranos.html>.

10. Niraj Chokshi, *House Report Condemns Boeing and F.A.A. in 737 Max Disasters*, N.Y. TIMES (Sept. 16, 2020), <https://www.nytimes.com/2020/09/16/business/boeing-737-max-house-report.html>.

11. Cade Metz & Daisuke Wakabayashi, *Google Researcher Says She Was Fired Over Paper Highlighting Bias in A.I.*, N.Y. TIMES (Dec. 3, 2020, 6:01 PM), <https://www.nytimes.com/2020/12/03/technology/google-researcher-timnit-gebru.html>.

12. Darrell M. West, *Techlash Continues to Batter Technology Sector*, BROOKINGS (Apr. 2, 2021), <https://www.brookings.edu/blog/techtank/2021/04/02/techlash-continues-to-batter-technology-sector/>.

regulatory violations. Government regulation also tends to better reassure the public that a problem is being addressed. Appropriately targeted and tailored regulation to address specific, significant problems is therefore warranted, and several major companies involved in AI have recently called for the government to regulate specific problems such as some aspects of facial regulation.<sup>13</sup>

But governmental regulation is not a panacea, and it is naïve to assume that comprehensive regulation is feasible and could solve and eliminate all problems and concerns associated with AI. This is clearly not the case, as regulation is imperfect and often inadequate attention is given to the challenges and complexities of ex ante regulation.<sup>14</sup> First of all, comprehensive regulation of AI is both infeasible and inadvisable. As a threshold matter, any regulation that purports to regulate all AI would need a bright-line definition that distinguishes AI applications that are subject to the regulation from non-AI software and products that are not regulated. The ambiguity and difficulty of precisely defining other emerging technologies such as nanotechnology have impeded or complicated regulation of those technologies,<sup>15</sup> and similar difficulties would be expected with any attempt to comprehensively regulate AI.

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13. Nicol Turner Lee & Caitlin Chin, *Police Surveillance and Facial Recognition: Why Data Privacy Is Imperative for Communities of Color*, BROOKINGS (Apr. 12, 2022), <https://www.brookings.edu/research/police-surveillance-and-facial-recognition-why-data-privacy-is-an-imperative-for-communities-of-color/>; Neil A. Chilson & Taylor D. Barkley, *The Two Faces of Facial Recognition Technology*, IEEE TECH. SOC'Y MAG., Dec. 2021, at 87, 89–90 (discussing issues such as bias and privacy implications).

14. William E. Kovacic & David A. Hyman, *Regulating Big Tech: Lessons from the FTC's Do Not Call Rule*, 26 VA. J.L. & TECH., Summer 2023, at 1, 4 (“[M]uch less attention [has been given] to the complexities of developing and implementing [ex ante regulation]”); DANIEL J. FIORINO, VOLUNTARY INITIATIVES, REGULATION, AND NANOTECHNOLOGY OVERSIGHT: CHARTING A PATH 16 (2010), <http://www.nanotechproject.tech/process/assets/files/8347/pen-19.pdf> [hereinafter FIORINO, VOLUNTARY INITIATIVES] (“Regulation requires that agencies have statutory authority, involves complex and time-consuming procedures, limits flexibility of agencies and firms and is implemented in the context of what often are adversarial and distrustful relationships.”).

15. See generally Martin Miernick et al., *Legal and Practical Challenges in Classifying Nanomaterials According to Regulatory Definitions*, 14 NATURE NANOTECHNOLOGY 208 (2019) (explaining the complexities of applying a regulatory scheme to nanomaterials); Gary E. Marchant, *What Is a Nanomaterial? There's No Good Definition—Which Makes It Difficult to Regulate*, SLATE (Sept. 22, 2016), <https://slate.com/technology/2016/09/the-difficulty-of-defining-nanomaterials.html>.

Moreover, AI presents a broad range of risks and concerns, ranging from safety to bias to unemployment, by products across many different industry sectors such as medical, automotive, and financial, the whole of which are beyond the jurisdiction of any single agency.<sup>16</sup> Existing regulatory agencies often lack adequate technical staff and expertise to quickly regulate a new emerging technology.<sup>17</sup> It is unlikely that legislatures will or should create a new AI regulatory agency to address this broad constellation of concerns across so many industry sectors.<sup>18</sup>

Another problem with comprehensive regulation is that it often creates an ever-expanding web of rules and requirements that ends up doing more harm than good. The history of regulation is littered with well-intentioned efforts to put in place comprehensive regulatory schemes for industries like trucking or aircraft that ended up being overly complicated and burdensome and were eventually rescinded with almost unanimous approval.<sup>19</sup>

Comprehensive regulation of an emerging technology in its early and formative stages of development, before risks and benefits are fully understood, can be particularly treacherous. An example is biotechnology, where burdensome regulations were put in place for all genetically modified (GM) products, before the risks and benefits of these products were well

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16. See Subbarao Kambhampati, *Why Are Artificial Intelligence Systems Biased?*, THE HILL (July 12, 2020), <https://thehill.com/opinion/cybersecurity/506924-why-are-artificial-intelligence-systems-biased>; Dario Amodei et al., *Concrete Problems in AI Safety* 2–3 (July 25, 2016) (unpublished manuscript) (on file at arXiv); See also WORLD ECON. F., *AGILE REGULATION FOR THE FOURTH INDUSTRIAL REVOLUTION: A TOOL KIT FOR REGULATORS* 6 (2020), <https://www.weforum.org/about/agile-regulation-for-the-fourth-industrial-revolution-a-toolkit-for-regulators#> (“Regulators can struggle to respond to innovations whose implications lie partly outside their sectoral or geographical jurisdiction requiring coordination with others (the ‘coordination problem’).”).

17. Kovacic & Hynman, *supra* note 14, at 9 (“a regulator dealing with technologically dynamic sectors is likely to find it necessary to develop its own team of technologists to understand the affected sector”); FIORINO, *VOLUNTARY INITIATIVES*, *supra* note 14, at 29 (“As for resources, it is fair to say that regulators always are struggling with constraints, especially on emerging issues where the regulatory infrastructure is lagging.”).

18. Ryan Hagemann et al., *Soft Law for Hard Problems: The Governance of Emerging the Technologies in an Uncertain Future*, 17 COLO. TECH. L.J. 37, 47, 68 (2018).

19. See, e.g., Christine S. Wilson & Keith Klovers, *The Growing Nostalgia for Past Regulatory Misadventures and the Risk of Repeating These Mistakes with Big Tech*, 8 J. ANTITRUST ENFT 10 (2020).

understood. Every scientific authority has now concluded that GM products are as safe, if not safer, than their non-GM counterparts,<sup>20</sup> and yet biotechnology products are still subject to burdensome regulatory requirements that do not apply to non-GM equivalents.<sup>21</sup> These additional regulatory requirements cost tens of millions of extra costs per product and delay those GM products by a decade or more.<sup>22</sup> More importantly, the regulatory burden has foreclosed the market to all but commodity crops by large corporations, snuffing out promising innovations by smaller companies and university researchers, many of which had humanitarian purposes.<sup>23</sup>

In fact, regulation can have anti-market and anti-small business effects, by creating regulatory entry barriers which only large corporations can overcome.<sup>24</sup> Regulators are often “captured” by regulated parties, in that the resulting regulatory programs are “designed and operated primarily for the [regulated entities] benefit.”<sup>25</sup> Regulation may have other

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20. See, e.g., NAT'L ACADS. OF SCI., ENG'G & MED., GENETICALLY-ENGINEERED CROPS: PAST EXPERIENCE AND FUTURE PROSPECTS 19 (2016), <https://nap.nationalacademies.org/read/23395/chapter/1> (“On the basis of its detailed examination of comparisons between currently commercialized GE and non-GE foods in compositional analysis, acute and chronic animal-toxicity tests, long-term data on health of livestock fed GE foods, and epidemiological data, the committee concluded that no differences have been found that implicate a higher risk to human health safety from these GE foods than from their non-GE counterparts.”).

21. Alan McHughen, *A Critical Assessment of Regulatory Triggers for Products of Biotechnology: Product vs Process*, 7 GM CROPS & FOOD 125, 126–27 (2016); Gary E. Marchant & Yvonne A. Stevens, *A New Window of Opportunity to Reject Process-Based Biotechnology Regulation*, 6 GM CROPS & FOOD 233, 233–34 (2016).

22. See generally AGBIOINVESTOR, TIME AND COST TO DEVELOP A NEW GM TRAIT (2022), <https://croplife.org/wp-content/uploads/2022/05/AgbioInvestor-Trait-RD-Branded-Report-Final-20220512.pdf> (studying time and cost of discovery, development, and authorization of “a new plant biotechnology-derived trait.”).

23. COUNCIL FOR AGRIC. SCI. & TECH. (CAST), REGULATORY BARRIERS TO THE DEVELOPMENT OF INNOVATIVE AGRICULTURAL BIOTECHNOLOGY BY SMALL BUSINESSES AND UNIVERSITIES 10–11 (2018), [https://www.cast-science.org/wp-content/uploads/2018/12/CAST\\_IP59\\_Biotech\\_Regs\\_CCE3A1D779985.pdf](https://www.cast-science.org/wp-content/uploads/2018/12/CAST_IP59_Biotech_Regs_CCE3A1D779985.pdf).

24. George Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 5 (1971). For example, before the FDA took first took serious regulatory action against direct-to-consumer (DTC) genetic health testing companies in 2013, there were over a dozen such companies in operation, but after the FDA regulatory crack-down only the largest such company, 23andMe, could afford the regulatory burdens of FDA-approved DTC genetic health tests.

25. *Id.* at 3. See also MAURER, SELF-GOVERNANCE, *supra* note 6, at 180.

socially disadvantageous effects, such as locking-in older and less beneficial technologies that get a regulatory free pass whereas better and newer technologies are deterred by burdensome and expensive requirements. Another systemic problem with regulation is the resistance of many policymakers to enact it, whether through lack of political will or an unwillingness to invest the necessary political capital and resources.<sup>26</sup> Policymakers are also often reluctant to support new regulations for fear they will eliminate jobs and harm international competitiveness.

Government regulation also faces an issue with incomplete compliance. Public agencies usually lack the resources to monitor all regulated entities and detect all or even most violations, and so depend primarily on deterrence and industry self-enforcement (similar to soft law). It is an open secret though that any complex facility or business is necessarily going to operate in violation of some of the complex web of regulations that apply to it.<sup>27</sup> Regulations are also limited in geographic scope to specific jurisdictions, even though technologies and markets typically extend beyond such borders.<sup>28</sup>

But the biggest shortcoming of technology regulation is the so-called “pacing problem,” in which regulation is unable to keep pace with fast developing technologies.<sup>29</sup> The pacing problem has two elements. First, regulatory agencies are too slow to adopt regulations in the first instance.<sup>30</sup> There are numerous administrative requirements that an agency must comply with in promulgating a regulation, and these make enactment slow

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26. Bryan Naylor, *Not Just Airplanes: Why the Government Often Lets Industry Regulate Itself*, NAT'L PUB. RADIO (Apr. 4, 2019, 5:01 AM), <https://www.npr.org/2019/04/04/709431845/faa-is-not-alone-in-allowing-industry-to-self-regulate>; Hagemann et al., *supra* note 18, at 69.

27. J. B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 GEO. L.J. 757, 792 (2003) (survey of regulatory lawyers found that companies are out of compliance two-thirds of the time).

28. MAURER, SELF-GOVERNANCE, *supra* note 6, at 180.

29. Gary E. Marchant, *The Growing Gap Between Emerging Technologies and the Law*, in THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT: THE PACING PROBLEM 19, 22–23 (Gary E. Marchant et al. eds., 2011) [hereinafter Marchant, PACING]; WORLD ECON. F., *supra* note 16, at 6.

30. MAURER, SELF-GOVERNANCE, *supra* note 6, at 180 (government regulation is “expensive and slow”).

and expensive.<sup>31</sup> The length of time it takes to promulgate a regulation has increased over the years, and regulatory agencies usually have stretched budgets these days that limit their resources and agility to adopt new regulations.<sup>32</sup> The second prong of the pacing problem is inertia. Even if regulations are in place, they are infrequently updated, again because of the same bureaucratic requirements that deter adopting or amending regulations.<sup>33</sup> As a result, existing regulatory programs often become quickly outdated, especially for a rapidly moving technology like AI.

For all these reasons, government regulation of an emerging technology like AI will necessarily be limited and imperfect. This does not mean that some narrowly tailored regulation for specific problems will not be needed and appropriate. Indeed, as AI advances, specific and real problems with AI applications become clear, and the role of hard law in governing AI will likely gradually expand over time. But premature hard law regulation of AI could do more harm than good and unduly impede innovation in this important technology.

In his classic treatise on regulatory practice and theory, Stephen Breyer, before being elevated to the U.S. Supreme Court, recommended that regulation should only be the “weapon of last resort,” and used only when narrowly tailored to serious risks or societal problems.<sup>34</sup> For AI, this means that government regulation will be necessary but not sufficient for technology governance. In contrast, many of the calls for AI regulation fail to heed Justice Breyer’s considered advice and just assume that some unspecified broad AI regulation will magically solve all the AI problems. It won’t.

#### B. SOFT LAW GOVERNANCE

The major alternative (or complement) to hard law government regulation is soft law. Soft law includes but goes beyond industry self-regulation and consists of a variety of instruments including codes of conduct, ethical guidelines,

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31. Hagemann et al., *supra* note 18, at 63–65, 104–06.

32. Marchant, *PACING*, *supra* note 29, at 168–69.

33. For example, the primary regulatory statute for electronic communications in the United States is the Electronic Communications Privacy Act (ECPA), which was enacted in 1986 before email, the world wide web, and smart phones even existed.

34. STEPHEN BREYER, *REGULATION AND ITS REFORM* 184–85 (1982).



private standards, voluntary programs, best practices, certification and auditing requirements, and private-public partnerships, among others. A soft law instrument is any measure that imposes substantive expectations that are not directly enforceable by government.<sup>35</sup>

Like government regulation, soft law has its strengths and weaknesses. Some of the advantages are the informality and hence speed by which they can be adopted and revised, thus providing more agile governance, critical for a fast-moving technology like AI.<sup>36</sup> Soft law expands the scope of governance actors from just government (in the case of regulation) to any one or combination of government, industry, civil society organizations, think tanks, standard setting bodies, and other third parties.<sup>37</sup> As such, with soft law there need not just be one approach imposed from above by the relevant government agency, but rather can be a diverse set of different approaches and instruments that allow experimentation and experiential learning.<sup>38</sup> Soft law often involves a cooperative approach between stakeholders unlike the adversarial approach of government regulation.<sup>39</sup> It gives a greater role to the experts and innovative thinkers who often work outside government in industry, think tanks, academia, and the non-governmental organizations (NGOs).<sup>40</sup> Soft law can also provide a mechanism to try out various and multiple governance approaches, and those that are successful may sometimes be adopted eventually

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35. Marchant & Allenby, *supra* note 2, at 108.

36. Kenneth W. Abbott et al., *Soft Law Oversight Mechanisms for Nanotechnology*, 52 JURIMETRICS J. 279, 301–02 (2012); Hagemann et al., *supra* note 18, at 63–65, 104–06; WORLD ECON. F., *supra* note 16, at 17 (“Soft law can be more easily updated to keep pace with technological change . . .”).

37. FIORINO, VOLUNTARY INITIATIVE, *supra* note 14, at 38.

38. Gary Marchant, “Soft Law” Governance of Artificial Intelligence, AI PULSE 4 (Jan. 25, 2019) [hereinafter Marchant, *AI Soft Law*], <https://escholarship.org/uc/item/0jq252ks>.

39. Hagemann et al., *supra* note 18, at 50–51; Wallach & Marchant, *supra* note 1, at 506; FIORINO, VOLUNTARY INITIATIVE, *supra* note 14, at 25.

40. WORLD ECON. F., *supra* note 16, at 33 (“The information asymmetry between businesses and regulators means that industry is typically better placed to manage the risks from technological innovation in a way that is most efficient and effective.”); MAURER, SELF-GOVERNANCE, *supra* note 6, at 179 (“Firms often possess uniquely valuable information about their internal operations, competitors’ activities, and the economic and technological feasibility of standards. NGOs may similarly know more about social needs and the private sector’s conduct on the ground.”).

into hard law government regulation.<sup>41</sup> Finally, soft law is not limited to legal jurisdictions, so unlike government regulation it is inherently international.<sup>42</sup>

But of course, soft law is not perfect either and has its own disadvantages. The biggest disadvantage is that it is not directly enforceable by government, and therefore compliance with soft law is likely to be incomplete.<sup>43</sup> Perhaps most disturbing, the “bad actors” in a given industry, the ones that most need to change their behavior, are probably least likely to comply with a soft law measure.<sup>44</sup> Meanwhile, the good actors who are most likely to be already acting responsibly will be the first to comply with the soft law requirements. In addition, because no authority usually has power to monitor and assess compliance, a company could publicly claim they are compliant with a soft law measure when they are not. Just like insincere or unfulfilled corporate promises about sustainability have been described as “green washing,”<sup>45</sup> weak and non-transparent industry claims of ethical self-governance of AI has been described as “ethics washing.”<sup>46</sup> This is particularly true for many soft law measures written in vague, general language that are susceptible to subjective and self-serving interpretations.<sup>47</sup>

Another major limitation of soft law mechanisms is that the public is less likely to trust such measures specifically because their participation is voluntary rather than compulsory.<sup>48</sup>

41. Gary E. Marchant et al., *Risk Management Principles for Nanotechnology*, 2 NANOETHICS 43, 43–60 (2008).

42. Abbott et al, *supra* note 36, at 302; WORLD ECON. F., *supra* note 16, at 36 (“[S]elf and co-regulation can support a more joined-up approach to regulation across regions and nations by embedding common rules across jurisdictions.”).

43. Marchant, *AI Soft Law*, *supra* note 38, at 4; FIORINO, VOLUNTARY INITIATIVE, *supra* note 14, at 39.

44. Jodi L. Short & Michael W. Toffel, *Making Self-Regulation More Than Merely Symbolic: The Critical Role of the Legal Environment*, 55 ADMIN. SCI. Q. 361, 387 (2010).

45. William S. Laufer, *Social Accountability and Corporate Greenwashing*, 43 J. BUS. ETHICS 253 (2003).

46. Karen Hao, *In 2020, Let's Stop AI Ethics-Washing and Actually Do Something*, TECH. REV. (Dec. 27, 2019), <https://www.technologyreview.com/2019/12/27/57/ai-ethics-washing-time-to-act/>.

47. Marchant, *AI Soft Law*, *supra* note 38, at 4.

48. Libby Maman et al., *Varieties of Regulatory Regimes and Their Effect on Citizens' Trust in Firms*, J. EUR. PUB. POL'Y, Oct. 2022, at 1 (empirical study finding that “citizens’ trust increases with the existence of a state regulator and decreases with self-regulatory regimes and deregulation”). *See also* Gary E.

Finally, because there is no single entity authorized to issue soft law measures, there can be a proliferation of such measures in any given technology field. While this attribute can be beneficial in letting 1,000 flowers bloom, it can also create uncertainty, confusion, and competition about which measures should apply.<sup>49</sup>

A complexity with evaluating soft law programs is the difficulty in measuring their effectiveness. Most soft law programs do not have the reporting and compliance assurance requirements that traditional regulations do, so there may be less information available for empirical assessment. In addition, one of the important benefits of soft law programs is that they often create more collaborative and less adversarial relationships than regulation, which can provide some longer-term benefits that are almost impossible to objectively measure.

For example, the chemical industry's voluntary Responsible Care program was criticized by academic researchers for failing to reduce toxic emissions from participating company facilities relative to non-participating companies.<sup>50</sup> Yet, as the government official who monitored this program noted, such a single narrow criticism overlooked other important but harder to measure benefits of the voluntary program:

Relying on this one measure, however, ignores the broad range of behaviors that Responsible Care aims to improve, such as pollution prevention, accident prevention and community outreach. Central to the program's effectiveness was the network of resources, relationships and pressures that backed them up. They created a learning system of norms and practices and a useful model . . . .<sup>51</sup>

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Marchant & Kenneth W. Abbott, *International Harmonization of Nanotechnology Governance Through "Soft Law" Approaches*, 9 NANOTECHNOLOGY L. & BUS. 393, 398–99 (2013); Marchant & Allenby, *supra* note 2.

49. MAURER, SELF-GOVERNANCE, *supra* note 6, at 42–43 (describing “standards war” beyond competing soft law initiatives on DNA synthesis safeguards).

50. See, e.g., Andrew King & Michael Lenox, *Industry Self-Regulation Without Sanctions: The Chemical Industry's Responsible Care Program*, 43 ACAD. MGMT. J. 698 (2000); Neil Gunningham, *Environment, Self-Regulation, and the Chemical Industry: Assessing Responsible Care*, 17 L. & POL'Y 57 (1995).

51. FIORINO, VOLUNTARY INITIATIVE, *supra* note 14, at 20, 25. Madhu Khanna makes a similar argument for the broader benefits of the voluntary 33/50 program, including increased communications among firms on pollution reduction strategies, greater employee engagement, and increased awareness of pollution discharges and costs that could be avoided. Madhu Khanna, *The U.S. 33/50 Voluntary Program: Its Design and Effectiveness*, in REALITY