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It's Not the Robot's Fault! Russian and American Perspectives on Responsibility for Robot Harms

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IT'S NOT THE ROBOT'S FAULT! RUSSIAN AND AMERICAN PERSPECTIVES ON RESPONSIBILITY FOR ROBOT HARMS

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As automated vehicles, personal robots, and other cyberphysical systems enter our world, law must confront important questions about civil liability for harms caused by these systems. Two legal scholars—one from Russia and one from the United States—come together to tackle these questions with an integrated approach that draws on the law of both countries.

I. INTRODUCTION

The question of who or what is responsible for harms caused by so-called cyberphysical systems is central to legal scholarship on automation. In this Article, two legal scholars who deal directly with robotics on different sides of the world attempt to add a few logs to the fire of this hot discussion. We first synthesize Russian and American perspectives[1] and then propose an

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1. Wherever possible, we try to distinguish between (1) differences between the legal systems of the two authors and (2) differences between the individual perspectives of the two authors. Neither of us

integrated approach to civil liability based on a given actor's relationship to the cyberphysical system and that actor's culpability for the harm.

II. RUSSIAN AND AMERICAN LAW

It is impossible to consider the issue of liability without considering the key features of each country's legal system and legal institutions. As demonstrated in the next section—and for reasons that we cannot fully explain—the relevant substantive law is strikingly similar between the Russian Federation and the United States.[2]

Key differences in the practical and procedural context for this substantive law nonetheless complicate these similarities. These differences implicate the creation, interpretation, implementation, and appreciation of law. For example, the legal rules discussed in this article are determined principally by parliament in the Russian Federation but by a combination of courts and legislatures in the various U.S. states (with some intervention by the U.S. Congress). Indeed, although this Article frequently cites both articles of the Russian Civil Code and sections of American legal restatements in parallel, these two kinds of sources are not at all comparable. The Civil Code is binding throughout the Russian Federation, whereas any given restatement of the law is at most an influential characterization of legal rules prevalent among U.S. states.

There are other differences as well. For example, unlike a trial in the Russian Federation, a trial in the United States may involve a jury of ordinary citizens who make factual determinations under the supervision of a judge. Panels of judges, however, are typical at the appellate levels in both countries.

In the United States, preparing to try or to otherwise resolve a case involves discovery, an important but expensive process in which plaintiffs and defendants can demand vast amounts of information from each other and even from third parties. In the Russian Federation, discovery is merely an inexpensive formality in which parties might exchange evidence before a hearing—though they might also wait to disclose that evidence until a more opportune point in the initial litigation.

More generally, the Russian and U.S. systems also differ with respect to cost and speed. Litigation in the Russian Federation is generally considered swift and relatively inexpensive financially. Its other virtues notwithstanding, civil litigation in the United States is rarely described as

presumes to speak for our respective country or for our respective community of domestic legal scholars.

2. With apologies for the English language and to the other countries of North and South America, we use "American" to refer only to the United States.

swift or cheap. Such litigation is not as common in the United States as is often assumed, but it does underpin an expansive system of private settlement that partially mitigates the country's lack of a robust social safety net.

III. OVERVIEW OF CIVIL LIABILITY

Responsibility can be technical (as in the case of a mechanic who has responsibility for maintaining a vehicle), moral (as in the case of a passerby who has a responsibility to rescue a stranger in distress), or legal. Legal responsibility can be further divided into obligations (such as driving carefully) and liabilities; these are roughly equivalent to primary and secondary obligations in international law. Liabilities in turn can be criminal (where the actor is fined or imprisoned by the state), administrative (where the actor merely pays a fine for a minor violation), or civil.

That brings us finally to civil liability—the legal responsibility of one party to compensate another for a private wrong or harm. This may also be called private liability or noncriminal liability. "Civil" here is used to distinguish civil liability from criminal liability. (Confusingly, "civil" can also be used to distinguish the codified civil law of continental Europe from the precedential common law of much of the English-speaking world.)

Civil liability is generally intended to promote reasonable behavior, to compensate the victims of certain harms, and to appropriately channel retributive desires. This liability is retrospective in that it arises after harm has occurred. But it is also prospective in that the possibility of liability is intended to directly or indirectly influence behavior. In this way, civil liability is one tool in a larger regulatory toolbox. These other tools—including administrative law and criminal law—are often used prior to the occurrence of harm. For example, in the case of a consumer product, these legal gateways might include the points at which the product is designed, manufactured, sold, resold, used, associated with a danger, updated, or disposed of.

A judicial determination of civil liability is often predicated on a defendant's commission of a tort, breach of a contract, sale of a dangerous product, participation in a dangerous activity, infringement on a property interest, or violation of a regulatory requirement.

In the United States, common law has led to considerable overlap among these categories: Products liability law, for example, is a child of both tort law and contract law. In the Russian Federation, civil law has created clearer boundaries between these categories, but a single harm can nonetheless implicate several of them.

There are significant differences among and even within these

categories of civil liability. Consider two key examples: culpability and damages.

The relationship between culpability and liability continues to challenge legislatures and courts in the Russian Federation and the United States (among many other countries).[3] In tort law, culpability—fault—is central, even though it is neither sufficient nor, in some cases, even necessary for tort liability. Russian civil codes since 1922 have included a fault-based liability provision, which currently states that:

> A person who has not performed an obligation or who has performed it improperly shall bear liability in case of fault (intent or negligence), except for instances where a law or contract provides for other grounds for liability. A person is recognized as being not at fault if with the degree of care and caution that was required of him by the nature of the obligation and the conditions of commerce, the person took all measures to properly perform the obligation.[4]

In Russia, fault is a subjective condition of legal responsibility expressing the offender's attitude to her own wrongful conduct and its consequences. Fault has a very specific nature as a condition for liability in civil law, which deals with specific relations mostly based on goods and money[5]—as well as with personal injury. This leads to the primacy of the compensatory and remedial functions of civil liability. Indeed, as in the United States, a party's subjective attitude generally does not affect compensation.[6] This explains why the *type* of fault is less important—and why in some cases there is no need to establish fault at all.

Although scholars disagree on its early history,[7] fault-based liability is also a cornerstone of modern American tort law. For example, unreasonable conduct is one of the four or five elements of a typical negligence claim. These elements are duty (an obligation owed by the defendant), breach (unreasonable conduct by the defendant), cause-in-fact (contribution of the

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3. *See, e.g.*, *infra* Section IV (discussing evolution of strict liability in products liability in the United States).

4. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 401(1) (Russ.).

5. SUKHANOV YE.A., 1 ROSSIYSKOYE GRAZHDANSKOYE PRAVO: V 2 T. OBSHCHAYA CHAST'. VESHCHNOYE PRAVO. NASLEDSTVENNOYE PRAVO. INTELLEKTUAL'NYYE PRAVA. LICHNYYE NEIMUSHCHESTVENNYYE PRAVA: UCHEBNIK [E.A. SUKHANOV, RUSSIAN CIVIL LAW IN TWO VOLUMES, GENERAL PART, RIGHTS IN REM. PROBATE LAW. INTELLECTUAL RIGHTS. PERSONAL NON-PROPERTY RIGHTS: A TEXTBOOK] (2d ed. 2011) (paraphrased from the original Russian) (in the original Cyrillic, СУХАНОВ Е.А., РОССИЙСКОЕ ГРАЖДАНСКОЕ ПРАВО: В 2 Т. ОБЩАЯ ЧАСТЬ. ВЕЩНОЕ ПРАВО. НАСЛЕДСТВЕННОЕ ПРАВО. ИНТЕЛЛЕКТУАЛЬНЫЕ ПРАВА. ЛИЧНЫЕ НЕИМУЩЕСТВЕННЫЕ ПРАВА: УЧЕБНИК).

6. *Id.* (paraphrased from the original Russian).

7. *Compare, e.g.*, W. Jonathan Cardi & Michael D. Green, *Duty Wars*, 81 S. CAL. L. REV. 671, 700 (2008), *with* John C.P. Goldberg & Benjamin C. Zipursky, *The Moral of* MacPherson, 146 U. PA. L. REV. 1733, 1761 n.104 (1998).

breach to harm suffered by the plaintiff), scope of liability (the exclusion of pragmatic limits on liability), and damages (elements of the harm that are recognized by law).

Despite the importance of culpability, even tort law has exceptions involving strict liability for innocent conduct, and liability without fault is often the rule rather than the exception in other categories of civil liability. For the reasons discussed below, these instances in which reasonable conduct can result in liability are especially important to robot law. We return later in the Article to eight key instances:[8]

1. Breach of a contract.[9]
2. Misrepresentation.[10]
3. Violation of certain laws (in some U.S. states).[11]
4. Sale of a defective product (in the Russian Federation and most U.S. states).[12]
5. Provision of a defective service (in the Russian Federation).[13]
6. Participation in certain abnormally dangerous activities.[14]

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8. There are other exceptions as well. In the Russian Federation, for example, strict liability can apply to professional bailees for damage to a thing. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 901. Harm caused to an individual as a result of illegal conviction, illegal criminal prosecution, illegal use of confinement under guard or recognizance not to leave, or illegal imposition of administrative liability in the form of administrative arrest as a measure of restraint, and also harm caused to a legal entity as a result of administrative prosecution in the form of administrative suspension of activity. *Id.* art. 1070. In the United States, for example, a person who intentionally enters another person's land that she mistakenly but reasonably believes to be her own can nonetheless be liable for trespass. RESTATEMENT (SECOND) OF TORTS § 164 (AM. LAW INST. 1965).

9. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 401(3) (entrepreneurial activity); RESTATEMENT (SECOND) OF CONTRACTS ch. 11, intro. note (AM. LAW INST. 1981).

10. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 178; RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 9 (AM. LAW INST. 1998).

11. Under a strict approach to negligence per se followed by some U.S. states, the violation of a law is irrefutably unreasonable (such that a bleeding defendant driving above the speed limit in order to reach a hospital could be liable for a crash caused by that speeding). *Cf.* RESTATEMENT (THIRD) OF TORTS: PHYSICAL & EMOTIONAL HARM § 14 cmt. c (AM. LAW INST. 2010).

12. *Compare* GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 1095 *with* RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 1 (AM. LAW. INST. 1998).

13. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 1095. Although strict liability does not generally apply to services in the United States, some U.S. states do hold some transport providers and other common carriers to a standard of utmost care under which even "slight" negligence can result in liability. *Compare, e.g.*, Eskew v. Burlington N. & Santa Fe Ry. Co., 958 N.E.2d 426 (Ill. App. 2011) (imposing a higher standard of care) *with* Bethel v. New York City Transit Auth., 92 N.Y.2d 348 (N.Y. 1998) (rejecting a higher standard of care); *see also, e.g.*, Kevin Werbach, *Is Uber a Common Carrier?*, 12 I/S: J. L. & POL'Y FOR INFO. SOC'Y 135, 146 (2015) (discussing the classification of broadband access).

14. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 1079(1); RESTATEMENT (THIRD) OF TORTS: PHYSICAL & EMOTIONAL HARM § 20 (AM. LAW INST. 2010). Whereas

7. Harm by certain animals under the defendant's control.[15]
8. Tortious conduct by an employee or other agent.[16]

The relationship between compensation and liability is equally complex. Consistent with its compensatory rationale, civil liability nominally seeks complete restoration of a violated right. In some instances, however, a contract between parties or a legal rule of more general application may limit recovery. For example, both Russian and American law permit certain limitations on contractual damages, and many U.S. states reduce the compensation awarded to a plaintiff whose own unreasonable conduct contributed to her harm. In other instances, law may provide for increased damages. For example, in the Russian Federation, law or contract can increase the liability of a carrier for harm caused to the life or health of a passenger compared to ordinary rules of the Civil Code,[17] and U.S. states generally permit punitive damages for reckless or intentionally harmful conduct.[18]

Even where law contemplates full compensation, reality often hinders it. In the United States, lawsuits can be deterred by litigation costs and other practical challenges, barred by arbitration clauses, impeded by evidentiary limitations, and tempered by settlements that result in only partial compensation—and even then, legal fees can significantly reduce the amount that an injured victim ultimately receives from any award or settlement.

These principles are important as we turn to harms caused by robots. For our purposes, a cyberphysical system is a combination of software and hardware that can act in and on the physical environment. A robot is a cyberphysical system with some nominally discrete physical form and some

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the Russian Federation explicitly identifies "means of transport" as one of these abnormally dangerous activities, GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 1079(1), most U.S. states do not apply this doctrine to the use of regular motor vehicles. The U.S. state of Florida does apply a "dangerous instrumentality doctrine" to motor vehicles. *See, e.g.*, Burch v. Sun State Ford, Inc., 864 So. 2d 466 (Fla. Ct. App. 2004) (holding that the dangerous instrumentality doctrine applies even when an operator is involved in intentional misconduct, unless the operator makes weapon-like use of the vehicle with the intent to cause physical harm).

15. RESTATEMENT (THIRD) OF TORTS: PHYSICAL & EMOTIONAL HARM §§ 21–23 (AM. LAW INST. 2010). In Russia, animals are subject to the same legal regime as property, GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 137, and the owner is responsible for non-contractual harm caused by her property, *id.* art. 209.

16. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 1068; RESTATEMENT (THIRD) OF AGENCY §§ 7.01–7.04 (AM. LAW INST. 2006).

17. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 800. In the United States, many states also impose heightened obligations on common carriers. *Cf.* Kevin Werbach, *supra* note 13, at 146 (discussing policy considerations regarding whether to apply legal obligations to newer network-based services).

18. RESTATEMENT (SECOND) OF TORTS § 908 (AM. LAW INST. 1979).

degree of what is commonly if controversially called autonomy.[19] An automated motor vehicle is one example of a robot.[20]

IV. PRIOR SCHOLARSHIP

While much English-language scholarship has considered the civil liability implications of increasing automation and connectivity, these issues are only beginning to gain attention in Russian-language scholarship. Relevant articles collectively address several overlapping topics. First, some deal squarely with civil liability for harms caused by cyberphysical systems.[21] Second, some analyze civil liability for artificial intelligence generally, with or without a physical embodiment.[22] Third, at least in the

19. On automation and autonomy, see, for example, SAE INT'L, SAE J3016: TAXONOMY AND DEFINITIONS FOR TERMS RELATED TO DRIVING AUTOMATION SYSTEMS FOR ON-ROAD MOTOR VEHICLES 28 (2018) (discussing the different and evolving definitions of "autonomous" and "autonomy" and the challenges these present for consistent application to automated driving systems); THOMAS B. SHERIDAN, TELEROBOTICS, AUTOMATION, AND HUMAN SUPERVISORY CONTROL 260 (1992) (defining multiple levels of automation in automobiles). *Cf.* U.S. DEP'T OF DEF., DEF. SCI. BD., TASK FORCE REPORT: THE ROLE OF AUTONOMY IN DOD SYSTEMS 31 (2012) (addressing the muddled understandings of autonomy by using the terms "robot" to refer to physical automations of repetitive processes and "unmanned system" to refer to "mobile robots" that combine physical systems with artificial intelligence).

20. The technically preferred term is "automated driving system." *See* SAE INT'L, *supra* note 19, at 3 (defining "Automated Driving System" as the hardware and software that are collectively capable of performing sustained dynamic driving tasks). However, "automated vehicle" is a commonly accepted term. *See, e.g.*, Rep. of the Global Forum for Road Traffic Safety, Rep. of the Inland Transp. Comm. on Its Seventy-Seventh Session, U.N. Doc. ECE/Trans/WP.1/165 (Oct. 3, 2018) (using the term in the title of a nonbinding resolution on the subject attached to the conference report); National Conf. of Comm'rs on Unif. State Laws, Uniform Automated Operation of Vehicles Act § 2(5) (2019) (unpublished manuscript), https://heinonline.org/HOL/Contents?handle=hein.nccusl/nccpub4477&id=1&size=2&index=&collection=nccusl (defining "[a]utomated vehicle" as a "motor vehicle with an automated driving system"); U.S. DEP'T OF TRANSP., PREPARING FOR THE FUTURE OF TRANSPORTATION: AUTOMATED VEHICLES 3.0 (2018) (using the term throughout the report as well as in its title).

21. *See, e.g.*, Curtis E.A. Karnow, *The Application of Traditional Tort Theory to Embodied Machine Intelligence*, *in* ROBOT LAW 51, 51 (Ryan Calo et al. eds., 2016); Ryan Abbott, *The Reasonable Computer: Disrupting the Paradigm of Tort Liability*, 86 GEO. WASH. L. REV. 1, 7–8 (2018); Andrea Bertolini, *Robots as Products: The Case for a Realistic Analysis of Robotic Applications and Liability Rules*, 5 L. INNOVATION & TECH. 214, 247 (2013); F. Patrick Hubbard, "*Sophisticated Robots": Balancing Liability, Regulation, and Innovation*, 66 FLA. L. REV. 1803, 1872 (2014); Christina Mulligan, *Revenge Against Robots*, 69 S.C. L. REV. 579, 593–94 (2018); Neznamov A.V., *Pravila bespilotnogo vozhdeniya: ob izmeneniyakh Venskoy konventsii o dorozhnom dvizhenii* [*Rules of Unmanned Driving: Towards Changes to the Vienna Convention on Road Traffic*], 1 ZAKON 175 (2018) (in the original Cyrillic, Незнамов А.В., *Правила беспилотного вождения: об изменениях Венской конвенции о дорожном движении*); Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 398 (2016); David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 150 (2014); Mark A. Lemley & Bryan Casey, *Remedies for Robots* 107–08 (Stanford Law Sch. Law & Econ. Research Paper Series, Working Paper No. 523, 2018), https://www.ssrn.com/abstract=3223621.

22. *E.g.*, WOODROW BARFIELD & UGO PAGOLLO, RESEARCH HANDBOOK ON THE LAW OF ARTIFICIAL INTELLIGENCE (2018) (ebook); MORKHAT P.M., ISKUSSTVENNYY INTELLEKT: PRAVOVOY

United States, much attention has focused on the specific case of automated driving.[23] Fourth, some scholarship has considered liability as part of a broader discussion of regulation.[24] Fifth, academic debates about legal personhood for robots have consumed considerable time and space.[25]

VZGLYAD [ARTIFICIAL INTELLIGENCE: LEGAL VIEW] (2017) (in the original Cyrillic, МОРХАМ П.М., ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ: ПРАВОВОЙ ВЗГЛЯД); Gurko A., *Iskusstvennyy intellekt i avtorskoye pravo: vzglyad v budushcheye* [*Artificial Intelligence and Copyright: A Look Into the Future*], 12 IS. AVTORSKOYE PRAVO I SMEZHNYYE PRAVA. 7–18 (2017) (in the original Cyrillic, Гурко А., *Искусственный интеллект и авторское право: взгляд в будущее*); Paulius Čerka et al., *Liability for Damages Caused by Artificial Intelligence*, 31 COMPUTER L. & SECURITY REV. 376 (2015); Jane R. Bambauer, *Dr. Robot*, 51 U.C. DAVIS L. REV. 383 (2017); James Grimmelmann, *Copyright for Literate Robots*, 101 IOWA L. REV. 657 (2016); Bryant Walker Smith, *Proximity-Driven Liability*, 102 GEO. L.J. 1777 (2014); Shlomit Yanisky-Ravid, *Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era—The Human-Like Authors Are Already Here—A New Model*, 2017 MICH. ST. L. REV. 659 (2017).

23. *See, e.g.*, NIDHI KALRA ET AL., RAND CORP., LIABILITY AND REGULATION OF AUTONOMOUS VEHICLE TECHNOLOGIES 17 (2009); JOHN VILLASENOR, BROOKINGS INST., PRODUCTS LIABILITY AND DRIVERLESS CARS: ISSUES AND GUIDING PRINCIPLES FOR LEGISLATION 2 (2014); Stephen S. Wu, *Product Liability Issues in the U.S. and Associated Risk Management*, *in* AUTONOMES FAHREN 575 (Markus Maurer et al. eds., 2015); Kyle Graham, *Of Frightened Horses and Autonomous Vehicles: Tort Law and Its Assimilation of Innovations*, 52 SANTA CLARA L. REV. 1241 (2012); Kenneth S. Abraham & Robert L. Rabin, *Automated Vehicles and Manufacturer Responsibility for Accidents: A New Legal Regime for a New Era*, 105 VA. L. REV. 127 (2019); Mark A. Geistfeld, *A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation*, 105 CALIF. L. REV. 1611 (2018); Jeffrey K. Gurney, *Sue My Car Not Me: Products Liability and Accidents Involving Autonomous Vehicles*, 2013 U. ILL. J. L. TECH. & POL'Y 247 (2013); Hubbard, *supra* note 21; Gary E. Marchant & Rachel A. Lindor, *The Coming Collision Between Autonomous Vehicles and the Liability System*, 52 SANTA CLARA L. REV. 1321 (2012); Bryant Walker Smith, *Automated Driving and Product Liability*, 2017 MICH. ST. L. REV. 1.

24. *See, e.g.*, NEW LAWS OF ROBOTICS. REGULATORY LANDSCAPE. WORLD EXPERIENCE IN THE REGULATION OF ROBOTICS AND ARTIFICIAL INTELLIGENCE TECHNOLOGIES (Andrey V. Neznamov ed., 2018); Bibi van den Berg, *Robots as Tools for Techno-Regulation*, 3 LAW, INNOVATION & TECH. 317, 325 (2011); Tomoko Nambu, *Legal Regulations and Public Policies for Next-Generation Robots in Japan*, 31 AI & SOC'Y 483, 486 (2016); Neznamov A.V. & Naumov V.B., *Strategiya regulirovaniya robototekhniki i kiberfizicheskikh sistem* [*Regulation Strategy of Robotics and Cyber-Physical Systems*], 2 ZAKON. (2018) (in the original Cyrillic, Незнамов А.В., Наумов В.Б. *Стратегия регулирования робототехники и киберфизических систем*); Neznamov A.V. & Naumov V.B., *Voprosy razvitiya zakonodatel'stva o robototekhnike v Rossii i v mire* [*Issues of Development of Legislation on Robotics in Russia and in the World*], 8 YURIDICHESKIYE ISSLEDOVANIYA 14 (2017) (in the original Cyrillic, Незнамов А.В., Наумов В.Б. *Вопросы развития законодательства о робототехнике в России и в мире*); Nicolas Petit, Law and Regulation of Artificial Intelligence and Robots—Conceptual Framework and Normative Implications (Mar. 9, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2931339; Adam D. Thierer et al., *Artificial Intelligence and Public Policy* (Aug.17, 2017) (unpublished manuscript), https://www.mercatus.org/system/files/thierer-artificial-intelligence-policy-mr-mercatus-v1.pdf.

25. *See, e.g.*, Arkhipov V.V. & Naumov V.B., *O nekotorykh voprosakh teoreticheskikh osnovaniy razvitiya zakonodatel'stva o robototekhnike: aspekty voli i pravosub"yektnosti* [*On Some Issues of the Theoretical Foundations of the Development of Legislation on Robotics: Aspects of the Will and Legal Personality*], 5 ZAKON 157 (2017) (in the original Cyrillic, Архипов В.В., Наумов В.Б. *О некоторых вопросах теоретических оснований развития законодательства о робототехнике: аспекты воли и правосубъектности*); Ignacio N. Cofone, *Servers and Waiters: What Matters in the Law of A.I.*, 21

Finally, some articles have addressed specific procedural issues related to cyberphysical systems.[26] The substantial literature on automation in armed conflict is outside our scope.

V. LIABILITY FOR CYBERPHYSICAL SYSTEMS

Robots and other cyberphysical systems fit well into the existing framework of civil liability, but some theoretical and practical questions have yet to be answered definitively—and perhaps cannot or should not be answered so early.[27]

Legislatures and courts will necessarily develop law alongside changing technologies and evolving social norms. This is true in both countries. For example, even in the Russian Federation, the Civil Code does not attempt an exhaustive list of abnormally dangerous activities, relying instead on an illustrative list followed by "etc." (и т.п.; и др.). In the United States, judges and juries constantly revisit the dynamically robust concept of reasonableness that is central to civil liability, for what was reasonable two hundred or even two years ago may not be reasonable today. So too with foreseeability: A reasonable actor is generally expected to take precautions with respect to only those risks that are foreseeable, but more is arguably becoming foreseeable and even foreseen.[28]

Regardless of how cyberphysical systems develop, they will almost certainly continue to cause some harms even as they prevent others. Airbags, which protect far more people than they seriously injure, provide a hopeful

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STANFORD TECH. L. REV. 167 (2018); Ibragimov R. & Suragina E., *Pravo mashin. Kak privlech' robata k otvetstvennosti?* [*Right Machines: How to Bring the Robot to Justice?*], 11 KORPORATIVNYY YURIST (2017) (in the original Cyrillic, Ибрагимов Р., Сурагина Е. *Право машин. Как привлечь робота к ответственности?* 11 КОРПОРАТИВНЫЙ ЮРИСТ); S.M. Solaiman, *Legal Personality of Robots, Corporations, Idols and Chimpanzees: A Quest for Legitimacy*, 25 ARTIFICIAL INTELLIGENCE L. 155, 161 (2017); Horst G.M. Eidenmueller, *The Rise of Robots and the Law of Humans* (Oxford Legal Studies Research Paper No. 27/2017, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2941001; Filipe Maia Alexandre, The Legal Status of Artificially Intelligent Robots: Personhood, Taxation and Control (June 1, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2985466; Katherine Sheriff, Defining Autonomy in the Context of Tort Liability: Is Machine Learning Indicative of Robotic Responsibility? (Dec. 12, 2015) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2735945.

26. *E.g.*, Bernard Dickens & Rebecca J. Cook, *Legal and Ethical Issues in Telemedicine and Robotics*, 94 INT'L J. GYNECOLOGY & OBSTETRICS 73 (2006); V.A. Laptev, *Otvetstvennost' "buduschego": pravovoye sushchestvo I vopros otsenki dokazatel'stv* [*Responsibility of the "Future": The Legal Essence and the Issue of Evaluation of Evidence*], 3 GRAZHDANSKOYE PRAVO 32–35 (2017) (in the original Cyrillic, Лаптев В.А., *Ответственность "будущего": правовое существо и вопрос оценки доказательств*).

27. *See* Hubbard, *supra* note 21, at 1872 (arguing criticisms of robotic developments based on potential injuries ignored that the legal scheme had successfully balanced innovation and safety).

28. David G. Owen, *Figuring Foreseeability*, 44 WAKE FOREST L. REV. 1277, 1307 (2009).

example of this phenomenon.[29] Thalidomide, a drug for morning sickness which caused death or severe injury in children born to the women who took it, offers a more cautionary tale.[30] And yet both examples are more complex: Earlier airbags killed children and lighter-weight adults for which they were not designed,[31] and thalidomide still has important uses today.[32]

In other words, it is essential to consider products not in isolation but rather as part of the systems in which they are actually used.[33] This systems approach also suggests that the safety of emerging technologies may depend on many different human and corporate actors, including their developers, manufacturers, owners, deployers, and users as well as on others within their environment.[34] When failures occur, some or all these actors may incur civil liability based in part on their levels of control over, culpability for, and contributions to the resulting harms.

Let us begin, however, by comparing the performance of just the manufacturer with the performance of the cyberphysical system itself under both the Civil Code in the Russian Federation and principles of products liability in the United States. A manufacturer that intentionally or even recklessly causes harm will easily face civil liability (and, in the United States, possibly even criminal liability).[35] For this reason, the lower levels of culpability—negligence and even innocent conduct—are much more interesting.

The concept of reasonableness is essential to understanding American approaches to these lower levels of culpability. Indeed, reasonableness is one of the most fundamental concepts in American law. Over the last century, myriad case verdicts, judicial opinions, pieces of legislation, restatements of the law, and law review articles have endeavored to develop or apply some notion of reasonableness. Broadly speaking: A person is negligent if she fails to behave as a reasonable person would under the same circumstances, a

29. See Richard Kent et al., *The Field Performance of Frontal Air Bags: A Review of the Literature*, 6 TRAFFIC INJURY PREVENTION 1 (Mar. 2005), for a general discussion of airbag effectiveness.

30. See ROCK BRYNNER & TRENT STEPHENS, DARK REMEDY: THE IMPACT OF THALIDOMIDE AND ITS REVIVAL AS A VITAL MEDICINE (2001), for a general discussion of the rise, fall, and subsequent rise again of thalidomide.

31. *See generally* Kent et al., *supra* note 29.

32. *See* BRYNNER & STEPHENS, *supra* note 30 (discussing modern uses for thalidomide).

33. *See* Bryant Walker Smith, *Lawyers and Engineers Should Speak the Same Robot Language*, *in* ROBOT LAW 78, 78 (Ryan Calo et al. eds., 2016).

34. For example, a human or other legal entity might specify high-level goals for the robot, design it to meet those goals, manufacture it, program it, calibrate it, test it, approve it, market it, supervise it (or fail to do so), provide data to it, update it, modify it, instruct it, inform it, own it, use it, damage it, take information from it, take instruction from it, otherwise interact with it, and so on.

35. In both the Russian Federation and the United States, individual employees could also be criminally prosecuted for their unlawful acts.

manufacturer is negligent if it fails to act as a reasonable manufacturer would, and a product is defective if it does not perform as a reasonable product would.[36]

Russian civil liability law embraces reasonableness as a concept but not as a term. For example, one could say that a reasonable person would act "with the degree of care and caution that was required of him by the nature of the obligation and the conditions of commerce."[37] Similarly, one could say that a product has a "defect" if, for example, it includes "unreliable or insufficient information."[38] In Russia, lawyers traditionally identify one's actions as lawful or unlawful rather than as reasonable or unreasonable—but this is a minor distinction for this comparative analysis. Accordingly, in the discussion that follows, we use terms related to reasonableness to broadly encompass the approaches in both countries.

Consider four scenarios that each result in physical harm:

1. The manufacturer acts reasonably, and the cyberphysical system performs reasonably.
2. The manufacturer acts unreasonably, and the cyberphysical system performs unreasonably.
3. The manufacturer acts unreasonably, but the cyberphysical system performs reasonably.
4. The manufacturer acts reasonably, but the cyberphysical system performs unreasonably.

The first scenario is straightforward: Unreasonable performance by the manufacturer or its product was not present and therefore could not be a but-for cause of the harm. For example, if a truck swerves at the last minute into an automated vehicle, that vehicle cannot overcome the laws of physics to prevent the collision. As in each of the four scenarios, the manufacturer could be liable under a theory of misrepresentation if it had made an incorrect claim about the performance of its cyberphysical system. Otherwise, only under a theory of absolute or enterprise liability would the manufacturer be liable for harm from the collision itself, and courts in the United States and in Russia have not recognized such a theory.

The second scenario is also relatively straightforward, but the result is different: Unreasonable performance by the manufacturer and unreasonable

36. Of course, these broad statements elide considerable complexity and controversy in both tort law and products liability law. The discussion of the fourth example, infra, hints at just some of this nuance.

37. GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 401(1).

38. *See, e.g.*, GRAZHDANSKII KODEKS ROSSIISKOI FEDERATSII [GK RF] [Civil Code] art. 1095; RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 2 (AM. LAW. INST. 1998). American approaches to informational and warning defects are similar.

performance by its product are both probably but-for causes of the harm. For example, an automated vehicle might swerve into a truck that it failed to recognize under ordinary environmental conditions that the manufacturer should have anticipated. Here, the manufacturer would likely be liable under the theories of negligence and design defect that are common to both the Russian Federation and the United States.

The third scenario becomes more interesting. Reasonable performance by the cyberphysical system itself would seem to undermine a claim that the manufacturer's unreasonableness was a but-for cause of the harm. Again, imagine that there is no way that the automated vehicle could avoid the swerving truck. Nonetheless, the manufacturer may still conceivably have some civil liability in both the Russian Federation and the United States. The manufacturer may have misrepresented the safety of its vehicle by saying, for example, that it was crash-proof. Or its design of the software may have been so sloppy that a judge or jury may conclude that this sloppiness must have contributed in some subtle way to the crash. Indeed, this is a possible interpretation of one of the larger verdicts in the United States against Toyota during its sudden unintended acceleration debacle.[39]

The fourth scenario is the most interesting in part because of its important past, complicated present, and potential future in American products liability law. An early case in the development of this law arguably involved such a scenario: Even if a soda producer had reasonably inspected the bottles that it filled with its soda, it was still liable for injuries that resulted when one of those bottles exploded because of an unidentified (and possibly unidentifiable) fracture.[40] This strict liability—that is, liability without fault—then expanded from manufacturing defects to products liability more generally as some courts held manufacturers liable for failing to design or warn against unreasonable risks that they could not have foreseen when they sold their ultimately dangerous products. However, this was largely a short-lived expansion, and most states now determine the reasonableness of a design or warning by reference to those risks that were foreseeable at the time of sale.

In some ways, however, cyberphysical systems evoke the old exploding bottle from American law. Even a manufacturer that takes all reasonable steps may nonetheless produce a cyberphysical system that ultimately interacts with our complex world in a way that is unreasonable. This eventuality is broadly foreseeable even if the particular failure is not.[41] An

39. Verdict, Agreement, and Settlement, Bookout v. Toyota Motor Sales USA Inc., No. CJ-2008-7969, 2013 WL 5596110 (Okla. Dist. Ct. Oct. 28, 2013).

40. Escola v. Coca Cola Bottling Co. of Fresno, 150 P.2d 436, 461 (Cal. 1944).

41. *Cf.* Owen, *supra* note 28, at 1307 ("[F]oreseeability is an explicit, central consideration in

automated vehicle manufacturer may simulate billions of kilometers of travel and yet miss specific sunlight conditions that ultimately lead its vehicle to swerve into the truck. And in this way a crash results from an unreasonable cyberphysical system produced by a reasonable manufacturer.

While generally not described in these terms, this combination of reasonable manufacturer and unreasonable product seems to generate the most speculation about the future of civil liability. In an extreme example, a manufacturer develops an artificially intelligent system that designs an artificially intelligent cyberphysical system that adapts as it learns from interactions in the physical world. At some point, the connection between manufacturer and product becomes so attenuated that the twin principles of reasonableness and foreseeability that are central to civil liability lose their relevance.

There are many potential responses to this concern. One response could involve simply expanding what it means for a manufacturer to act reasonably, especially with respect to supervising and updating products after they have been sold.[42] Most physical systems of the last century cannot be remotely monitored or updated, and physical changes to these systems are often expensive if not impossible. But improving at minimum the software on a cyberphysical system may be easier—as well as critically important in the face of evolving cybersecurity risks. If undertaking these updates is reasonable, then a manufacturer that fails to do so may be liable for harm that results from that failure.

Another response could involve a renewed embrace of strict products liability without regard to the reasonableness of the design process or the foreseeability of the risk. Under this rule, a manufacturer would be liable for harm caused by the unreasonable performance of its cyberphysical system even if it could not have foreseen the specific risk. Alternatively, judges and juries may simply take an expansive view of foreseeability by determining that a manufacturer should have anticipated almost anything.[43] After all, in a world where technology titans warn about human extinction or enslavement at the hands of artificial intelligence, would anything less really be a surprise?

Civil liability could also evolve through other longstanding legal principles that emphasize what one of us calls trustworthiness.[44] In the

evaluating whether a person's conduct should be blamed.").

42. *See* Smith, *supra* note 22, at 1820 (discussing reasonable mechanisms that could be put into place to make products safer).

43. *See* Owen, *supra* note 28, at 1307 (explaining that it would be a mistake to narrow the role of judges and juries when it comes to determining foreseeability).

44. BRYANT WALKER SMITH, THE TRUSTWORTHY COMPANY (forthcoming 2019).

United States, special kinds of actors—fiduciaries, common carriers, and public service companies—generally have heightened obligations to their customers or to the public. The companies that manufacture or deploy cyberphysical systems may increasingly fall into, or at least close to, these categories. For example, some industries may shift from selling products to selling services to consumers, including services like transportation that are historically associated with common carrier liability. Some companies may even voluntarily act more like insurers, rather than merely manufacturers, of their cyberphysical systems.

Actors other than the manufacturer may additionally or alternatively be civilly liable for harms caused by cyberphysical systems. Let us turn to the user of such a system and again consider four scenarios that each result in physical harm to someone other than the user herself:

1. The user acts reasonably, and the cyberphysical system performs reasonably.
2. The user acts unreasonably, and the cyberphysical system performs unreasonably.
3. The user acts unreasonably, but the cyberphysical system performs reasonably.
4. The user acts reasonably, but the cyberphysical system performs unreasonably.

Whereas the corresponding scenario was unlikely to result in liability for the manufacturer, the first user scenario could result in civil liability for the user—at least in the Russian Federation. This is because, at least initially, the use of some cyberphysical systems could conceivably be treated as an abnormally dangerous activity—either because the same activity would be considered abnormally dangerous if done by a human (as in the case of driving) or because it would independently satisfy relevant criteria. In the Russian Federation, these criteria could include use of an object that poses an increased danger for others[45] because it cannot be fully controlled.[46]

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45. Krasavchikov O.A., 2 KATEGORII NAUKI GRAZHDANSKOGO PRAVA: IZBRANNYYE TRUDY [CATEGORIES OF THE SCIENCE OF CIVIL LAW: SELECTED WORKS] 317 (2005) (in the original Cyrillic, Красавчиков О.А., Категории науки гражданского права: Избранные труды); 3 POSTATEYNYY KOMMENTARIY K GRAZHDANSKOMU KODEKSU ROSSIYSKOY FEDERATSII [AN ARTICLE-BY-ARTICLE COMMENTARY TO THE RUSSIAN FEDERATION CIVIL CODE], pt. 2 (P.V. Krasheninnikov et al. eds. 2011) (quoting 2 SOVETSKOYE GRAZHDANSKOYE PARVO: UCHEBNIK [SOVIET CIVIL LAW: A TEXTBOOK] 38 (O. A. Krasavchikov et al. eds., 3d ed. 1985) (in the original Cyrillic, Советское гражданское право: Учебник)) [hereinafter COMMENTARY] (in the original Cyrillic, Постатейный комментарий к Гражданскому кодексу Российской Федерации, части второй).

46. The term "source of increased danger" is still being discussed. It could include both the "concept of activity" (an activity as a source of increased danger) and the "concept of the object" (a material object as a source of increased danger). *Id.*

The second scenario is initially straightforward. The user may have, for example, unreasonably neglected to maintain the cyberphysical system or unreasonably deployed it in conditions for which it was not designed. If her unreasonable conduct was a but-for cause of the harm, then she would likely be liable. However, this scenario is complicated by the potential liability of the manufacturer. In the United States, the law of joint and several liability varies widely among the various states, but its application to a cyberphysical system does not seem to present particularly novel issues.

The third scenario is similar. The user is probably liable, and—per the earlier discussion—the manufacturer is probably not.

The fourth scenario is again the most interesting and perhaps the most uncertain. As a reasonable actor, the user is not directly liable for any negligence. However, as in the first scenario, the user could conceivably be liable for undertaking an abnormally dangerous activity. In this scenario, other bases for strict liability may also be available, either directly or by analogy. In many U.S. states, the owner of a vehicle is civilly liable for the negligence of another person who drives that vehicle with her permission. In both the Russian Federation and the United States, a legislature or court could hold the owner of an automated vehicle liable by similarly treating the vehicle's automated driving system as a permissive driver.[47] It could also analogize the cyberphysical system to a dangerous condition on land or to a wild animal.[48] Alternatively, it could hold the user vicariously liable by treating the cyberphysical system as her agent acting in the scope of that agency,[49] similar to how electronic agents can already bind their users in contract law.[50] In this way, the user would be liable for the unreasonable performance of the cyberphysical system just as an employer would be liable for the unreasonable performance of its employee.[51]

This possibility must be clearly and emphatically distinguished from the superficially similar argument that, like corporations, cyberphysical systems themselves should be legal persons subject to legal liability. Strict

47. *See, e.g.*, Automated and Electric Vehicles Act 2018, c. 18, (Gr. Brit.); HILARY ROWEN, UNIF. LAW COMM'N DRAFTING COMM. ON HIGHLY AUTOMATED VEHICLES, NOTE TO COMMITTEE MEMBERS AND OBSERVERS ON INSURANCE PROVISIONS (2018).

48. *See, e.g.*, Richard Kelley et al., *Liability in Robotics: An International Perspective on Robots as Animals*, 24 ADVANCED ROBOTICS 1861 (2010) (proposing a framework to treat Robots as animals when determining legal liability).

49. Hubbard, *supra* note 21, at 1862.

50. *See* RESTATEMENT (THIRD) OF AGENCY §§ 6.01–6.04 (AM. LAW INST. 2006) (stating that a contract made with an agent is binding).

51. It is conceivable that the reverse could also apply: A human could be an agent for a cyberphysical system. But in that case, for the reasons discussed in the paragraphs that follow, it would be unlikely for the agency relationship—and inappropriate for civil liability—to stop at the cyberphysical system.

liability does not require legal personhood; while human employees are obviously both actual and legal persons, the same is not generally true of animals, real property, or electronic agents. Indeed, legal personhood is more closely associated with limiting liability (through the corporate form) than with expanding liability (through principal-agent relationships). This is true in both the Russian Federation and the United States.

More fundamentally, in the view of our American author, there are at least two reasons why legal personhood for cyberphysical systems is not sensible as a way of addressing civil liability.[52] First, unlike humans or even corporations that can be clearly delineated and distinguished, cyberphysical systems are not necessarily discrete. Consider a single hypothetical automated vehicle. It could be one cyberphysical system. But it could also be a thousand cyberphysical systems, where each system corresponds to a different electronic control unit. Or, someday, it could be one one-millionth of a cyberphysical system made up of all the automated vehicles that are digitally connected to their manufacturer. Just as the Internet is a network of networks, an artificial intelligence super unit could be a network of different artificial intelligence subunits. This systems boundary problem makes legal personhood impractical.

Second, legal personhood is not helpful. Return to the goals of civil liability with which this article began. A cyberphysical system can be made safer simply by directly changing its programming or calibrating its training—not by fining it or putting it in jail. A robot has no external resources with which to compensate those who are injured by it, and insurance does not require personhood. Finally, as personally satisfying as it may be to physically destroy a machine that has caused harm, such inefficient destruction would harken back to the notorious animal trials that may have taken place centuries ago.[53]

In contrast, an expansion of first-party insurance, third-party insurance, and the social safety net could help to promote the goals of safety and compensation. By setting rates based on risk, liability insurance could encourage manufacturers, owners, and users to act reasonably—and to ensure that compensation is available when harm does occur. A similar approach has already been adopted in the United Kingdom[54] and is being

52. We recognize a small difference of opinion in this paragraph and the next. Our Russian author would take a slightly more sympathetic position toward the argument that cyberphysical systems could in theory be legal persons subject to legal liability should the need arise. Our American author emphatically would not. When the machines rise, our Russian author will put in a good word for our American author.

53. *See* SADAKAT KADRI, THE TRIAL: A HISTORY FROM SOCRATES TO O.J. SIMPSON 146–59 (2005) (discussing several historical examples).

54. *See* Automated and Electric Vehicles Act 2018, c. 18, § 2 (Gr. Brit.) (describing the imposition

considered in the United States.[55] In addition, first-party insurance or equivalent social programs could directly compensate those who are harmed.

We therefore return to the humans and other legal entities—manufacturers, users, and others—for which civil liability is appropriate. At a policy level, the parliament and to a limited extent courts (in the Russian Federation) and both legislatures and courts (in the United States) may ultimately be faced with a decision about where to draw the line between liability and no liability for harm caused by a cyberphysical system. Based on the previous discussion, there are five possibilities for the minimum culpability necessary to impose civil liability on an actor for harm caused by a cyberphysical system:

1. The actor intends to and does cause harm through the cyberphysical system.
2. The actor recklessly causes harm through the cyberphysical system.
3. The actor negligently causes harm through the cyberphysical system.
4. The cyberphysical system causes harm through its unreasonable performance.
5. The cyberphysical system causes harm (regardless of whether its performance was reasonable).

Different rules are possible and different legal bases are available for different kinds of actors. For example, one potential framework for civil liability based on role and culpability could look like the following:[56]

of liability for damages caused by insured and uninsured automated vehicles).

55. *See* National Conf. of Comm'rs on Unif. State Laws, Uniform Automated Operation of Vehicles Act § 3 cmt. (2019) (unpublished manuscript), https://heinonline.org/HOL/Contents?handle=hein.nccusl/nccpub4477&id=1&size=2&index=&collection=nccusl (clarifying that existing state vehicle laws regarding insurance would apply to automated vehicles).

56. We do not reference the "owner" of a cyberphysical system because of the ambiguity of this term, particularly in the context of cyberphysical systems encompassing onboard and offboard elements subject to complex assertions of property rights.

Culpability	Role					
	Third party	**User**	**Maintainer**	**Developer**	**Deployer**	**Insurer**
1. Intent	*Liability*	*Liability*	*Liability*	*Liability*	*Liability*	*Liability*
2. Recklessness	*Liability*	*Liability*	*Liability*	*Liability*	*Liability*	*Liability*
3. Negligence	No liability	*Liability*	*Liability*	*Liability*	*Liability*	*Liability*
4. Unreasonable system	No liability	No liability	No liability	*Liability*	*Liability*	*Liability*
5. Any harm	No liability	No liability	No liability	No liability	No liability	*Liability*

This example could reflect a cautious approach by legislators or judges to cyberphysical systems. Under a deviation from the rule of negligence, a third party—an individual who interacts with but does not actually use a cyberphysical system operating in a public space—might be shielded from liability for conduct that is merely unreasonable. Such a rule could be based on a lack of behavioral norms toward these systems, on a desire to increase their acceptance, or on an expectation that they should mitigate the carelessness of others. Under a rule of negligence, an individual user or a maintainer might be liable for their own unreasonable behavior but not directly liable for the unreasonable behavior of the system itself. Under a rule of strict liability, a commercial developer or a deployer of such a system might be liable for harm resulting from the system's unreasonable performance. And under a rule of absolute liability, if a cyberphysical system is subject to an insurance requirement, the insurer of that system might be at least initially liable for all harm caused by that system—the approach already adopted by the United Kingdom for automated vehicles.[57]

Hypothetical crashes involving a sidewalk delivery robot illustrate this sample framework more concretely. A jogger who kicked the robot into the path of a bicyclist would be liable for the bicyclist's resulting injuries if the kick were deliberate but would not be liable if the kick were merely careless. An individual who used the delivery robot to send a package would not be liable for either but would be liable if the package improperly contained fireworks that caused injury by exploding in the crash. The company that maintained the delivery robot would be liable for injuries resulting from its failure to properly clean the robot's sensors but would not be liable for

57. Otherwise, in both the Russian Federation and the United States, it is generally not correct to describe an insurer as directly liable for harm that the conduct or property of its insured causes to third parties. This third-party insurance is also distinct from first-party insurance in which the insurer compensates the injured policyholder.

injuries resulting from the robot's failure to properly interpret data from those sensors. The company that developed or commercially deployed the robot would be liable for injuries from that interpretive failure but would not be liable for injuries sustained by the bicyclist who crashed into the robot deliberately kicked by the jogger. And the insurer of the robot would be obligated to compensate this injured bicyclist, but then entitled to recover its payments from the jogger through subrogation.

A liability framework could also look quite different from the example just illustrated. Bystanders, maintainers, developers, and owners might all be held to a default rule of negligence; maintainers may instead be strictly liable for their participation in an abnormally dangerous activity, deployers may be liable only for their culpable behavior, or insurers might be obligated only to their customers under the terms of their insurance contracts (as is typical). Indeed, if permitted by law, contracting parties might expand or contract the potential liability between them in a way that dramatically changes and even frustrates such a prospective liability framework. Finally, legislators or judges may decide that different liability rules should apply to different kinds of cyberphysical systems, effectively introducing a third dimension to the chart above.[58]

Any liability framework based on categorization could be criticized for calcifying arbitrary distinctions and fostering unnecessary complexity. Indeed, over the centuries American tort law has shifted—incompletely and imperfectly—from a system of confusing and conflicting writs to a system based on more general principles of reasonableness. Nonetheless, as demonstrated in the earlier discussion, differentiation is still more the rule than the exception: Differences in harm, actor, relationship, and danger correspond to different liability rules. For this reason, refining the Russian Civil Code's criteria for abnormally dangerous activities with a view toward cyberphysical systems may be a useful first step.

At the same time, these distinctions are also united by deeper themes, especially trust.[59] Companies that develop, deploy, and employ cyberphysical systems in the public space ask the public for trust. This trust is based in part on implicit or explicit representations that these companies make to regulators, customers, and the public at large, and these representations can in turn give rise to liabilities. If, as a condition of market access, an entity promises that its cyberphysical system will perform reasonably, then the entity can be liable if the system fails to do so. For this reason, it may be appropriate for legislatures or regulators to require that

58. For example, U.S. law often treats medical devices differently than other products.

59. SMITH, *supra* note 44, at 7 (emphasizing the importance of the public's trust in developers for the evaluation of the safety of automated driving systems).

every cyberphysical system have a competent entity that vouches for it. One of us has long advocated this approach.[60] It has come to play a central role in the regulation of automated driving[61] and may offer a path forward for other cyberphysical systems as well.

VI. CONCLUSION

This Article has introduced, compared, and attempted to harmonize Russian and American approaches to robot liability. Both from a Russian and from an American perspective, existing law is robust and flexible. Cyberphysical systems will inevitably raise questions as they inevitably cause harm, but in many cases both the questions and the answers are not entirely new.

In other words, we expect that the law will continue to bend rather than break. Even when courts in the Russian Federation and the United States eventually adjudicate cases involving a runaway cyberphysical system that is many iterations removed from its original human conception, they will be able to reach one or more normatively responsible parties. The mechanism could be foreseeability, abnormally dangerous activities, common carriers, principal-agency relationships, one of the other legal doctrines we have discussed, or one of the many others we have not. The motivation—and, occasionally, a tension—will be the expectation that law itself be reasonable, even as what is reasonable for the law and for those subject to it continues to evolve.[62]

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60. *See e.g.*, Bryant Walker Smith, *Regulation and the Risk of Inaction*, *in* AUTONOMES FAHREN 593, 607 (Markus Maurer, et al. eds., 2015) (summarizing eight potential regulatory strategies proposed to allocate risk); Bryant Walker Smith, *How Governments Can Promote Automated Driving*, 47 N.M. L. REV. 99, 128–30 (2017) (discussing regulatory changes to operator's insurance minimums as a means of addressing product liability concerns).

61. *See, e.g.*, AV START Act, S. 1885, 115th Cong. § 9 (2017) (requiring that manufacturers file "safety evaluation reports" with the Secretary of Transportation in unenacted bill); LAW COMM'N & SCOTTISH LAW COMM'N, LAW COMM'N CONSULTATION PAPER 240, SCOTTISH LAW COMM'N DISCUSSION PAPER NO. 166, AUTOMATED VEHICLES: A JOINT PRELIMINARY CONSULTATION PAPER 101 (Nov. 2018), https://s3-eu-west-2.amazonaws.com/lawcom-prod-storage-11jsxou24uy7q/uploads/2018/11/6.5066_LC_AV-Consultation-Paper-5-November_061118_WEB-1.pdf (introducing discussion of a recent statute's regime for assigning civil liability for harms caused by automated vehicles); NTC AUSTRALIA, SAFETY ASSURANCE FOR AUTOMATED DRIVING SYSTEMS: CONSULTATION REGULATION IMPACT STATEMENT 9 (May 2018), ris.pmc.gov.au/sites/default/files/posts/2018/06/safety_assurance_for_automated_driving_systems.pdf (assigning responsibility for automated vehicle safety to the manufacturer); *U.S. Automated Vehicles Activities*, U.S. DEP'T OF TRANSP., www.transportation.gov/AV (last updated Feb. 27, 2019) (voluntary safety self-assessments).

62. Professor Sergey Alekseev has observed that the law "possesses its own enormous power, absorbing in itself the fundamentals of universally accepted justice." *See interv'yu zhurnalu Zakon*, SCICENTER (*July* 2009), https://scicenter.online/gosudarstvo-pravo-shpori-scicenter/sergey-sergeevich-alekseev-dlya-prava-sdelal-77197.html (in the original Cyrillic, интервью журналу Закон). The U.S. Supreme Court has recognized that "[t]he nature of injustice is that we may not always see it in our own

Finally, because civil liability focuses on problems and failures, it may not be a particularly inspiring topic. For this reason, it is also important to remember the promise of these new technologies. Law will need to address their failures, but society will benefit from their successes.

times." Obergefell v. Hodges, 135 S. Ct. 2584, 2598 (2015).