
Company Law and Autonomous Systems: A Blueprint for Lawyers, Entrepreneurs, and Regulators

by SHAWN BAYERN, THOMAS BURRI, THOMAS D. GRANT, DANIEL M.
HÄUSERMANN, FLORIAN MÖSLEIN, AND RICHARD WILLIAMS*

Table of Contents

I. Introduction	135
II. In the Company of Autonomous Systems: The American Limited Liability Company and Beyond	136
A. The Memberless Limited Liability Company under German Company Law	139
B. Autonomously Operated Entities under Swiss Law	143
C. Autonomous Companies and Limited Liability Partnerships in the United Kingdom	149
III. The Implications of Legal Personality	153
A. Constitutionality	154
B. Informal Influence	156
C. At the Inception – Or at the End?	157
D. The Reality of Control	159
IV. Conclusion	160

I. Introduction

In discussions of the regulation of autonomous systems, private law — specifically, company law — has been neglected as a potential legal and

* Shawn Bayern: Larry & Joyce Beltz Professor, Florida State University College of Law; Thomas Burri: Assistant professor of international law and European law at University of St. Gallen, Switzerland; Thomas D. Grant: Senior Research Fellow, Wolfson College, University of Cambridge; Daniel M. Häusermann: Dr. iur. (University of St. Gallen), LL.M. (Harvard), Private Reader (Privatdozent) at University of St. Gallen; Florian Mösllein: Professor of Private Law, German and European Business Law at Philipps-University Marburg; Richard Williams: Hogan Lovells University Lecturer in Corporate Law, University of Cambridge. The authors contributed equally to the paper. We gratefully acknowledge the University of St. Gallen's funding of a workshop in Munich.

regulatory interface. As one of us has suggested previously,¹ there are several possibilities for the creation of company structures that might provide functional and adaptive legal “housing” for advanced software, various types of artificial intelligence, and other programmatic systems and organizations — phenomena that we refer to here collectively as *autonomous systems*, for ease of reference. In particular, this prior work introduces the notion that an operating agreement or private entity constitution (such as a corporation’s charter or a partnership’s operating agreement) can adopt, as the acts of a legal entity, the state or actions of arbitrary physical systems. We call this the *algorithm-agreement equivalence principle*.² Given this principle and the present capacities existing forms of legal entities, companies of various kinds can serve as a mechanism through which autonomous systems might engage with the legal system.

This paper considers the implications of this possibility from a comparative and international perspective. Our goal is to suggest how, under U.S., German, Swiss, and U.K. law, company law might furnish the functional and adaptive legal “housing” for an autonomous system — and, in turn, we aim to inform systems designers, regulators, and others who are interested in, encouraged by, or alarmed at the possibility that an autonomous system may “inhabit” a company and thereby gain some of the incidents of legal personality. We do not aim here to be normative. Instead, the paper lays out a template suggesting how existing laws might provide a potentially unexpected regulatory framework for autonomous systems, and to explore some legal consequences of this possibility. We do suggest that these considerations might spur others to consider the relevant provisions of their own national laws with a view to locating similar legal “spaces” that autonomous systems could “inhabit.”

II. In the Company of Autonomous Systems: The American Limited Liability Company and Beyond

To frame the discussion, we consider two examples that are either possible under current technology or may become at least partly possible within a decade or two:

1. *Self-managed, rule-bound online commercial services*. As purely online services, such as “cloud storage” for file hosting or “cloud computing”

1. Shawn Bayern, *The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems*, 19 STAN. TECH. L. REV. 93 (2015) [hereinafter “Business Entities and Autonomous Systems”]; Shawn Bayern, *Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC*, 108 NW. U. L. REV. 1485, 1495–1500 (2014).

2. Cf. Bayern, *supra* note 1, at 99.

for scalable distributed processing, increase in complexity and economic importance, a market niche may be filled by online services that operate independently and are managed purely by algorithmic rule-sets. Putting aside for the moment questions about who would set up such systems or profit from them, it is conceptually straightforward to imagine an automated cloud-storage service that accepts online payment (perhaps in the form of cryptocurrency) through a standardized automated interface, uses this payment to reserve and maintain storage from a collection of back-end providers like Amazon or Oracle, and provides automated customer-service functions such as file retrieval and metadata management. The contracts between the service and its customers are drafted entirely in terms of the capabilities and limitations of the algorithms that operate the service; for example, customers may pay for a particular set of virtual services specified by a formal set of rules and implemented in software by the online provider.

2. *Perpetual autonomous foundation.* In 1996, internet entrepreneur and activist Brewster Kahle established the Internet Archive, which replicates and aims to preserve large amounts of diverse data, much like a classical library. The Internet Archive, accessible at archive.org, stores among other things time-stamped snapshots of the evolving web, collections of music and books, and so on. The organization has been run largely as a traditional nonprofit, both functionally and legally — that is, it has a board and officers and employees — but consider a close analogue of this organization: Suppose a wealthy founder like Kahle decides to implement in software a long-term archival tool that is meant to store data perpetually. Suppose that, either to achieve redundancy in data replication and preservation or because at some point software may seem a more reliable tool than a traditional nonprofit foundation, this founder desires to establish a perpetual, autonomous foundation that captures and preserves information. The founder does not want to employ, and perhaps does not trust, individual people to manage the perpetual mission of the organization; instead, the founder wishes to commit certain resources to the organization's software initially and then permit the software to act in an economically, functionally, and perhaps legally autonomous manner. Alternatively, imagine a founder who wishes to set up a grant-making nonprofit that relies exclusively on formally determined, crowd-based decisions to determine the recipients of grants.

We take no specific normative position on the social desirability of these possible arrangements. We do conjecture that some actors may desire them and, if seeking to realize such arrangements, will need their legal consequences to be clarified. We also recognize that regulators and policymakers may wish to encourage, to oppose, or to channel these possibilities for various ends.

As one of us has previously suggested, speaking purely as a matter of positive law, modern business-entity law in the U.S. would appear to permit either of the two examples above — and indeed essentially any arbitrary configuration of software, rules, or ordered physical states — to achieve a functional equivalent of legal personhood. What this means in practice is that the software-driven commercial service, perpetual foundation, or similar arrangement could, under present U.S. law, interact with the legal system in the manner that familiar entities normally interact: make contracts, own property, be a legal principal, be a legal agent, file a lawsuit (possibly with the help of a legal agent), be sued, etc. Constitutional rights in the U.S. for legal entities are the subject of significant debate, but at least these private rights seem available under U.S. law.

In the US, the mechanism to achieve legal independence for an autonomous entity arises primarily under Limited Liability Company (LLC) law, mainly because such law is extremely flexible. The very point of modern LLCs appears to be to give legal entity status to any arrangement that has an operating agreement. Because an “operating agreement” can essentially defer to the rules embodied in software, the autonomous commercial service and the autonomous foundation in our examples might use the LLC form. State LLC statutes often do not permit or envision this particular type of independent entity, but previous work by one of the present authors has suggested some relatively straightforward steps to create autonomous LLCs. In particular:

- (1) an individual member creates a member-managed LLC, filing the appropriate paperwork with the state;
 - (2) the individual (along, possibly, with the LLC, which is controlled by the sole member) enters into an operating agreement governing the conduct of the LLC;
 - (3) the operating agreement specifies that the LLC will take actions as determined by an autonomous system, specifying terms or conditions as appropriate to achieve the autonomous system’s legal goals;
 - (4) the individual transfers ownership of any relevant physical apparatus of the autonomous system to the LLC;
 - (5) the sole member withdraws from the LLC, leaving the LLC without any members.
- The result is potentially a perpetual LLC — a new legal person — that requires no ongoing intervention from any preexisting legal person in order to maintain its status.³

3. Shawn Bayern, *The Implication of Business-Entity Law for the Regulation of Autonomous Systems*, 7 EUR. J. RISK REGULATION 297, 303 (2016).

As previously suggested, existing partnership law would appear to allow such steps. Given the flexibility of the law in this area, the U.S. approach raises an interesting possibility: In most cases, any arrangement can establish “legal person” status in the US; sophisticated philosophical or technical analysis of autonomous systems would not be necessary. As a result, in the spirit of the evolving common law of commerce, U.S. law is potentially quite adaptive to business realities, although of course its current state may well be too flexible for those who wish autonomous legal entities to be restricted.

Very broadly speaking, the laws of other major countries provide for similar ways for memberless entities controlled by autonomous systems to interact with the existing legal system, although most legal systems are currently less open-ended than the LLC acts of U.S. states and, in many cases, their restrictions and conceptions of entities raise particular issues for the creation and channeling of autonomous entities. The three subsections below consider the potential status of memberless entities managed by autonomous systems in (A) Germany, (B) Switzerland, and (C) the United Kingdom.

A. The Memberless Limited Liability Company under German Company Law

Under German law, the legal form of limited liability companies (*Gesellschaft mit beschränkter Haftung*, typically abbreviated GmbH) promises an interesting option for autonomous systems to inhabit. Germany indeed prides itself for being the original birthplace of such companies, since they were already introduced in 1892 by a specific code⁴ and have spread all over the world since then.⁵ Moreover, the German academic debate about the concept of limited liability and separate legal personality has been particularly rich ever since *Friedrich Carl von Savigny’s* and *Otto von Gierke’s* famous debate about legal personhood (*‘reale Verbandspersönlichkeit’*).⁶ More recently, there has also been an intensive academic debate among legal philosophers⁷ and also among constitutional

4. Gesetz betreffend die Gesellschaften mit beschränkter Haftung [GmbH] [Limited Liability Companies Act], Apr. 20, 1892, REICHSGESETZBLATT [RGL.] at 477 (Ger).

5. See, e.g., Jan Thiessen, *Transfer von GmbH-Recht im 20 Jahrhundert – Export, Import, Binnenhandel*, RECHTSTRANSFER IN DER GESCHICHTE: LEGAL TRANSFER IN HISTORY 446 (Vanessa Duss et al. eds., 2006).

6. Compare Friedrich Karl von Savigny, SYSTEM DES HEUTIGEN RÖMISCHEN RECHTS, §§ 60, 85 (1840), with OTTO FRIEDRICH VON GIERKE, DAS WESEN DER MENSCHLICHEN VERBÄNDE 23 (1902).

7. Gunter Teubner, *Elektronische Agenten und große Menschenaffen: Zur Ausweitung des Akteursstatus in Recht und Politik*, 27 ZEITSCHRIFT FÜR RECHTSSOZIOLOGIE 5 (2006); Malte-Christian Gruber, *Was spricht gegen Maschinenrechte?*, AUTONOME AUTOMATEN 191 (Jochen

lawyers⁸ as to whether the legal system should or could attribute legal personality to autonomous systems that can act, learn and communicate on a self-referential basis.

Surprisingly, however, those two strands of discussion so far have not been brought together. As far as we are aware, there is no discussion under current, positive company law yet as to whether or not a GmbH can provide legal housing for autonomous systems.⁹ Yet, due to the flexible and enabling character of its legal form, it seems plausible that the “legal homunculus of genius design” — as the GmbH was once called¹⁰ — could effectively provide autonomous systems with legal personality.

In particular, the possibility to form single-member limited liability companies (“*Ein-Mann-GmbH*”) could pave the way for such creatures. In German law, that possibility was introduced in 1980 and allows for the formation and existence of limited liability companies with only one member.¹¹ Despite initial conceptual criticism — mainly concerning the contractual nature of companies — the single-member limited liability company is widely accepted today. As its name implies, however, it still requires at least one member, and unlike in American LLC law,¹² that member needs to be a natural — not an artificial — person. Accordingly, § 1 of the German Limited Liability Companies Act (GmbHG) states that “a company with limited liability (*Gesellschaft mit beschränkter Haftung*, GmbH) may be formed by one person or several persons pursuant to the provisions of this Act for any purpose permitted by law” (emphasis added). As a consequence, the formation of a company without any such person is precluded. This preclusion, however, does not prevent an existing single-

Bung & Sascha Ziemann eds., 2015); cf. Lothar Philipps, *Gibt es ein Recht auch für ein Volk von künstlichen Wesen, wenn sie nur Verstand haben?*, JENSEITS DES FUNKTIONALISMUS: ARTHUR KAUFMANN ZUM 65. GEBURTSTAG 119, 119–26 (1989).

8. E.g., Jens Kersten, *Menschen und Maschinen*, 70 JURISTENZEITUNG (JZ) 1, 6 (Jan. 2015) (in favor of such possibility); cf. HANS PETER BULL, *Sinn und Unsinn des Datenschutzes*, MOHR SIEBECK 120 (2015) (strictly opposing).

9. Very recently from a company law perspective, however, but again largely as a normative claim, Jan-Erik Schirmer, *Rechtsfähige Roboter?*, 71 JURISTENZEITUNG (JZ) 660 (July 2016).

10. Wolfgang Zöllner, *100 Jahre GmbH - Überlegungen zu Grundfragen des GmbH-Rechts aus Anlaß ihres Jubiläums*, 47 JURISTENZEITUNG (JZ) 381 (1992).

11. More extensively, see, e.g., Karl-Heinz Fezer, *Die Einmanngründung der GmbH*, JURISTENZEITUNG (JZ) 608–18 (1981); Werner Flume, *Die GmbH-Einmanngründung*, 146 ZEITSCHRIFT FÜR DAS GESAMTE HANDELSRECHT UND WIRTSCHAFTSRECHT (ZHR) 205 (1982); Peter Ulmer, *Die Einmanngründung der GmbH – ein Danaergeschenk?*, in BETRIEBS-BERATER (BB), 1001 (1980); see also HEINZ-G. TRÖSTER, *DIE EINMANN-GMBH – EIN BEITRAG ZUR LEHRE VON DER RELATIVITÄT DER RECHTSPERSÖNLICHKEIT* (1971).

12. See N.Y. LTD. LIAB. CO. LAW § 701(a)(4) (1999) (referring to a temporary memberless period of “one hundred eighty days” but permitting the LLC to remain memberless for any “other period as is provided for in the operating agreement”).

member limited liability company to “lose” its only member, for example by an acquisition of its own shares, by testamentary succession, or by a forfeiture or redemption of its shares.¹³ As a consequence, the existing GmbH would potentially transform into a memberless company — that is, a company without any natural persons as members,¹⁴ but which could well serve as a shell for an autonomous system.

So far, such memberless limited liability companies (“*Kein-Mann-GmbH*”) have not had much significance in practice. Nonetheless, their potential existence has been subject of academic debate ever since Max Hachenburg published an article on that topic in 1915.¹⁵ Nowadays the topic is regarded as a “dogmatic touchstone of German corporate law.”¹⁶ We will see, however, that the arguments of this old debate acquire renewed salience once we add autonomous systems to the picture.

Basically, there are three or four different dogmatic positions with respect to memberless limited liability companies in Germany.¹⁷ Some argue that such entities are strictly illegal and that every legal act that may lead to their creation — for example, the acquisition of a company’s own shares — must itself be void because it aims at an impossible legal consequence.¹⁸ However, acts that have a memberless GmbH as a consequence may well rest on legitimate reasons, and sometimes these acts may even be mandated by the law itself — for example in inheritance cases where the company succeeds its only member as the owner of its shares.¹⁹

13. See, e.g., Holger Fleischer, *Comment on § 1*, MÜNCHENER KOMMENTAR ZUM GMBHG para. 80 (2nd ed. 2015).

14. Extensively discussed by various monographs, cf. ARND BRETSCHNEIDER, *DIE GESELLSCHAFTERLOSE GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG* (1st ed. 1994); DIRK OLDENBURG, *DIE KEINMANN-GMBH – EIN UNMÖGLICHES RECHTSGEBILDE?* (1985); ALFRED PAULICK, *DIE GMBH OHNE GESELLSCHAFTER* (1979); HEINO RÜCK, *DIE KEINMANN-GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG* (1994).

15. Max Hachenburg, *Zum Erwerb eigener Geschäftsanteile durch die Gesellschaft mit beschränkter Haftung*, FESTSCHRIFT FOR COHN 79 (1915).

16. Fleischer, *supra* note 14, at para. 81.

17. See Rolf Steding, *Die gesellschafterlose GmbH – eine rechtlich zulässige Unternehmensvariante?*, NEUE ZEITSCHRIFT FÜR GESELLSCHAFTSRECHT (NZG) 57, 60 (2003); Olaf Sosnitza, *Comment on § 33*, GMBH-GESETZ para. 53 (Lutz Michalski ed., 2nd ed. 2010); Fleischer, *supra* note 14, at para. 81.

18. Karl Becker, *Der Erwerb eigener Geschäftsanteile der GmbH*, GMBH-RUNDSCHAU (GmbHR) 700, 704 (1938); Wolfgang Hösel, *Eigene Geschäftsanteile der GmbH*, DEUTSCHE NOTAR-ZEITSCHRIFT (DNotZ) 5, 7 (1958). See also Friedrich Buchwald, *Der eigene Anteil der GmbH*, GMBH-RUNDSCHAU (GmbHR) 169, 171 (1958); Karl Winkler, *Der Erwerb eigener Geschäftsanteile durch die GmbH*, GMBH-RUNDSCHAU (GmbHR) 73, 77 (1972) (with respect to the voidance of such legal acts in particular).

19. See, e.g., KARSTEN SCHMIDT, *GESELLSCHAFTSRECHT* 995 (4th ed. 2002); PAULICK, *supra* note 15, at 92–105.

Other authors argue that the existence of memberless limited liability companies is possible, even on a permanent basis. For example, Max Hachenburg claimed that the shell of a corporation may well persist indefinitely despite its loss of members.²⁰ The prevailing opinion takes a middle course and holds that memberless limited liability companies can indeed exist, but only during a transitional period before the company is ultimately dissolved.

Among the advocates of this middle position, two different views can be distinguished. Some argue that the dissolution of the company starts automatically once it has been transformed into a memberless company and that continuation of the company requires the passing of a specific resolution.²¹ Others argue in favor of a mere duty to start dissolution proceedings by appointment of a temporary executive director.²² These two positions contrast (1) an opt-out from automatic dissolution with (2) an opt-in to dissolution. Two principal arguments are brought forward in favor of automatic dissolution with opt-out — first, that automatic dissolution clarifies the point in time when dissolution begins, and second, that only automatic dissolution avoids the question of the permissible timeframe for the existence of the memberless company.²³

Much more fundamental, however — and much more important with respect to autonomous systems — are the core arguments that are brought forward against the (permanent) existence of memberless companies. From a doctrinal — and somewhat circular — perspective, the possibility of such companies would conflict with the nature of “membership” companies as those that have members.²⁴ More formally, such companies might also enable an evasion of the law of foundations.²⁵ A further argument concerns the essential core of memberless companies: such companies lack a

20. Max Hachenburg, *Zum Erwerb eigener Geschäftsanteile durch die Gesellschaft mit beschränkter Haftung*, Festschrift für Cohn 79, 88-91 (1915). See also Bretschneider, *supra* note 15, at 47-49 & 55; Peter Kreutz, *Von der Einmann- zur “Keinmann”-GmbH*, Festschrift für Stimpel 379, 383-93 (1985).

21. E.g., Schmidt, *supra* note 20, at 996; Sosniza, *supra* note 18, at para. 54; Jan Wilhelm, *Kapitalgesellschaftsrecht* 259, para. 684 (3d ed. 2009).

22. Lutz Michalski, *Comment on § 1, GmbH-Gesetz* para. 62; Paulick, *supra* note 15; Christine Windbichler, *GESELLSCHAFTSRECHT* 234, § 21 para. 40 (23d ed. 2013).

23. Cf. Fleischer, *supra* note 14, at para. 82; Sosniza, *supra* note 18, at para. 54.

24. See, e.g., Werner Flume, *Die Juristische Person* 187 (1983); Schmidt, *supra* note 20, at 995; Windbichler, *supra* note 23 at para. 40; *contra* Kreutz, *supra* note 21, at 385.

25. Schmidt, *supra* note 20, at 996; Steding, *supra* note 18; *contra* Bretschneider, *supra* note 15, at 34-36; Kreutz, *supra* note 21, at 385.

functioning decision-making body.²⁶ The idea behind this argument is that organizations must at least be able to make decisions in order to be bestowed with legal personhood. While this idea seems plausible in principle, the argument loses much of its force once we consider autonomous systems, because it is precisely a core feature of such systems that they are able to take decisions independently of a governing group of human beings. Algorithms can take ‘decisions’ based on a finite set of if-then-rules, and artificial intelligence even allows for self-referential learning and truly ‘autonomous’ decision-making.

The dogmatic debate about memberless limited companies has shown that the main consideration against the existence of such companies is that they lack a decision-making body. Yet autonomous systems can (or will someday be able to) take decisions themselves, so that they could serve as a means to overcome this core deficit of memberless limited companies. By the same token, such a company could serve as an important legal tool for those autonomous systems and provide them with the shell of a legal person. That shell would ultimately confer legal personhood to autonomous systems under German law. What seems more problematic, however, is whether autonomous systems could also direct the legal person, because § 6 para 2 GmbHG allows only natural persons to act as directors of a LLC. That provision is challenged on constitutional grounds, however, but it is difficult to predict whether the Constitutional Court will require legal persons also to be permitted as LLC directors.²⁷

In any event, German law — as that law currently exists — presents the possibility of an autonomous system exercising some or all the elements of legal personhood through the vehicle of a memberless limited liability company.

B. Autonomously Operated Entities under Swiss Law²⁸

In Switzerland, the question of whether, or to what extent, autonomous systems can be given de facto legal personhood has not been addressed yet.

26. Buchwald, *supra* note 19; PETER KINDLER, GRUNDKURS HANDELS-UND GESELLSCHAFTSRECHT para. 106 (8th ed. 2016); WINDBICHLER, *supra* note 23.

27. In a recent decision, the German Constitutional Court decided that a similar provision did not violate fundamental rights of legal persons, *see* Bundesverfassungsgericht [BverfG][Federal Constitutional Court], NEUE JURISTISCHE WOCHENSCHRIFT [NJW] Jan. 12, 2016, 930, 2016 (Ger.). On potential consequences for § 6 para. 2 GmbHG *cf.* Markus Gehrlein, *Leitung einer juristischen Person durch juristische Personen?*, NEUE ZEITSCHRIFT FÜR GESELLSCHAFTSRECHT (NZG) 566 (2016).

28. The ideas expressed in this section are further elaborated in Daniel M. Häusermann, *Memberless Legal Entities Operated by Autonomous Systems – Some Thoughts on Shawn Bayern’s Article ‘The Implications of Modern Business-Entity Law for the Regulation of Autonomous*

Three Swiss legal entities look most promising in this regard — namely, the stock corporation (*Aktiengesellschaft*),²⁹ the limited liability company or LLC (*Gesellschaft mit beschränkter Haftung, GmbH*),³⁰ and the foundation (*Stiftung*).³¹ Before each of these entities is discussed, a few observations regarding the supreme governing body of such entities are in order.

All private law entities in Switzerland are required to have a supreme governing body. Depending on the type of entity, the supreme governing body may be a board of directors (in the case of a stock corporation), one or several managing officers (in the case of an LLC), or a board of trustees (in the case of a foundation).³² Only natural persons — that is, humans — are eligible to be appointed to such body.³³ In contrast, Swiss corporate law does not prohibit legal entities from having an autonomous system take management decisions on their behalf. Such an arrangement might, however, come with a practical drawback. If the board of directors of a stock corporation duly delegates management to (human) managers, directors will be liable solely for breaches of their duty of care in selecting, instructing and monitoring managers.³⁴ The situation is similar with a foundation, but unclear with an LLC.³⁵ Swiss courts might deny this liability privilege to directors who have delegated management to an autonomous system and, as a result, directors may be liable for the system's decisions as if they had taken them themselves.³⁶ In any case, the requirement to have a supreme governing body consisting of humans is an important limitation to the possibility of giving an autonomous system *de facto* legal personhood using a Swiss private law entity.

Systems' from a Swiss Law Perspective, U. ST. GALLEN LAW & ECON. (Working Paper No. 2016-06, Aug. 13, 2016), <http://ssrn.com/abstract=2827504>.

29. Cf. OBLIGATIONENRECHT [OR], CODE DES OBLIGATION [CO], CODICE DELLE OBLIGAZIONI [CO][CODE OF OBLIGATIONS] Mar. 30, 1911, SR 211, art. 620 (Switz.).

30. *Id.* art. 772.

31. Cf. SCHWEIZERISCHES ZIVILGESETZBUCH [ZGB], CODE CIVIL [CC], CODICE CIVILE [CC][CIVIL CODE] Dec. 10, 1907, SR 210, art. 80 (Switz.).

32. Cf. OR art. 707(1), 809(2); ZGB art. 83-83a.

33. See OR art. 707(3), 809(2); HANDELSREGISTERVERORDNUNG [HREGV], ORDONNANCE SUR LE REGISTRE DU COMMERCE [ORC], ORDINANZA SUL REGISTRO DI COMMERCIO [ORC][COMMERCIAL REGISTER ORDINANCE] Oct. 17, 2007, SR 221.411, art. 120 (Switz.).

34. OR art. 754(2).

35. See Harold Grüniger, *Art. 83*, BASLER KOMMENTAR ZIVILGESETZBUCH I N 11a, N 19 (Heinrich Honsell, Nedim Peter Vogt & Thomas Geiser eds., 4th ed., Basel 2010), (with regard to foundations); Dieter Gericke & Stefan Waller, *Art. 827*, BASLER KOMMENTAR OBLIGATIONENRECHT II N 8 (Heinrich Honsell, Nedim Peter Vogt & Rolf Watter eds., 4th ed., Basel 2012), (with regard to LLCs).

36. *But see* OR art. 754(2).

A *Swiss stock corporation* may be formed for any lawful (for-profit or not-for-profit) purpose³⁷ by one or more legal or natural person.³⁸ Contrary to the situation in Germany (see above subsection A) it is clear under Swiss law that a corporation must not own all of its own shares and thus become a memberless entity.³⁹ The reasons for this are mainly structural. A corporation may not vote its own shares; so if there were no shareholders other than the company, nobody could vote at the shareholders' meetings to be held annually.⁴⁰ The same reasoning applies in the case of circular ownership structures where a direct or indirect subsidiary of a corporation holds 100% of the shares of its parent.⁴¹

Furthermore, a Swiss stock corporation is required to have a board of directors comprising at least one director.⁴² Only natural persons may be appointed as directors.⁴³ The board of directors has certain mandatory responsibilities, such as the supreme oversight of the corporation. These responsibilities cannot be waived or assigned to another body or entity,⁴⁴ whereas, if certain formalities are observed, the board may delegate the management of the corporation to one or several directors, other individuals or a management company.⁴⁵ When the board has unlawfully delegated authority, the directors can be held liable for the actions of the persons to whom they (unlawfully) delegated authority as if they had performed them themselves.⁴⁶ As explained, Swiss courts might not accept a delegation to

37. See, e.g., Carl Baudenbacher, *Art. 620* at N 2. See also OR art. 620(3).

38. Cf. OR art. 625.

39. See, e.g., PETER BÖCKLI, *SCHWEIZER AKTIENRECHT* § 1 N 62 (4th ed., Zurich 2009) and the references therein cited. Some scholars believe that corporations may hold all of their own shares on a temporary basis.

40. See OR art. 659a(1) and 699(2). A further impediment to a repurchase of all shares against consideration is that a repurchase of more than 10% (and in certain limited cases more than 20%) of the company's share capital by the company is impermissible (even though sanctions are limited). See also OR art. 659.

41. See OR art. 659b(1).

42. See OR art. 707(1).

43. See OR art. 707(3); HREGV art. 120.

44. See OR art. 716a(1).

45. A delegation of management to a legal entity is permissible except for the mandatory responsibilities of the board of directors. See TRIBUNAL FÉDÉRAL [TF] [Federal Supreme Court] Oct. 13, 2011, 137 ARRÊTS DU TRIBUNAL FEDERAL SUISSE (RECEUIL OFFICIEL) [ATF] III 503, 509–510 (Switz.). Additional restrictions apply to listed companies, see VERORDNUNG GEGEN ÜBERMÄSSIGE VERGÜTUNGEN BEI BÖRSENKOTIERTEN AKTIENGESELLSCHAFTEN [VEGÜV] [ORDINANCE AGAINST EXCESSIVE COMPENSATION IN LISTED STOCK COMPANIES] Nov. 20, 2013, SR 221.331, art. 6 (Switz.).

46. But see OR art. 754(2).

an autonomous system as lawful.⁴⁷ While the system's actions on behalf of the company would not be void or illegal, the director would bear the liability risk associated with unlawful delegation. To mitigate that risk, the shareholder of the autonomously operating corporation could agree to indemnify the corporation's director with respect to any claims that may be raised against him in connection with his activity — or, rather, passivity — as a director.⁴⁸

To summarize, an autonomous system cannot be given *de facto* legal personhood without human involvement by means of a Swiss stock corporation. The corporation must have at least one shareholder and at least one natural person acting as director. This notwithstanding, an autonomous system could operate the company's business. *De facto*, though not *de jure*, the autonomous system could even take the actions that are reserved to a director, provided that a director can be found who is comfortable with this setup — for example, because he or she is properly indemnified by the company's shareholder(s).

Basically the same applies *mutatis mutandis* to *Swiss limited liability companies* (LLCs). An LLC may be formed for any lawful (for profit or not for profit) purpose⁴⁹ and must have at least one member. An LLC cannot lawfully acquire, either directly or via a subsidiary, 100% of its own capital.⁵⁰ A Swiss LLC must have at least one managing officer; managing officers must be natural persons.⁵¹ While the managing officers of an LLC have similar mandatory responsibilities as the board of directors of a stock corporation,⁵² it is not court-tested whether a managing officer of an LLC would benefit from the same liability privilege as a director of a stock corporation⁵³ if he or she delegated day-to-day management to other individuals or a management company.⁵⁴ In addition, “delegation” of all decision-making to an autonomous system may give rise to a similar liability risk as with directors of stock corporations. Thus, a Swiss LLC is no more

47. See *supra* note 29 and accompanying text.

48. Indemnification by the company itself is only permissible to a limited extent. See, e.g., BÖCKLI, *supra* note 40, at § 13 N 861. The details are disputed in doctrine. See *id.*

49. See, e.g., Carl Baudenbacher, Alexander Göbel & Philipp Speitler, *Art. 772, supra* note 37, at N 38.

50. See OR art. 783(1)-(2), 659b(1) in conjunction with 783(4).

51. See OR art. 809(2).

52. See OR art. 810(2). A notable difference is that the articles of association may reserve the approval of certain matters by the company's members. See OR art. 811.

53. See *supra* text accompanying notes 36, 38.

54. See Dieter Gericke & Stefan Waller, *Art. 827, supra* note 37, at N 8 (most legal scholars believe that the liability privilege would not be applicable).

and no less suitable for giving *de facto* legal personhood to an autonomous system than a stock corporation.

In contrast, *private foundations* organized under Swiss law may have interesting characteristics for autonomous systems. While Swiss stock corporations and LLCs by definition have members,⁵⁵ Swiss private law foundations cannot have members. A foundation is an estate that a settlor dedicates to a given purpose; it is thus always a memberless legal entity.⁵⁶ A foundation must have a supreme governing body, usually called board of trustees (*Stiftungsrat*), which oversees the foundation's operations.⁵⁷ Only natural persons may become members of the board of trustees.⁵⁸ The Swiss government requires a board of trustees to have at least three members.⁵⁹ In addition, Swiss foundations (putting aside certain exceptions not relevant here) are under permanent oversight by a governmental authority.⁶⁰

Foundations must not seek profit for profit's own sake, but they are allowed to hold or operate a business.⁶¹ The range of permissible purposes of foundations is limited, the most important being purposes of charity (charitable foundations), well being of family members (family foundations), and provision of occupational benefits (pension foundations).⁶² A foundation's purpose must be stated in its objects clause and is considered to be the foundation's heart and soul.⁶³ The beneficiaries of a foundation, who by definition are legal or natural persons, are either defined explicitly in the objects clause or have to be derived from the purpose.⁶⁴ Beneficiaries do not have to be identified specifically; the general public may be a beneficiary, as for example when a foundation's purpose is to maintain a public garden.⁶⁵ A foundation's purpose may also be to preserve and foster

55. See, e.g., ARTHUR MEIER-HAYOZ & PETER FORSTMOSER, SCHWEIZERISCHES GESELLSCHAFTSRECHT § 2 N 52 (11th ed., Berne 2012).

56. *Id.* at N 53. See also ZGB art. 80.

57. Cf. ZGB art. 83; Grüninger, *supra* note 36, at N 3.

58. HREGV art. 120. This rule is subject to dispute in doctrine. See, e.g., Grüninger, *supra* note 36, at N 5.

59. EIDGENÖSSISCHES DEPARTEMENT DES INNERN EDI, LEITFADEN FÜR STIFTUNGEN GEMÄSS ART. 80 FF. [ZGB], § 10.1 (Nov. 2010), <https://www.edi.admin.ch/edi/de/home/fachstellen/eidgenoessische-stiftungsaufsicht/leitfaden-fuer-stiftungen.html>.

60. See ZGB art. 84.

61. See Bundesgericht [BGer] May 18, 2001, 127 ENTSCHEIDUNGEN DES BUNDESGERICHTS (AMTLICHE SAMMLUNG) [BGE] III 337 cons. 2b-2c (Switz.); Grüninger, *supra* note 36, at N 15.

62. See ZGB art. 87(1) and 89a; Grüninger, *supra* note 36, at N 1.

63. See Grüninger, *supra* note 36, at N 12 and references cited therein.

64. See Hans Michael Riemer, *Art. 80, DAS PERSONENRECHT (BERNER KOMMENTAR ZUM SCHWEIZERISCHEN PRIVATRECHT)* N 37 (3rd ed., Berne 1981).

65. *Id.*

the business that it operates (so-called enterprise foundation).⁶⁶ In that case, the Swiss Federal Supreme Court assumes that all stakeholders of the business are the foundation's beneficiaries.⁶⁷

Whether owning and operating an autonomous system would be a lawful purpose for a Swiss foundation depends on what that system would do. An autonomous system working for the benefit of certain beneficiaries or the general public, by for example providing services on a not-for-profit basis, seems compatible with Swiss law. However, authorities⁶⁸ may require that the activities the system is to engage in be specified in the foundation's objects clause. If the autonomous system were to operate for its own sake (i.e., without benefitting anyone or anything, other than the autonomous system), the matter would become trickier. On the one hand, a foundation may undoubtedly pursue eccentric or bizarre purposes, provided that it stays within the limits of public morals.⁶⁹ From this perspective, giving *de facto* legal personhood to an autonomous system may be a permissible purpose. On the other hand, a foundation whose sole purpose is to operate an autonomous system arguably would not benefit anyone, not even the general public, and may therefore be impermissible due to a lack of beneficiaries. However, in general, it seems possible to define a foundation's purpose in a way that is legally valid and achieves the goal of giving legal independence to an autonomous system.

The two examples given in Part I — a business-like service that benefits its users, or a perpetual organization with a specified public mission — would embody permissible purposes under Swiss foundation law. The test of a foundation's public purpose by the authorities may thus serve as a functional regulatory barrier in Switzerland, whereas the generalized and somewhat formal understanding of the "purpose" of LLCs under U.S. law establishes no such restriction. In addition, while under Swiss foundation law it seems generally possible to establish a foundation whose purpose is to house an autonomous system, the requirement of having a board of trustees composed of humans cannot be dispensed with. Such a foundation would also be under permanent government oversight.

66. See BGer, *supra* note 62.

67. See Bundesgericht [BGer], May 18, 2001, docket no. 5C.9/2001, (not published in 127 BGE III 337), cons. 3e/bb.

68. The cantonal COMMERCIAL REGISTER reviews the deed of foundation before its registration, *cf.* OR art. 940.

69. See, e.g., Riemer, *supra* note 65, at N 61; *Id. Art. 84*, at N 48.

C. Autonomous Companies and Limited Liability Partnerships in the United Kingdom

United Kingdom law offers two principal business entities that are relevant to the ability of nonhuman autonomous systems to imitate legal personhood. Those forms are the company⁷⁰ and the Limited Liability Partnership (LLP).⁷¹

The United Kingdom (U.K.) has, broadly speaking, a unified set of rules regarding the *company* form. All companies in U.K. law, save those incorporated by Royal Charter or specific Act of Parliament, are formed under and governed by the provisions of the Companies Act 2006 and its predecessors. Within the Act different types of company are permitted. The principal division is between “public” and “private.” Private companies are, as their name suggests, not permitted to offer their shares for sale to the public,⁷² but they are not subject to any minimal capital requirement.

Public companies must have at least two directors and private companies at least one director.⁷³ In both cases, however, at least one director of the company must be a natural person.⁷⁴ The Act *currently* permits corporate directors to hold office in a company as additional directors, but this rule is unlikely to endure. The U.K. Parliament passed legislation in 2015⁷⁵ to amend the Act to ban corporate directors outright,⁷⁶ though the amendments to the Act have not yet been brought into force. Nonetheless, even the current requirement to have at least one director who is a natural person prevents a nonhuman autonomous system from exclusively inhabiting the corporate form in any way that could approximate to or imitate legal personhood.

Limited liability partnerships (LLPs), on the other hand, are a relatively recent innovation in UK law, and they afford greater scope for autonomous systems to interact with the legal system without direct human involvement. The LLP form allows the partnership to benefit from separate legal personality and limited liability without adopting the traditional structure of a company. Accordingly, the LLP is something of a hybrid between a private company and a general English partnership.

70. Incorporated under the Companies Act, 2006 (U.K.).

71. Incorporated under the Limited Liability Partnerships Act, 2000 (U.K.).

72. Companies Act 2006, c. 46, § 755 (U.K.).

73. *Id.* § 154.

74. *Id.* §§ 154-55.

75. Small Business Enterprise and Employment Act 2015, c. 26, § 87 (U.K.).

76. Companies Act 2006, c.46, § 156A (U.K.); exceptions may be provided under § 156B.

At the heart of the LLP regime is respect for the autonomy of the members of the LLP to organize its affairs through their “membership agreement.”⁷⁷ LLPs are, for example, not required to have a board of directors separate from the members and so members are free to structure governance arrangements as they wish. Deference to autonomy of the members of an LLP also finds expression in the lack of any requirement for LLP membership agreements to be publicly registered and disclosed (unlike the constitutional “articles of association” of companies⁷⁸) or indeed, any requirement that membership agreements be written down.⁷⁹ LLP agreements are, in essence, treated like contracts⁸⁰ and are construed in accordance with normal rules of contractual interpretation.⁸¹

Certain rules are set out in the LLP Act that identify LLPs closely with their members. Each member of an LLP is, for example, designated by the LLP Act⁸² as an agent of the LLP (subject to restrictions on authority that the members may adopt in the LLP agreement). The Act also requires LLPs to have a minimum of two members.⁸³ Potentially relevant to the search for a legal housing for an autonomous system, the members of the LLP may be natural or legal persons.⁸⁴

The flexibility that characterizes the LLP in U.K. law offers two potential ways in which an autonomous system could interact with the legal system with no direct human intervention. The first could be termed a “soft” arrangement whereby an LLP is formed by two corporate members who then adopt the acts of an autonomous system as the acts of the LLP in their LLP agreement on the basis of the *algorithm-agreement equivalence principle*.⁸⁵ The first step in this process should be uncontroversial. The second step — that is, adoption of the acts of an autonomous system as the acts of the LLP — is novel, but there is nothing *in principle* that should prevent such an agreement from being concluded given the contractual nature of LLP agreements and the general emphasis on respect for party autonomy that is at the heart of the LLP regime. Of course, the commercial sustainability of an LLP adopting the acts of an autonomous system would be conditional on

77. Limited Liability Partnerships Act, c. 12, § 5(1) (U.K.).

78. Companies Act 2006, c.46, § 18(2) (U.K.).

79. *Id.*

80. *Id.*

81. *See, e.g.,* Rowe v. Aries Film Partner 1 Ltd [2016] EWCH 1800 (Ch).

82. Limited Liability Partnerships Act 2000, c. 12, § 6 (U.K.).

83. *Id.* § 2(1)(a).

84. JOHN WHITTAKER & JOHN MACHELL, LIMITED LIABILITY PARTNERSHIPS: THE NEW LAW 9–10 (2001).

85. *Id.*

the ability of an autonomous system to function in an effective commercial manner. Assuming such technological ability, however, this arrangement could allow an autonomous system to interact with other legal persons directly without human intervention or agency.

The members of the LLP would, of course, retain a role in the association under this arrangement and would be obliged to fulfill residual statutory functions allocated to members, such as authenticating LLP accounts and returns.⁸⁶ Nonetheless, members could under this arrangement withdraw from the day-to-day business of the company. And as the members would themselves be corporate bodies, the association could legally function within orthodox arrangements without human membership of the organization.

Might it be possible to go even further and manipulate the LLP form so as to leave the autonomous system to inhabit the LLP without the involvement of any other legal person at all? This might be possible if the members of an LLP were able to withdraw from the association, leaving the autonomous system to inhabit its personality alone. This is the second, more speculative, way in which an autonomous system might interact with the legal system through the mechanism of an LLP, at least for a period of time.

As we have mentioned, the LLP Act sets a minimum membership requirement of two members to create and operate an LLP.⁸⁷ The LLP Act imposes personal liability on any member who allows an LLP to operate for more than *six months* with fewer than two members.⁸⁸ But there is no explicit rule that requires an LLP to cease its business if it has fewer than two members, nor is there any provision for the *automatic* liquidation of such an LLP.⁸⁹ So if *both* members of an LLP withdrew from the LLP simultaneously having previously concluded an agreement for the LLP to act through an autonomous system, the LLP could, in theory at least, continue to interact with the legal system effectively. And of course in such a situation the personal liability provision in s. 4A of the LLP Act would have no effect because, assuming simultaneous withdrawal, no single member would have breached the provision.⁹⁰

There is as such no formal statutory limitation on the period during which an LLP could, in theory, operate without any members and, as such,

86. See, e.g., Limited Liability Partnerships Regulations 2008, SI 2008/1911, Reg.12 (U.K.).

87. Limited Liability Partnerships Act 2000, c. 12, § 2(1) (U.K.).

88. *Id.* § 4A(2).

89. WHITTAKER & MACHELL, *supra* note 85, at 60.

90. Limited Liability Partnerships Act 2000, c. 12, § 4A(2) (U.K.).

the U.K. LLP, much like the U.S. LLC,⁹¹ would seem to offer some prospect for an autonomous system to exclusively inhabit an incorporated legal person in a manner that would closely mimic legal personhood for the system itself, at least for a period of time. Such an arrangement is, however, unlikely to be stable. A key risk for an LLP without members would be a petition for winding up by one of its creditors. The winding up of LLPs is governed by the legislation for winding up companies⁹² in the Insolvency Act 1986 and a ‘memberless’ LLP, even if solvent, could be wound up under s. 122(1)(c) of that Act⁹³ on an application from a creditor or other contributory.⁹⁴ Moreover, a memberless LLP would be unable to comply with statutory accounting and filing obligations⁹⁵ that require the authentication of members,⁹⁶ and persistent default in filing could, eventually, result in the striking off of the LLP from the register (effective liquidation) by the U.K. registrar of companies on the ground of apparent inactivity.⁹⁷

The techniques outlined here in respect of the ways in which an autonomous system could inhabit the personality of a U.K. LLP and interact with the legal system through it are, of course, speculative as a matter of practical law (such approaches have to our knowledge not been the subject of litigation), though it is hopefully clear that the most successful approach is likely to be that which retains traditional membership of the LLP by at least two members. More generally, U.K. courts have taken a pragmatic approach to the development and use of corporate personalities in the past. Going forward, this flexibility could readily accommodate technological advances in artificial intelligence. We need think only of the seminal case of *Salomon v. Salomon*,⁹⁸ where the English courts recognized the separate legal personality of the “one person” company without any apparent difficulty, when it had been hitherto widely believed that the Companies Act then in force had not intended to grant legal personality to such entities. “Private” one-person companies were however a commercial fact that

91. Bayern, *supra* note 2.

92. Limited Liability Partnerships Regulations 2001, SI 2001/1090, Reg. 5 (U.K.).

93. *Id.* sch. 3.

94. Insolvency Act 1986, c. 45, § 124 (U.K.).

95. The Limited Liability Partnerships (Accounts and Audit) (Application of Companies Act 2006) Regulations 2008, S.I. 2008/1911, Reg. 4 (U.K.) (applying accounting and auditing provisions of the 2006 Act to LLPs).

96. *See id.* Reg. 12.

97. The Limited Liability Partnerships (Application of the Companies Act 2006) Regulations, 2009, S.I. 2009/1804, Reg. 50 (U.K.) (applying §§ 1000-1002 of the 2006 Act to LLPs).

98. *Salomon v. Salomon & Co Ltd* [1897] A.C. 22 (H.L.).

developed through the latter half of the 19th century,⁹⁹ and their recognition as legal persons was reached without U.K. courts troubling themselves with philosophical questions about the nature and validity of the legal personality in “one-person” entities.¹⁰⁰ Of course in the subsequent century there has been a tendency to invest the *Salomon* decision with a certain economic rationality on the basis that whilst the separate legal personhood of one-person entities may be a “fiction,” it is an economically desirable fiction. But that rationality was not the driving force behind the decision itself.

Our purpose in highlighting the pragmatic approach of U.K. law to corporate legal personality here is therefore simply to point out that whilst many practical and theoretical problems might be posed by granting legal personhood to an autonomous system, U.K. law is likely to focus on practical solutions and to this extent it is quite possible that the flexibility inherent in U.K. corporate law develops in a manner that allows autonomous systems, as an increasingly present commercial fact, to inhabit corporate forms in a way that approximates to some form of legal personhood.

III. The Implications of Legal Personality

In our examination of whether legal entities under different legal orders would be able to house an autonomous system, four horizontal issues arise. First (section II.A), there are issues of constitutionality: Would the constitutional jurisprudence of corporations apply to those inhabited by autonomous systems? Second (section II.B), there are issues of functional or effective influence: Even if an artificial intelligence never formally takes over an organization, it might gain influence or control over it in practice; what legal consequences might this have? Third (section II.C), there are issues of how to deal with legal uncertainty in a transitory phase: when the *lex lata* is applied to bestow legal personality upon an artificial intelligence, rules normally governing a “transitory phase” are involved. Finally (section II.D), we consider temporal issues: organizational rules may be eternalized when an artificial intelligence is permanently hosted in an organization.

99. See e.g., REPORT OF THE DEPARTMENTAL COMMITTEE APPOINTED BY THE BOARD OF TRADE TO INQUIRE WHAT AMENDMENTS ARE NECESSARY IN THE ACTS RELATING TO JOINT STOCK COMPANIES INCORPORATED WITH LIMITED LIABILITY UNDER THE COMPANIES ACTS, 1862 TO 1890, 1895 [C. 7779], ¶ 12.

100. Ron Harris, *The Transplantation of the Legal Discourse on Corporate Personality Theories: From German Codification to British Political Pluralism and American Big Business*, 63 WASH. & LEE L. REV. 1421, 1450 (2006).

A. Constitutionality

Does an autonomous system in an LLC organized under U.S. law, a *nomman's GmbH* in German law, a foundation governed by Swiss law, or an LLP organized under British law hold constitutional rights? Imagine a state expropriating property from a legal person, refusing to grant it a business license, or prohibiting it from communicating a viewpoint. How does a court respond to a personless organization asserting constitutional rights to defend against such measures? The law could be read in (at least) three ways.

On one reading — perhaps a formalist one — the court would hold that an autonomous system in an organization may invoke constitutional rights merely by virtue of the organization's status as a legal entity. On this view, it does not matter who is within or behind the organization. Any legal person should enjoy the constitutional rights developed in case law — e.g., the right to own property — if only to facilitate doing business.¹⁰¹

On a less formalist reading of the rights of legal entities, constitutional courts could give a different answer. On this view, an organization holds constitutional rights only because natural persons act collectively through it. Natural persons do not forfeit their rights solely because they act together.¹⁰²

101. It is generally understood to be settled law in the Western world that regular legal persons such as companies hold at least some constitutional rights. (The law is not settled with regard to constitutional rights of companies based on public-private partnerships, however. *See* Peter Selmer, §53: *Zur Grundrechtsberechtigung von Mischunternehmen*, HANDBUCH DER GRUNDRECHTE (HGR) II, 1255, 1255-1291 (2007).) Which rights specifically they hold is typically decided on case-by-case basis. For the Swiss Federal Supreme Court, *see* Beatrice Weber-Dürler, §205: *Träger der Grundrechte*, HANDBUCH DER GRUNDRECHTE (HGR) II 79-99 (2007). The German Constitution includes a general clause in article 19(3), *see* GRUNDGESETZ FÜR DIE BUNDESREPUBLIK DEUTSCHLAND [GRUNDGESETZ] [GG] [Basic Law], May 23, 1949, BGBl. I (Ger.), which states that legal persons hold all fundamental rights which owing to their “nature” (“Wesen”) lend themselves to being held by a legal person. Subsequent case law clarified the nature of rights in this regard for each constitutional right. *See* Peter J. Tettinger, §51 *Juristische Personen des Privatrechts als Grundrechtsträger*, HANDBUCH DER GRUNDRECHTE (HGR) II 1203-1233 (2006). The European Court of Human Rights also applied a case-by-case approach with the rights under the European Convention of Human Rights, the Court of Justice of the European Union, and the European Union's foundational treaties. Both these courts, however, only implicitly decided on the capacity of legal persons to hold rights, for instance by allowing companies to claim violation of the right to own property. *See* Tettinger, *supra*, at 1229, N 71 and 73; *see* FACTSHEET—COMPANIES: VICTIMS OR CULPRITS, EUR. CT.H.R. (July 2013) (for the case-law of the European Court of Human Rights as to companies), http://www.echr.coe.int/Documents/FS_Companies_ENG.pdf. For the U.S., *see* Ilya Shapiro & Caitlyn W. McCarthy, *So What if Corporations Aren't People?*, 44 J. MARSHALL L. REV. 701, 705 (2011), <http://ssrn.com/abstract=1873158> (mentioning a “pattern of case-by-case adjudication”).

102. *See* Shapiro & McCarthy, *supra* note 102, at 707 (“Corporations are useful legal fictions composed of individuals who do not shed their own constitutional rights at the office-building door.”) This reading lifts the “corporate veil,” which happens only exceptionally in corporate law. *See* *Barcelona Traction, Light and Power Company, Limited (Belgium v. Spain)*, Judgment, 1970 I.C.J. Rep. 3, 40, ¶ 57 (Feb. 5) (the corporate veil is lifted only “in exceptional circumstances”).

Given that natural persons are absent when an autonomous system alone inhabits an organization, on this view there would be no reason for the organization to hold constitutional rights.

A third, pragmatic reading might occupy the middle ground. It would differentiate among constitutional rights, recognizing that an autonomous system in an organization holds certain rights — e.g., the right to property — while other rights, typically those with a more “human touch,” remain out of reach.¹⁰³ Organizations inhabited by artificial intelligence could thus be barred from claiming free speech in order to influence voters in elections.¹⁰⁴ How and where to place the dividing line may well give rise to considerable differences.

Which of the three approaches the law will take might depend upon *when* the law comes to address the matter. Constitutional law might address artificial intelligence in organizations at an earlier (i) or later stage (ii).

i) Constitutional law could preclude the formation of an organization around an artificial intelligence in the first place, thus barring it from being treated as a legal person.¹⁰⁵ In continental legal orders like Germany, a litigant might invoke human dignity to rule out a rights-holding autonomous system, even if company law, taken in isolation, did not prohibit it.¹⁰⁶ A clear exclusion — a preemptive strike by constitutional judges against a constitutional rights-holding artificial intelligence — is unlikely, however,

On lifting the corporate veil in the context of constitutional rights, *see* Thorsten Kingreen Florian Möslein, *Die Identität der juristischen Person: Die Hobby Lobby-Entscheidung des U.S. Supreme Court zur Glaubensfreiheit gewinnorientierter Kapitalgesellschaften*, JURISTEN ZEITUNG (JZ) 57 (2016).

103. Malte-Christian Gruber, *Was spricht gegen Maschinenrechte?*, AUTONOME AUTOMATEN, KÜNSTLICHE ROBOTER UND ARTIFIZIELLE AGENTEN IN DER TECHNISIERTEN GESELLSCHAFT, BEITRÄGE ZUR RECHTS-, GESELLSCHAFTS- UND KULTURKRITIK 191, 191–206 (Jochen Bung, Malte Gruber & Sascha Ziemann eds., 2015), one might call this an act of “functionally awarded legal personality” (“funktional zugeschrieben[e]” Rechtsfähigkeit’ (our translation)).

104. *See, e.g., Citizens United v. Federal Election Commission*, 558 U.S. 310 (2010). If *Citizens United* were applied to a legal person hosting an artificial intelligence, it could rely on free speech in the context of elections. On a somewhat different note, artificial intelligence could also engage in hate speech. *See, e.g.,* Teresa Sickert, *Künstliche Intelligenz: Vom Hipster-Mädchen zum Hitler-Bot*, SPIEGEL ONLINE, (Mar. 24, 2016), <http://www.spiegel.de/netzwelt/web/microsoft-twitter-bot-tay-vom-hipstermaedchen-zum-hitlerbot-a-1084038.html> (describing how a Microsoft chatbot chatted autonomously on the internet, but soon engaged in hate speech).

105. Note that constitutions regularly guarantee the right to found organizations. Founding an organization in order to host an artificial intelligence is therefore an act protected by constitution. By way of example, see the freedom to choose a corporate form, a right which is protected by the economic freedom, which in turn is a fundamental right under the Swiss constitution. JÖRG PAUL MÜLLER & MARKUS SCHEFER, *GRUNDRECHTE IN DER SCHWEIZ*, 1060 (4th. ed., 2008).

106. For a case where human dignity was at issue on the European level, *see* Case C-36/02, *Omega Spielhallen und Automatenaufstellungs-GmbH v. Oberbürgermeisterin der Bundesstadt Bonn* 2004 E.C.R. I-9609 (concerning “laser sport”).

because artificial intelligence (and autonomous systems generally) develop gradually in small steps.

ii) Even if an organization hosting an autonomous system could lawfully be brought into existence and hold constitutional rights, protection for general public morals could intervene at a later stage. Protection of *ordre public* or public policy is contained in some or another form in most (probably all) constitutional orders. It is embodied in various international instruments.¹⁰⁷ In international humanitarian law, there is the catchall concept of the “public conscience of mankind” (Martens Clause, 1899 Hague Convention and its progeny). Conceivably, public morals could be invoked to annul or otherwise limit the effect of specific conduct of an organization hosting an artificial intelligence.

Finally, a government could itself establish an organization hosting an autonomous system, for instance, in order to outsource public tasks and services to it. Automated driving provides at least limited examples for autonomous systems to enter into markets, and artificial intelligence may soon steer public buses; much of tax assessment has been automated already in many countries, so entrusting it to an artificial intelligence inhabiting its own legal entity seems a plausible eventual step. Pressure to increase productivity and save taxpayers’ money is already weighing in and forcing the hands of human governments. However, do citizens have the right to be driven by human chauffeurs or talk to human tax officials at any point? Today, in many countries it is already difficult to reach a human in the interaction with tax authorities. Lodging an artificial intelligence in an organization with legal personality may extend the “computer loop,” possibly attenuating the human operator’s role to the vanishing point. By implication the question becomes urgent: do we need to define essential tasks of the state that must be fulfilled by human beings under all circumstances?

B. Informal Influence

Constitutional law is one thing; reality is often another. Even though the law may formally preclude an autonomous system from taking over an organization, such a system could still gain influence over an entity or the human beings running it. The concern is not necessarily that an artificial intelligence might sneak up on the leadership of a company. Rather, the

107. E.g., United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards, art. V (2)(b), June 10, 1958; UNCITRAL MODEL LAW ON INTERNATIONAL COMMERCIAL ARBITRATION, art. 34(2) (1985 with amendments as adopted in 2006). As to its widespread inclusion in other instruments, see the observation of the Chairman of the drafting meetings for UNCITRAL, noting that all thirty-eight conventions of the Hague Conference include it: Loewe (Austria), UNCITRAL meetings, 318th mtg., 11 June 1985, para. 58, para. 45.

manner in which the human decision-makers relate to an autonomous system in their company is the matter to keep in mind. If an artificial intelligence had qualities that the human decision-makers in a company found useful, it could gain influence on their decision-making.

In a limited way, existing machines already exert influence: A board of directors makes sure to keep engineers on the payroll who are needed to run a machine that is necessary to carry out the company's functions; they make sure the electricity bills are paid to keep it running. One might say that that machine is influencing the board. But that machine is not yet participating in decision-making; it is not engaging in a discourse with the human beings about their decisions.

An artificial intelligence in the future conceivably could do this, however. Though legal corporate governance rules may make no provision for an artificial intelligence to run a company — or may even preclude it — the door would open to the artificial intelligence to exert influence. In this case, one thing to watch for is the quality of the relationship between the artificial intelligence and the human decision-makers. How often do the human decision-makers turn to the artificial intelligence for analysis or for answers to questions? What matters are they asking it to analyze, and what sort of questions are they asking it to answer? How often do they invoke the artificial intelligence's input as justification for decisions? Reference to an artificial intelligence could become deference when routine dulls the senses — which is why a driver cannot always be expected to intervene in a system that drives a car autonomously even in case of danger, and why doctors need to be careful when they receive counsel from a machine. Similarly, decision-makers in companies involving artificial intelligence may have to be careful. The law of business organizations for a long time has been concerned with the duty of care of the business manager; the introduction of an autonomous system might simply be a new factual situation, which the existing law is perfectly capable of addressing, but it may take more than one dispute to figure out exactly how.

C. At the Inception – Or at the End?

Legal rules exist for the purpose of regulating the terminal phase of a company, by allowing it to be wound up in an orderly manner; others govern the transition towards new owners, such as heirs. Reflecting the purpose of such rules, they do not apply for an indefinite period; their application is transitory. Across national jurisdictions, the diversity of rules dealing with the expiration of organizations and the deaths of persons is vast. However, many such rules have one thing in common: they deal with the situation in

which the human being who was once involved (whether directly or indirectly) has left the scene.

Our legal systems, accordingly, are familiar with entities that have lost their human participants. An actor who seeks to vest an autonomous system with legal personality might look to the rules that exist to deal with entities in that stage of their life cycle. We should not dismiss out of hand the possibility that the existing rules in a particular legal system might be adapted to accommodate an entity that is “personless” by design. The entity continues to exercise the rights and observe the obligations that follow from its prior recognition as a legal person. Creditors, for instance, can sue it — the protection of creditors indeed being one of the main purposes of the rules concerning the transitory phase of an organization. This is the state of affairs that one would aim for if one’s goal were to give an autonomous system a legal framework in which to interact with the world. That is, one would aim to set up an organization from which the human participants have withdrawn, but which retains the capacity to be a debtor, a creditor, and a contracting party for whatever purpose. Extending the application of the transitory rules to a new situation, the autonomous system would exercise rights and honor obligations, as if human beings were still involved. The transitory rules would be applied, in effect, to afford the autonomous system legal personality, or at least enough of the functional incidents of legal personality to be indistinguishable from it.

Using the transitory rules in this way would eventually raise significant questions. Would an entity in its winding-up phase — including an autonomous system with legal capacity — be able to enter into new contracts, and if so to what extent? How well would the entity’s existing legal relationships (i.e., the relationships established before the winding-up procedure began) hold up? While positive company and insolvency law generally answer these questions, issues specific to the artificially intelligent organization are harder to tackle. Transitory rules might be a pathway for the artificial intelligence to reach legal capacity, but this implies preserving for an indefinite time a state of affairs that was intended to be temporary. Most legal systems are past the point where, for example, inheritance law once resulted in unsettled disputes giving a decedent’s estate a decades-long twilight existence; and even *Jarndyce v. Jarndyce* eventually came to a close — Dickensian spoiler alert! — because the estate ran out of money to pay the lawyers.

Yet, in a world of emerging autonomous systems — a world in which the lawyer’s creativity is no less than it was in generations past — legal rules designed to deal with the terminal phases of entities and people merit consideration. How long might a terminal phase be extended under those rules? Should we think about time limits and, if so, what are the appropriate

limits? Should a development that might have as much social and legal impact as vesting legal personality in an artificial intelligence be based on rules of transitory character designed to perform a very different function? Beyond these fundamental questions, the legal rules concerning the terminal phase of a legal entity should be a focus of consideration, as we watch for the emergence of an autonomous-system-driven organization. In particular, the *application* of those rules in practice should be watched. Legal rules intended to address transitory situations have more than once been extended indefinitely and thus been transformed into permanent arrangements — or at least have lasted long enough to leave the human subjects of the law in a state of perplexity.

D. The Reality of Control

It is inherent in the logic of hosting an autonomous system in a legal entity that it works independently from the degree of intelligence the entity possesses. The entity's constitutional document simply refers to the "will" or "decisions" — more abstractly, the arbitrary state — of the autonomous system, regardless of how far advanced it is, and legal personality is bestowed upon it as a consequence of organizational law.

This state of affairs may be easy to understand when the "housed" autonomous system performs only simple, straightforward tasks. But the considerations inevitably would become more complex, when the "housed" system begins to think intelligently and begins to perform more complex tasks — including the meta-task of deciding what tasks to perform, when, and how. For the foreseeable future, artificial intelligence will not be general, but rather specific and sectorial. Nor will it be independent from humans. Instead it will be symbiotic with humans relying on their support as they, in turn, will look to it for help. Humans and artificial intelligence will be mutually dependent.

This raises two points with regard specifically to artificial intelligence in an entity. First, circumstances might change. With an artificial intelligence hosted in an entity from which all human participants have withdrawn, a change in circumstances may become hard to accommodate. How can the constitutional documents of an entity be changed when the founders no longer have the power to intervene? Laying down the objective of an organization for eternity is notoriously difficult. With the founders/participants "out of the loop," an organization hosting an artificial intelligence may become immutable. "Decentralized autonomous organizations" linked to block chains have faced similar problems. When

baked in block chain commands turn out to be unwise, someone must have the power to change them — which stands in contradiction to their nature.¹⁰⁸

Immutability leads to the second point. True to symbiosis, an artificial intelligence looking to accommodate change will contract human help. Enter the programmer. A programmer may gain significant influence over the artificial intelligence. In fact, the programmer may be the only one having *any* influence over it, if only by doing a good — or bad — job of re-programming. However, like managers, programmers have no formal role in decision-making in an organization, despite their effective impact. Thus the gap between the law and reality widens.

IV. Conclusion

Where would a creative entrepreneur house an autonomous system so as to render it maximally capable of interacting with the legal order? None of the organizations we scrutinized matches the flexibility of the U.S. limited liability company (LLC). For the German equivalent, the *Gesellschaft mit beschränkter Haftung*, German scholarship is generally skeptical whether it can exist as a personless company, a “Kein-Mann-GmbH.” While housing an autonomous system in this form of German company is not categorically excluded, a human member must be there to chaperone it.

The most flexible entity British law offers, the *Limited Liability Partnership* (LLP), is at least theoretically capable of hosting an autonomous system. It bestows legal personality like the U.S. LLC. Provided that both members of a British LLP withdraw simultaneously, it continues to exist, though it is uncertain for how long. More doubts thus linger under current British than U.S. law.

A Swiss Stiftung (Foundation) seems well designed to host an autonomous system, since it provides legal personhood to an estate devoted to a specific purpose. Since there are few restrictions as to such purposes, it generally seems possible to establish a Foundation whose purpose is to house an autonomous system that engages in certain specified activities. Yet, unlike the U.S. LLC, an autonomous system inhabiting a Foundation needs collaborators on a permanent basis: The board of trustees must be human beings who, when they defer to the autonomous system, run the risk of being held liable for the decisions that they implement.

The above options have given rise to certain concerns. Autonomous systems housed in entities, for instance, may be able to claim constitutional

108. See Schumpeter, *Not-so-clever Contracts*, *ECONOMIST* (July 30, 2016), <http://www.economist.com/news/business/21702758-time-being-least-human-judgment-still-better-bet-cold-hearted>.

rights. Is this desirable? The techniques developed above also put rules to creative use that were designed solely to govern certain transitional phases in the life cycle of organizations. Should creative entrepreneurs be allowed to extend such transitional phases *ad infinitum*? Even if company law or constitutional law heeded these concerns and denied autonomous systems legal personhood, policy makers cannot afford to ignore more complex transactional arrangements. For instance, autonomous systems could gain practical influence over human managers and board members. Their sheer usefulness could dull humans and make them complacent, leaving autonomous systems de facto in charge of companies. Programmers might then be alone in exercising real and meaningful influence over autonomous systems and — by extension — over the companies that those systems influence or control. However, current company law has little or nothing to say about programmers or autonomous systems.

We conclude with a further possibility of interest to both entrepreneurs and regulators: In today's interconnected world, an entity registered in one jurisdiction may qualify to "do business" in another. Thus, for example, a U.S. LLC might operate in Germany. It is unclear the extent to which jurisdictions will tolerate novel uses of existing foreign business forms. Mutual recognition of business forms across national legal systems would seem to assume familiarity with the forms — and with the functional purposes for which the forms are employed. Harnessing company law to house an autonomous system likely would attract challenges in the jurisdictions where it is attempted — and in other jurisdictions where it might have effects.
