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A Preface to the Philosophy of Legal Information

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I. INTRODUCTION

It is not trivial that law exists as binary information. It would be difficult to find any significant administrative regulation, legislative act, court precedent, or treatise that has not been converted from semantics into a digital form.[1] And, the law does not sit passively stored as bits; law is transmitted through the Internet and manipulated as electronic data.[2] It is analyzed as numeric data by computers that can monitor and anticipate its evolution. Although the transformation from printed words to the binary code of computers has been occurring for some time, its significance is not well understood by legal philosophers, even though philosophers in other areas have been studying the digitalization of information.[3] The reason for this lack of concern might be that, on the surface at least, representing law as binary

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1. Eighty-three percent of the respondents to a survey conducted by the American Bar Association's Legal Technology section reported that they turn first to on-line sources for their research. Only eleven percent still look first to printed materials. Am. Bar Ass'n, 2016 Legal Technology Survey Report, Vol. V: Online Research, at xviii (Joshua Poje ed., 2016).

2. Although the availability of online legal material is always expanding, it is difficult to estimate the scale of change beyond what can be suggested in anecdotal accounts. For example, Harvard Law School is currently digitalizing its entire collection of over forty million pages of case law for public access. *Harvard Law School Launches 'Caselaw Access' Project*, Harvard Law Today (Oct. 29, 2015), http://today.law.harvard.edu/harvard-law-school-launches-caselaw-access-project-ravel-law/.

3. Terrell Ward Bynum and James H. Moor argue:

    > Computing provides philosophy with . . . a set of simple, but incredibly fertile notions—new and evolving subject matters, methods, and models for philosophical inquiry. Computing brings new opportunities and challenges to traditional philosophical activities [. . .] computing is changing the way philosophers understand foundational concepts in philosophy, such as mind, consciousness, experience, reasoning, knowledge, truth, ethics and creativity. This trend in philosophical inquiry that incorporates computing in terms of a subject matter, a method, or a model has been gaining momentum steadily.

    Luciano Floridi, *Open Problems in the Philosophy of Information*, 35 Metaphilosophy 554, 555 (2004) (quoting Terrell Ward Bynum & James H. Moor, *How Computers are Changing Philosophy*, in The Digital Phoenix: How Computers Are Changing Philosophy 1, 1 (Terrell Ward Bynum & James H. Moor eds., 1998)).

information seems to do little to alter its nature. After all, law must be converted back into semantic information before it can be used by a human being, so the change to digital form may seem inconsequential.

Nonetheless, in common experience, the law seems to be changing. It is becoming more voluminous, vastly more complex, and evolving much more rapidly than it has in the past. These are precisely the developments that one might anticipate from information and communications technology (ICT). At least some commentators believe that something in the deep structure of law is changing.[4] Information technologies have given rise to new concepts and new ways of thinking.[5] New forms of empirical research have fruitfully

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4.	Mireille Hildebrant argues the following:

> The deep structure of modern law has been built on the affordances of the printing press: on the linearity and sequential processing demands of written text, which evokes the need for interpretation, reflection and contestation. The study and practice of law have thus been focused on establishing the meaning of legal norms and their applicability to relevant human interactions, while establishing the meaning of human action in the light of the applicable legal norms. Data-driven agency builds on an entirely different grammar, its building blocks are information and behaviour, not meaning and action. We need to face the possibility that this will drain the life from the law, turning it into a handmaiden of governance (that fashionable term meaning anything to anybody), devouring the procedural kernel of the Rule of Law that enables people to stand up for their rights against big players, whether governmental or corporate or otherwise. In this article I will test the interface between law and data-driven agency by understanding law *in terms of* information, assuming that we cannot take for granted that law will interact with an artificially intelligent ICT infrastructure (ICTI) in the same way as it has interacted with written and printed text (our previous and current ICTI). By framing law *as* information, I hope to convince the reader that technological infrastructures matter, require our attention and must somehow be brought under the Rule of Law. This will not be business as usual, as it will require rethinking and redesigning the architecture of the Rule of Law.

> Mireille Hildebrandt, *Law as Information in the Era of Data-Driven Agency*, 79 Mod. L. Rev. 1, 2 (2016).

5.	The empirical study of law is the goal of the social sciences. For an overview of the social sciences theory of law, see Brian Z. Tamanaha, *An Analytical Map of Social Scientific Approaches to the Concept of Law*, 15 Oxford J. of Legal Stud. 501, 501–35 (1995). Some recent theories have sought to understand law through systems theory. *See* Niklas Luhmann, Law as a Social System 464 (Fatima Kastner et al. eds., Klaus A. Ziegert trans., 1993) (arguing that law is best understood as a self-organizing adaptive system). In recent years, computational theoretic approaches to complexity are contributing to refined analysis of areas of law through quantitative models of complex adaptive systems. This has brought to law concepts such as self-organization, emergence, and chaos. *See generally* Lawrence Lessig, Code: Version 2.0 (2006) (early but influential study of law's relation to the ICT).

modeled legal rules as complex dynamic systems.[6] Various forms of artificial intelligence are gaining ground in the practice of law.[7] These changes are topics that legal philosophers should be investigating. They should be asking questions, such as: What are the consequences of these changes for the nature of law? How are they changing the role of law in the democracy? And, what is the role of the legal professional in this new era?

To approach these and similar questions, this essay examines a contemporary philosophy—the philosophy of information—that argues that the new concepts of information developed in the twentieth century by philosophers and scientists hold the potential to transform the traditional fields of philosophical inquiry, especially metaphysics, epistemology, and ethics. It takes the work of Luciano Floridi to be an exemplar of this movement.[8] Philosophers can learn from computer scientists and technologists. Philosophers can also contribute to the responsible development of new information technologies by providing insights into the nature of representation, truth, consciousness, moral meaning, and political purpose.[9] Information sciences hold the potential to challenge the fundamental assumptions about the nature of knowledge, philosophical anthropology, ethics, and politics.[10] Investigating

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6.   *See, e.g.*, Michael Bommarito & Daniel Katz, *A Mathematical Approach to the Study of the United States Code*, 389 Physica A, 4195 (2010); Jeffrey G. Miller, *Evolutionary Statutory Interpretation: Mr. Justice Scalia Meets Darwin*, 20 Pace L. Rev. 409 (2000); J. B. Ruhl, *Complexity Theory as a Paradigm for the Dynamical Law-and-Society System: A Wake-Up Call for Legal Reductionism and the Modern Administrative State*, 45 Duke L.J. 849 (1996).

7.   Julie Sobowale, *How Artificial Intelligence is Transforming the Legal Profession*, A.B.A. J. (Apr. 2016), http://www.abajournal.com/magazine/article/how_artificial_intelligence_is_transforming_the_legal_profession.

8.   Luciano Floridi, *About: Biography*, Luciano Floridi, http://www.philosophy-ofinformation.net/about/ (last visited Jan. 25, 2018).

9.   Floridi's philosophy of information draws mostly from traditional Anglophone legal philosophy. There is also a related Continental form of speculative realist philosophy of information that draws from the thought of Gilles Deleuze, Alain Badiau, and Bruno Latour. *See, e.g.*, Gilles Deleuze & Félix Guattari, What is Philosophy? (rev. ed. 1996).

10.   Floridi explains:

> I was drawn to what I later defined as the philosophy of information because, in the late eighties, I was looking for a conceptual framework in which psychologism, introspection, armchair speculations and all those linguistic (or perhaps one should say, Anglo-Saxon, or Indo-European) intuitions could be monitored, tamed and kept under tight control. I shared with Popper a desire for an "epistemology without the knowing subject," as the title of one of his papers declared. The sort of philosophy popular at the time smacked too much of bad metaphysics, a sort of betrayal of the purer and cleaner approach defended by Analytic as well as Neopositivist philosophy, which I admired so much (since then, I have somewhat re-

the interconnections between philosophy and information technology is the goal of the philosophy of information (PI) as referred to in Floridi's project and critical commentaries.[11]

Drawing from PI, this article argues for a philosophy of *legal* information (PLI) dedicated to understanding the implications for the philosophy of law of the many concepts of information that exist today. Philosophers, like Floridi, are enriching philosophical discourse by describing how new concepts of information alter human understanding.[12] Also, the philosophy of information contributes to the development of legal philosophy.[13] Conceiving law in terms of different concepts of information opens new horizons for descriptive and normative jurisprudence.[14] ICT has brought tremendous benefits, but it also poses dangers. By extending the abilities to know and manipulate the world, ICT has greatly expanded the scope of human moral agency.[15] This is of substantial importance since moral, political, and legal dilemmas, which were at the far edge of science fiction only a generation ago, now seem close at hand. New approaches to legal philosophy are needed to respond to these changed conditions. PI suggests a new approach to legal theory that has resources for responding to the emerging issues of the ICT.

> pented and now I consider myself an ex-analytic philosopher). Since I was interested in epistemology and logic, the move from knowledge to information and from inferential to computational processes was almost natural.
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> Charles Ess, *Computer-Mediated Communication and Human-Computer Interaction*, *in* THE BLACKWELL GUIDE TO THE PHILOSOPHY OF COMPUTING AND INFORMATION 89 (Luciano Floridi ed., 2008).

11. Hereinafter, PI refers to Floridi's project. *See* LUCIANO FLORIDI, THE ROUTLEDGE HANDBOOK OF PHILOSOPHY OF INFORMATION (Luciano Floridi ed., 2016); Gordana Dodig Crnkovic & Wolfgang Hofkirchner, *Floridi's "Open Problems in Philosophy of Information", Ten Years Later*, 2 INFO. 327 (2011); Charles Ess, *Luciano Floridi's Philosophy of Information and Information Ethics: Critical Reflections and the State of the Art*, ETHICS AND INFO. TECH. 89 (2008) (overview of Floridi's project and critical commentaries); LUCIANO FLORIDI'S PHIL. OF TECH.: CRITICAL REFLECTIONS (Hilmi Demir ed. 2012) (collection of critical essays).

12. *See* THE ONLIFE MANIFESTO: BEING HUMAN IN A HYPERCONNECTED ERA (Luciano Floridi ed., 2015) (providing an overview of what Floridi call "onlife").

13. *See* Dan L. Burk, *Information Ethics and the Law of Data Representations*, 10 ETHIC AND INFO. TECH. 135 (2008) (providing an example of legal scholarship drawing from Floridi's philosophy).

14. *See infra* Part III.A.i–ii.

15. LUCIANO FLORIDI, THE FOURTH REVOLUTION: HOW THE INFOSPHERE IS RESHAPING HUMAN REALITY, at vii (2014) (stating, "The great opportunity offered by ICTs comes with a huge intellectual responsibility to understand them and take advantage of them in the right way.").

This article is divided into three parts. Part II describes Floridi's account of the historical horizon of scientific advance as it influences human self-understanding—philosophical anthropology. He examines several historical moments that suggest how scientific advances revolutionized philosophical anthropology. Alan Turing, who showed that human beings are not the only creatures who can calculate, and Claude Shannon, who showed that information is a common physical phenomenon, achieved the fourth of these developments. These developments led to new theories of information and to new understandings of human nature and philosophical anthropologies. Part III describes PI. It suggests how PI can reinvigorate traditional philosophical questions, particularly in the areas of ontology, epistemology, and philosophical ethics. Part IV suggests how a PLI might be applied to understand the new condition of law. The final part describes the essential descriptive claims of PLI and examines how PLI can contribute to normative jurisprudence.

II.   INFORMATION AND PHILOSOPHICAL ANTHROPOLOGY

Floridi argues that philosophy must be renewed to respond to the human self-awareness, which has been transformed by ICT. He makes this claim in *The Fourth Revolution: How the Infosphere is Reshaping Human Reality*,[16] where he suggests that four advances in the history of science caused revolutionary shifts in philosophical anthropology.[17] Science has incrementally transformed human self-understanding by decentering humans from the privileged places that they had naively imagined for themselves. In the current information age—the Fourth Revolution—human beings must come to terms with a new self-awareness in which they are a particular kind of information entity among many different kinds of entities that exist in an information environment called the "infosphere."[18]

A.   The First Three Revolutions: Copernicus, Darwin, and Freud

Floridi identifies three prior developmental revolutions. The first revolution is the assertion of heliocentrism by Nikolas Copernicus (1473–1543), which decentered human self-understanding being the apex at the center of God's creation by arguing that the sun, rather than the earth, was at the center of the universe.[19] Floridi's second and third revolutions occurred in the late nineteenth century, the second was Charles Darwin's *Origins of Species*,[20] and the third was due to the development of Sigmund Freud's psychoanalysis.[21] Darwin decentered human beings from the apex position among ani-

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16.   *Id.* at ix.

17.   Luciano Floridi, Information: A Very Short Introduction 8–9 (2010).

18.   *See id.* at 14–18 (for a concise description of the infosphere).

19.   *Id.* at 8–9.

20.   *Id.*

21.   *Id.*

mals by showing that animals, including humans, evolve through historical processes and have common origins.[22] He showed that human uniqueness does not lay in the creative source of the species since all species evolve through a common set of physical processes and the species were less differentiated in earlier generations.[23] Human beings can no longer claim to possess a metaphysical essence superior to other creatures.[24] While traits, like being rational, might still distinguish humans from non-humans, rationality itself is not part of the metaphysical substance of the person as viewed in premodern thought.[25] Freud discovered the unconscious mind and its influence on reason.[26] This discovery altered philosophical anthropology again, this time decentering human beings from the privileged position of being the only self-aware beings.[27] After the discovery of the unconscious mind, it was no longer possible to maintain the belief that human beings know themselves and consciously control their own actions.

B.   The Fourth Revolution

The Fourth Revolution began with the discovery of the mathematical conceptions of computation by Alan Turing (1912–1954)[28] and the scientific theory of information advanced by Claude E. Shannon (1916–2001).[29] Turing and Shannon revolutionized human self-understanding by showing that

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22.   *Id.*

23.   Floridi, Information: A Very Short Introduction, *supra* note 17, at 8–9.

24.   *Id.*

25.   Boethius first asserted that the belief that rationality is intrinsic to the substance of the person in the essay on the nature of the divine personhood of the trinity. Boethius, *A Treatise Against Eutyches and Nestorias*, *in* The Theological Tractates 73–127 (E. Capps et al. eds., 2005). *See* Daniel Dennett, Darwin's Dangerous Idea: Evolution and the Meanings of Life (1995) (discussing how Darwin's theory of evolution overturned hylomorphic metaphysics).

26.   Floridi, Information: A Very Short Introduction, *supra* note 17, at ix.

27.   *Id.*

28.   *See* B. Jack Copeland, Turing: Pioneer of the Information Age (2013); Andrew Hodges, Alan Turing: The Enigma (2d ed. 2014) (providing biographical information on Alan Turing).

29.   Although Floridi does not emphasize the role of Shannon, Shannon's work is essential to the project of PLI, since his theory of information is essential to the digitalization of legal information. *See* Siobhan Roberts, *Claude Shannon, the Father of the Information Age, Turns 1100100*, New Yorker (Apr. 30, 2016), http://www.newyorker.com/tech/elements/claude-shannon-the-father-of-the-information-age-turns-1100100; Graham P. Collins, *Claude E. Shannon: Founder of Information Theory*, Scientific American (Oct. 14, 2002), https://www.scientificamerican.com/article/claude-e-shannon-founder/; M. Mitchell Waldrop, *Claude Shannon: Reluctant Father of the Digital Age*, MIT Tech.

humans are not the only beings that are capable of computation and that information is a common physical phenomenon.[30]

1.   The Context of Early Twentieth-Century Mathematical Logic

Before examining the concepts of computation and information that evolved in the twentieth century, it is useful to consider how logic and mathematics developed in the second half of the nineteenth century and early decades in the twentieth century. During this period, mathematics developed as the attempt to find its logical foundations, such that foundations of mathematical axioms could be proven to be logically necessary.[31] The existence of such foundations had been presumed since Euclid's *Elements*.[32]

For Christian philosophers, there were two ways of gaining knowledge of the world, through faith in scripture and Christian tradition and through natural reason, defining natural as reason unassisted by faith.[33] Christian philosophers held faith and reason to be in harmony.[34] This was a foundational claim for medieval Scholastic moral philosophy, which depended upon the mind's faculty to apprehend metaphysical essences of material beings and thereby discern the transcendent moral good—an ideal in the mind of God (the "Eternal Law")—as it participates in the material world.[35] Some logicians, notably William of Ockham, raised questions about whether the mind can know metaphysical essences through "natural" reason alone.[36] Others viewed Euclid's geometry as confirming the power of natural reason to know and to understand the intelligible world that their faith proclaimed.[37] Geometry, they argued, secured belief in the natural, intelligible world.[38] This argument endured for many centuries and even after the Enlightenment philosophers called into question the ability of faith to do so.[39]

REV. (July 1, 2001), https://www.technologyreview.com/s/401112/claude-shannon-reluctant-father-of-the-digital-age/.

30.   *See supra* note 29.

31.   *See, e.g.*, LUKE HEATON, A BRIEF HISTORY OF MATHEMATICAL THOUGHT 167–98 (2017) (providing a history of modern geometry).

32.   EUCLID'S ELEMENTS (Dana Densmore ed., Thomas L. Heath trans., 2002); *see also* WILLIAM KNEALE & MARTHA KNEALE, THE DEVELOPMENT OF LOGIC 2–6 (1962).

33.   *See, e.g.*, THOMAS AQUINAS, SUMMA THEOLOGICA: BOOK I (1st ed. 1952).

34.   *See id.*

35.   *See id.*; *see also* KNEALE & KNEALE, *supra* note 32, at 239.

36.   KNEALE & KNEALE, *supra* note 32, at 239.

37.   *Id.* at 385.

38.   *Id.*

39.   *Id.*

By the end of the nineteenth century, however, the foundations of Euclidian geometry fell into doubt because mathematicians realized that there were many axioms of Euclidian geometry, which were not derived or derivable from Euclid's postulates.[40] In effect, Euclid made guesses that seemed reasonable within the context of his times but, in fact, were not logically necessary. That meant that there was no logical foundation for geometry, and that perhaps geometry rested on nothing more secure than the faith-claims of the medieval theologians. Many mathematicians and logicians believed that the entire system of Euclidian geometry was in need of revision to prove that it still could rest on the foundational bedrock of logical necessity.[41]

One of the most influential mathematicians to undertake this revision of Euclid was David Hilbert, who in 1899 published *Grundlagen der Geometrie* (Foundations of Geometry).[42] The work contained Hilbert's attempt to re-found geometry based on an entirely new set of axioms that could unite mathematics, logic, and set theory.[43] He rebuilt mathematics "by the laying down of principles which are sufficient to support the generally accepted doctrine . . . ."[44] In his reformulation, these principles did "not give rise to contradictions," which had arisen in modern mathematics.[45] To do this, Hilbert limited his theory only to those axioms whose existence is guaranteed by the axioms. His analysis results in a closed system of axioms that may not contradict one another, but the foundation of the system as such cannot be derived from within its own axioms. Thus, Euclidian geometry could be shown to be coherent but not necessary, and the propositions of the Euclidian system cannot be translated to non-Euclidian geometry.[46]

In the early twentieth century, many other mathematicians took up the challenge of grounding arithmetic on logically sound principles.[47] Most famous among them was Alfred North Whitehead and Bertrand Russell.[48] For Whitehead and Russell, the quest took the form of drafting a massive work, the *Principia Mathematica*, which sought to defend a theory of numbers with the logic of set theory, a field which still commands the attention and respect

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40. *Id.* at 386.

41. *See id.* at 379–90 (discussing the impact of non-Euclidean geometry on the field of mathematical logic); *see also* ØYSTEIN LINNEBO, PHILOSOPHY OF MATHEMATICS 176–79 (2017).

42. DAVID HILBERT, THE FOUNDATIONS OF GEOMETRY (E. J. Townsend trans., 1902); KNEALE & KNEALE, *supra* note 32, at 681–88.

43. KNEALE & KNEALE, *supra* note 32, at 683.

44. *Id.* at 682.

45. *Id.*

46. *Id.*

47. *Id.* at 683.

48. ALFRED NORTH WHITEHEAD & BERTRAND RUSSELL, 1 PRINCIPIA MATHEMATICA (2d ed. 1963).

of philosophers of mathematics.[49] Whitehead and Russell abandoned their project after completing three lengthy volumes comprised of over two thousand pages, many of which were entirely written in symbolic logic.[50]

While Whitehead and Russell labored over their work, Hilbert attempted to show that each area of mathematics could be made logically consistent through a generalization of the approach he used to analyze the axioms of Euclid.[51] In 1923, he gave a lecture in which he discussed a set of twenty-three "open problems" that were calls for proofs he believed a complete theory of mathematics required.[52] These questions are known as the "Hilbert Program."[53] In 1928, a year after the initial publication of Whitehead and Russell's *Principia*, Hilbert added to his Program what he called the *Entscheidungsproblem*,[54] which would be taken up by Alan Turing.[55] In this open problem, Hilbert sought a proof for his belief that all mathematical calculations could be determined by a "decision procedure," called an algorithm that was determined within the logic of each field of mathematics.[56]

In 1931, Kurt Gödel published a paper under the title, *Über formal unentscheidbare Statze der "Principia Mathematica" und verwandter Systeme* (On Formally Undecidable Propositions of "*Principia Mathematica*" and Related Systems) that had devastating consequences for Whitehead's and Russell's work.[57] In it, Gödel demonstrated that systems of axioms, like the one that Whitehead and Russell developed, cannot be complete because some of the axioms will not necessarily be provable and the individual axioms of such a system of axioms cannot be proved to be consistent from within the system of axioms itself.[58] The proof of the consistency of the axioms always relies on a referent outside of the system itself. Gödel's thesis is known as the Incompleteness Theorems.[59] It undercut Whitehead and Russell and the en-

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49. KNEALE & KNEALE, *supra* note 32, at 517–19; WHITEHEAD & RUSSELL, *supra* note 48.

50. *See* KNEALE & KNEALE, *supra* note 32, at 517–19.

51. HILBERT, *supra* note 42, at 1–15.

52. *See* KNEALE & KNEALE, *supra* note 32, at 681–88 (discussing the Hilbert Problems).

53. *See generally* Richard Zach, *Hilbert's Program*, STAN. ENCYCLOPEDIA OF PHIL. (2015), http://plato.stanford.edu/archives/spr2016/entries/hilbert-program/.

54. *Id.*

55. *Id.*

56. *Id.*

57. KURT GÖDEL, ON FORMALLY UNDECIDABLE PROPOSITIONS OF PRINCIPIA MATHEMATICA AND RELATED SYSTEMS (B. Meltzer trans., 1992).

58. *See* ERNEST NAGEL & JAMES R. NEWMAN, GÖDEL'S PROOF (Douglas R. Hofstadter ed., 2001) (introducing Gödel's proof).

59. *See* KNEALE & KNEALE, *supra* note 32, at 712–24 (describing Gödel's proof); *see also* Juliette Kennedy, *Kurt Gödel*, STAN. ENCYCLOPEDIA OF PHIL. (2015),

tire Hilbert Program. Gödel's influence on philosophy has been uneven. While some philosophers have argued that the Incompleteness Theorems demonstrate the marvelous power of the human mind to understand beyond reason,[60] the more common interpretation focuses on the need to recognize, in a Kantian sense, the limits that are intrinsic to the questions that one investigates.[61] The cautiousness about the limitations intrinsic to the question is an important theme for many later philosophers and computer scientists, including those who investigated Hilbert's *Entscheidungsproblem*.

2.   Alan Turing's Theory of Computation

Turing was already a young pioneer of mathematics and computer science when he took up the problem where Gödel had left it.[62] In 1937, he published an influential paper titled, *On Computable Numbers with an Application to the Entscheidungsproblem*, in which he developed several ideas that became important for computer science.[63] Of particular importance to him was the nature of what we now call "algorithms."[64] For Turing, the existence of algorithms suggested a metaphorical computational machine that could operate algorithmically.[65] This was a breakthrough since "[c]omputers at the time since meant people who did computations, not machines . . . ."[66] A second step for Turing was to argue that these metaphorical computational machines could be described as a string of numbers capable of performing any calculation, and thus solving the *Entscheidungsproblem*.[67] His concept of a universal computational machine is a foundation for contemporary computer science.[68] It is now described as the first statement of the Universal Turing machine.[69] During his service as a cryptologist during World War II,

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http://plato.stanford.edu/archives/win2015/entries/goedel/; Panu Raatikainen, *Gödel's Incompleteness Theorems*, Stan. Encyclopedia of Phil. (2015), http://plato.stanford.edu/archives/spr2015/entries/goedel-incompleteness/.

60.   Kneale & Kneale, *supra* note 32, at 724.

61.   *Id.*

62.   Alan Turing, *On Computable Numbers, with an Application to the Entscheidungsproblem – A Correction*, in Alan Turing, His Work and Impact 16 (S. Berry Cooper & Jan van Leeuwen eds., 2013); *see also* Chris Bernhardt, Turing's Vision: The Birth of Computer Science 11–13 (2016).

63.   Bernhardt, *supra* note 62, at 15–24; *see also* B. Jack Copeland, *Computable Numbers, A Guide*, in The Essential Turing 5–57 (B. Jack Copeland ed., 2004).

64.   Bernhardt, *supra* note 62, at 11–15.

65.   *Id.*

66.   *Id.*

67.   *See* Turing, *supra* note 62, at 16–17.

68.   *See* Bernhardt, *supra* note 62, at 12.

69.   Alan Turing wrote the following:

Turing's ideas about calculation allowed British cryptographers to develop a computational device that assisted in breaking the German enigma code.[70]

The conception of universal computation was a major contribution that Turing made to philosophy because it contained the basis for a new perspective on humanity.[71] Universal computability suggested that human beings are not unique in having the ability to perform any operation that can be described by an algorithm.[72] Turing's work on computability suggests that human beings must be viewed alongside other entities that perform computations.[73] This is a decentering of human beings from the pedestal of being the

> We may compare a man in the process of computing a real number to a machine which is only capable of a finite number of conditions *q1*, *q2*, . . . , *qR*, which will be called "*m*-configurations". The machine is supplied with a "tape" (the analogue of paper) running through it, and divided into sections (called "squares") each capable of bearing a "symbol". At any moment there is just one square, say the *r*-th, bearing the symbol $S(r)$ which is "in the machine". We may call this square the "scanned square". The symbol on the scanned square may be called the "scanned symbol". The "scanned symbol" is the only one of which the machine is, so to speak, "directly aware". However, by altering its m-configuration the machine can effectively remember some of the symbols which it has "seen" (scanned) previously. The possible behaviour of the machine at any moment is determined by the *m*-configuration *qn* and the scanned symbol S(r). This pair *qn*, S(r) will be called the "configuration": thus the configuration determines the possible behaviour of the machine. In some of the configurations in which the scanned square is blank (*i.e.* bears no symbol) the machine writes down a new symbol on the scanned square: in other configurations it erases the scanned symbol. The machine may also change the square which is being scanned, but only by shifting it one place to right or left. In addition to any of these operations the *m*-configuration may be changed. Some of the symbols written down will form the sequence of figures which is the decimal of the real number which is being computed. The others are just rough notes to "assist the memory". It will only be these rough notes which will be liable to erasure.
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> It is my contention that these operations include all those which are used in the computation of a number. The defence of this contention will be easier when the theory of the machines is familiar to the reader. In the next section I therefore proceed with the development of the theory and assume that it is understood what is meant by "machine", "tape", "scanned", etc.

Turing, *supra* note 62, at 17.

70. *See* HODGES, *supra* note 28, at 222–33.

71. *See* Copeland, *Computable Numbers, A Guide*, *supra* note 63, at 45.

72. *See id.* at 36 (describing the concept of a computable number).

73. Floridi explains:

> [Computer scientists] have not only provided unprecedented epistemic and engineering powers over natural and artificial realities; by doing so they have also cast new light on who we are, how we are related to the world

privileged creatures capable of computation.[74] After Turing, human computation must be viewed alongside other natural computing systems.[75] Even individual biological cells make computations,[76] and technological systems created by human beings can increasingly outperform human beings in a growing number of computational pursuits.[77] Human calculators can no longer be assumed to be unique or supremely competent to perform any computation.[78]

3.   Claude E. Shannon's Information Theory

Although Floridi does not include Claude E. Shannon among his heroes of the information age, Shannon's theory of information was nonetheless of vital importance to the Fourth Revolution that Floridi describes.[79] In the 1940s and 1950s, Bell Labs, the research entity of the telephone carrier, sought to grow by extending its service to more remote locations.[80] To achieve this goal, Bell Labs had to figure out a way to cope with the noise introduced by lengthening the transmission wires.[81] Shannon viewed the

> and hence how we understand ourselves. Today, we are slowly accepting the idea that we are not standalone and unique entities, but rather informationally embodied organisms (inforgs), mutually connected and embedded in an informational environment, the infosphere, which we share with both natural and artificial agents similar to us in many respects.

> Luciano Floridi, The Ethics of Information 14 (2013); Luciano Floridi, *Turing's Three Philosophical Lessons and the Philosophy of Information*, *in* Phil. Transactions of the Royal Soc'y 3540 (2012) ("Turing has changed our philosophical anthropology as much as Copernicus, Darwin and Freud. This has had a significant impact on what it means to do philosophy after Turing, the last point to which I wish to call the reader's attention.").

74.   *See* Floridi, The Ethics of Information, *supra* note 73, at 14.

75.   *See id.*

76.   For a discussion of the biological cell as a computational system, see J. Craig Venter, Life at the Speed of Light: From the Double Helix to the Dawn of Digital Life 25–46 (2013).

77.   *E.g.*, Nick Bostrom, Superintelligence: Paths, Dangers, Strategies 14 (2014) (describing the progress of machine intelligence as it has surpassed human ability in a number of areas and the prospects for the future).

78.   *See* Floridi, The Ethics of Information, *supra* note 73, at 14.

79.   Floridi's Fourth Revolution is the rise of ICT, which could not have occurred without Shannon's theory of information. Jimmy Soni, A Mind at Play: How Claude Shannon Invented the Information Age (2017) (discussing the significance of Shannon's work).

80.   *See* James Gleick, The Information 3–7 (2011).

81.   *Id.* at 5–7.

problem as one of mathematical abstraction.[82] Shannon's paper, *The Mathematical Theory of Communication*, describes the basis for the vast computation and communication systems that we enjoy today.[83] Telegraphs were controlled by switches that could be in one of two states: open or closed.[84] Shannon called this binary condition a "bit," which he described as the smallest unit of information.[85] Bits are what are transmitted through a channel and received at a distant location.[86] The idea of sending a binary signal was not a new idea; in fact, the telegraph did just that.[87] Shannon abstracted the idea of the bit of information from the digital binary embodiment of it.[88] He posed the fundamental problem of communication as "that of reproducing at one point either exactly or approximately a message selected at another point"[89] and, that the "semantic aspects of communication are irrelevant to the engineering problem."[90] His achievement was to define information as a generalizable physical process that could be mathematically described apart from the semantic meaning that might be carried.[91]

Shannon sought to understand the extraction of a signal, a stream of bits from a noisy background the long wires, as a problem for statistical analysis.[92] To achieve this statistical abstraction, Shannon needed to separate the concept of "information" (the stream of bits) from the psychological concept that involves semantic meaning.[93] Shannon described information as a measurable phenomenon associated with the amount of uncertainty that a system

82. *See id.* at 204–68 (describing the development of Shannon's theory of information).

83. *See* Claude Shannon, *The Mathematical Theory of Communication*, 27 Bell Sys. Technical J. 379 (1948), *reprinted in* Claude E. Shannon & Warren Weaver, The Mathematical Theory of Communication 29 (1963).

84. *Id.* at 9.

85. *Id.*

86. *Id.* at 7.

87. *See id.* at 7–9.

88. *See* Gleick, *supra* note 80, at 221–26.

89. Shannon & Weaver, *supra* note 83, at 31.

90. *Id.*

91. James V. Stone, Information Theory 2 (2015).

92. Shannon & Weaver, *supra* note 83, at 31 ("The significant aspect is that the actual message is one selected from a set of possible messages. The system must be designed to operate for each possible selection, not just the one which will actually be chosen since this is unknown at the time of design."); *see also* Gleick, *supra* note 80, at 221–31.

93. Shannon & Weaver, *supra* note 83, at 31 ("Frequently the messages have *meaning*; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem.").

could allow.[94] Information, in Shannon's theory, is understood either as adding certainty or as taking away uncertainty.[95] He described the reduction in the amount of uncertainty achieved by a reduction in information entropy.[96] Although Shannon used the term "entropy," he did not intend to suggest that information entropy is related to the second law of thermodynamics, which states that there is a natural tendency of any isolated system to degenerate into a more disordered state.[97] Nonetheless, later research suggests that the mathematical description of information that Shannon developed might be related to physical systems and might suggest that information is a property of physical systems that can be expressed in terms of order and energy.[98] Shannon's theory of information is a theory about the communication of information without meaning, which is to say it is about raw data.[99]

C.   The Infosphere

The revolution sparked by Turing and Shannon is still unfolding, but it too has decentered the person by showing that calculation is not a distinctly human ability and that information in Shannon's physical sense is abundant.[100] One conclusion that Floridi suggests is that humans are information agents who interact with other information entities in an information environment that he calls the "infosphere."[101] Modern philosophers, Kant for example, viewed human beings as individuals who grounded truth-claims in logical necessity.[102] But, in the twentieth century critiques of logic brought by Ludwig Wittgenstein and others, reliance on logical necessity no longer

94.   For discussion of Shannon entropy, see GLEICK, *supra* note 80, at 269–86; STONE, *supra* note 90, at 21–44.

95.   STONE, *supra* note 90 (introducing information theory).

96.   *Id.* at 31–38.

97.   GLEICK, *supra* note 80, at 268.

98.   *See id.* at 280.

99.   *See id.* at 219.

100.   FLORIDI, THE FOURTH REVOLUTION, *supra* note 15, at ix ("We need philosophy to grasp better the nature of information itself. We need philosophy to anticipate and steer the ethical impact of ITCs on us and on our environments. We need philosophy to improve the economic, social, and political dynamics of information.").

101.   FLORIDI, INFORMATION: A VERY SHORT INTRODUCTION, *supra* note 17, at 14–18.

102.   *See* Robert Johnson & Adam Cureton, *Kant's Moral Philosophy*, STAN. ENCYCLOPEDIA OF PHIL. (2016), https://plato.stanford.edu/entries/kant-moral/. *See* TERRELL L. HILL, AN INTRODUCTION TO STATISTICAL THERMODYNAMICS (2012) (an accessible discussion of the relation between Shannon and Bolzmann entropy).

seemed possible.[103] Philosophy made the "linguistic turn" which sought to locate the foundations of knowledge in the structures of intersubjectivity.[104] Philosophers, like Jürgen Habermas, sought to ground their truth claims in the practically necessary structure of discourse.[105]

Floridi's philosophy seeks what amounts to another turn—an information turn—where the foundations of knowledge are relations among information agents of various types.[106] PI is a form of speculative realism in which each successive generation emerges into a preexisting information environment that individuals come to know by interacting with and by changing the environment.[107] In other words, information is not simply a psychological event, it is an ontological reality.[108] This is the horizon of PI.

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103. *See* STANLEY CAVELL, THE CLAIMS OF REASON: WITTGENSTEIN, SKEPTICISM, MORALITY, AND TRAGEDY 129–243 (1979).

104. *See* THE LINGUISTIC TURN: ESSAYS IN PHILOSOPHICAL METHOD (Richard Rorty ed. 1992) (describing the "linguistic turn").

105. Habermas' theory is intended to replace the Kantian epistemology that Habermas describes as a transcendental subjectivity. In the *First Critique*, Kant's method of transcendental argument looks to the self-evidently necessary noetic structures that provide the principles that are foundational for self-responsible, autonomous reason. IMMANUEL KANT, THE CRITIQUE OF PURE REASON 426 (J.M.D. Meiklejohn trans., 2d ed. 2010). Kant's approach is subjective, in the sense that it seeks principles of validation within individual subjective self-awareness. Kant looks within individual subjectivity because he believes that, since internal awareness is immediate, its structure is self-evident. Therefore, he holds that subjectivity can be the basis for self-responsible philosophy.

    Habermas rejects Kant's approach because he believes that it cannot resolve fundamental *aporias* because it starts from a monological presumption that takes as given an isolated individual with a self-governing mind. For Habermas, this presupposition prevents subjective theories like Kant's from grasping the contribution of intersubjectivity to the self and to reason. The self is constituted by interaction with others, for Habermas, and cognitive awareness is a function of interaction. Therefore, without intersubjectivity there is no possibility of reason. Habermas' discourse theory attempts to describe the necessary and sufficient conditions for reason beginning from this presupposition of intersubjective. *See* JÜRGEN HABERMAS, POSTMETAPHYSICAL THINKING: PHILOSOPHICAL ESSAYS 12–22 (William Mark Hohengarten trans., 1992) (discussing Habermas' conception of intersubjectivity).

106. *See* LUCIANO FLORIDI, THE PHILOSOPHY OF INFORMATION 13–17 (2013) (describing the scope of the philosophy of information).

107. *Id.* at 15–16.

108. *Id.* at 20–21.

III.   PHILOSOPHY OF INFORMATION

Part II shows how different scientific discoveries led to revolutions in human self-understanding, culminating with the discoveries of Alan Turing and Claude Shannon, and this led to the contemporary "fourth revolution."[109] Part III turns to explicating Floridi's PI. Part III begins by describing the historical emergence of PI, followed by a simple definition, and then examines the components of the definition. Next, Part III discusses Levels of Abstraction (LoA), which is a principle method of PI. Finally, Part III discusses applications of PI to traditional philosophical questions of ontology, epistemology, and ethics.

A.   The Meta-Theoretic Perspective of the Philosophy of Information

1.   Background

Although there have been antecedents to PI over the past two decades, Floridi has refined those loose themes into a sophisticated theory.[110] In describing PI, Patrick Allo draws a useful analogy between PI and the philosophy of probability.[111] Both deal with a well-defined mathematical concept "but are stuck with widely divergent and often incompatible interpretations: chances, frequencies, subjective probabilities, propensities in [the philosophy of probability],"[112] and an array of formal and informal definitions of information in PI.[113] Moreover, the philosophy of probability applies to applications of formal methods of analysis and thus leads to fields of inquiry like Bayesian epistemology.[114] Similarly, PI is concerned

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109. *See generally* FLORIDI, THE FOURTH REVOLUTION, *supra* note 15 (introducing the concept of the fourth revolution).

110. *See* PATRICK ALLO, PUTTING INFORMATION FIRST: LUCIANO FLORIDI AND THE PHILOSOPHY OF INFORMATION, METAPHILOSOPHY 248–51 (P. Allo ed., 2010).

111. *Id.* at 248.

112. *Id.*

113. *Id.* at 249–50.

114. As the Bayesian probability has become influential, questions about its foundational epistemological status have been investigated. The Stanford Encyclopedia of Philosophy defines it this way:

"Bayesian epistemology" became an epistemological movement in the 20th century, though its two main features can be traced back to the eponymous Reverend Thomas Bayes (c. 1701–61). Those two features are: (1) the introduction of a *formal apparatus* for inductive logic; (2) the introduction of a *pragmatic self-defeat test* (as illustrated by Dutch Book Arguments) for *epistemic* rationality as a way of extending the justification of the laws of deductive logic to include a justification for the laws of inductive logic. The formal apparatus itself has two main elements: the use of the laws of probability as coherence constraints on rational degrees of be-

with applications of information in computation and other forms of analysis.[115]

A central claim of PI is that information is an ontological category, in the sense that any knowledge of being is informational.[116] In this respect, PI is a "relational ontology".[117] It traces its origins through representative figures like Gottfried Leibniz,[118] Charles Sanders Peirce,[119] and Alfred North Whitehead.[120] All three of these thinkers conceived of mathematical relationships as fundamental to philosophical inquiry.[121] Leibniz's work in the *Monadology* suggests a foundational ontology based on simple substances, called "monads," that are knowable through relation.[122] Similarly, Peirce argues for a logic of semiotic representation, where "thought-signs" represent objectives of cognitive understanding.[123] And, Whitehead describes the "event," which is an actual entity that exists as a relation of becoming.[124] In each case, philosophy is speculative realism, where the conclusion adopted by modern philosophers as diverse as Kant and Rorty, that reality cannot be known, is bracketed in favor of investigating the philosophical implications of mathematical inquiry.[125]

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lief (or degrees of confidence) and the introduction of a rule of probabilistic inference, a rule or principle of *conditionalization*.

William Talbott, *Bayesian Epistemology*, Stan. Encyclopedia of Phil. (2008), http://plato.stanford.edu/entries/epistemology-bayesian/.

115. *See* Floridi, The Philosophy of Information, *supra* note 106, at 13.

116. *See, e.g.*, *id.* at 20–21.

117. *See id.*

118. *See* Nicholas Jolley, Leibniz (2005); Lloyd Strickland, Leibniz's Monadology: A New Translation and Guide (Lloyd Strickland trans., 2014) (introduction to Leibniz).

119. *See* Fernando Zalamea, Peirce's Logic of Continuity (2012) (introduction to Charles Sanders Peirce).

120. *See* Donald W. Sherburne, A Key to Whitehead's Process and Reality (1966) (introduction to Alfred North Whitehead).

121. *See id.* at 168–70; Jolley, *supra* note 118, at 59; Zalamea, *supra* note 119, at 3.

122. Strickland, *supra* note 118, at 39–50.

123. *See, e.g.*, Gilles Deleuze, The Fold: Leibniz and the Baroque (Tom Conley trans., 1993); Albert Atkin, *Peirce's Theory of Signs*, Stan. Encyclopedia of Phil. (2010), https://plato.stanford.edu/entries/peirce-semiotics/#ThoSig.

124. *See* Roberto Casati & Achille Varzi, *Events*, Stan. Encyclopedia of Phil. (2014), http://plato.stanford.edu/archives/win2015/entries/events/.

125. *See* Sherburne, *supra* note 120, at 168–70; Jolley, *supra* note 118, at 59; Zalamea, *supra* note 119, at 3.

Whitehead and Russell play important roles in the historical development of PI.[126] Whitehead influenced many significant thinkers for contemporary legal philosophy, including Willard Quine, whose work is influential in contemporary American jurisprudence.[127] Although Russell ceased to be actively engaged in philosophical discourse after the refutation of his work with Whitehead, his early work in epistemology developed into various theories of epistemological and ontological structural realisms.[128]

PI draws on this rich philosophical background but is not constrained by it.[129] One of the goals of PI is to confront what Floridi calls the "Scholasticism" of contemporary philosophy.[130] He refers to the unquestioned orthodoxies that are called into question by the new concepts of information.[131] Scholasticism "gradually fossilizes thought, reinforcing its fundamental character of immobility."[132] The entrenchment of reified ideas "weakens its capacity for reaction to scientific, cultural, and historical inputs, divorces it from reality . . . ."[133] Dogma needs to be challenged where it no longer serves to clarify and enlighten.[134]

For example, PI challenges philosophers who view technology with scorn,[135] which, at least in part, is the legacy of Martin Heidegger, for whom

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126. *See* Leemon McHenry, *Quine and Whitehead Ontology and Methodology*, *in* Process and Analysis: Whitehead, Hartstone, and the Analytic Tradition 157–69 (George W. Shield ed., 2012); Willard van Orman Quine, *Response to Leemon McHenry*, *in* Process and Analysis: Whitehead, Hartstone, and the Analytic Tradition 171–73 (George W. Shield ed., 2012); L. R. Russell et al., *Symposium: Materialism in the Light of Modern Scientific Thought*, 8 The Proceedings of the Aristotelian Society: Mind, Matter, and Purpose 99, 130–42 (Supp. 1928) (describing Whitehead's and Russell's contribution to early structural realism).

127. *See* McHenry, *supra* note 126; Quine, *Response to Leemon McHenry*, *supra* note 126 (discussing Whitehead's influence on Quine).

128. *See* Bertrand Russell, The Problems of Philosophy (2012); G. Maxwell, *Scientific Methodology and the Causal Theory of Perception*, *in* Problems in Philosophy of Science 148 (Imre Lakatos & Alan Musgrave eds., 1968) (discussing Russell and Poincaré); Russell, *supra* note 128 (providing background on Russell's epistemology).

129. Floridi, The Philosophy of Information, *supra* note 106, at 11.

130. *Id.* at 11–12.

131. *Id.*

132. *Id.* at 11.

133. *Id.*

134. *See id.*

135. Floridi writes the following:

> It will become normal to consider the world as part of the infosphere, not so much in the dystopian sense expressed by the *Matrix*-like scenario,

technology was a pathology of modernity.[136] He believed that technology reduced the human experience of moral meaning because it forced an abstract and removed attitude in which one was not connected bodily to the world.[137] Heidegger believed that technology created a sort of virtual existence in which the moral meaning of experiences, like the cry of a hungry child, were lost in abstract concepts and compress space and time.[138] We might have more knowledge of human suffering but far less experience of it.[139] Heidegger argued that technology obscured moral meaning and created the conditions for repressive cultural forms.[140]

Floridi's philosophy of information is not intrinsically negative, but also it is far from being morally triumphalist.[141] For him, technology brings about creative moments which achieve new ontological possibilities.[142] Technology also brings forth opportunities for liberation or oppression and calls for ethical assessment and responsible action.[143] Some technological advances expand the cognitive reach of human beings.[144] They bring about more complex and nuanced speculative and practical philosophy.[145]

Two synergistic interpretations of philosophy guide this approach: a conceptual interpretation and a metaphysical interpretation.[146] In the first interpretation, philosophers are "conceptual engineers" whose principle task is to clarify muddled concepts and to create new grammar and syntax to fill in

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> where the "real reality" is still as hard as the metal of the machines that inhabit it; but in evolutionary, hybrid sense represented by an environment such as New Port City, the fictional, post-cybernetic metropolis of *Ghost in the Shell*.

Floridi, Information: A Very Short Introduction, *supra* note 17, at 17.

136. *See* Martin Heidegger, Bremen and Freiburg Lectures 51–63 (Andrew J. Mitchell trans., 2012).

137. Floridi, The Ethics of Information, *supra* note 73, at 15 ("We have begun to see ourselves as inforgs not through some transformation in our bodies but, more seriously and realistically through the reontologization of our environment and of ourselves. It is our world and our metaphysical interpretation of it that is changing.").

138. Martin Heidegger, *The Question Concerning Technology*, *in* Basic Writings: Martin Heidegger 311, 333 (David Farrell Krell ed., 1993).

139. *See id.*

140. *Id.*

141. Floridi, The Ethics of Information, *supra* note 73, at 9.

142. *See id.* at 7–9.

143. *See id.*

144. *See id.* at 6.

145. *See id.* at 7.

146. Floridi, The Philosophy of Information, *supra* note 106, at 17–19.

the gaps that arise in new cultural experiences.[147] On this account, which Floridi calls "analytic," philosophy is closely tied to culture.[148] When the context and conditions of society change, often as a result of new technology, new questions arise and old answers sometimes fail to satisfy.[149] Philosophers help to bring about Kuhnian "paradigm shifts" by clarifying concepts, sharpening questions, and creating new concepts to help better frame issues for cultural discourse.[150] For analytic philosophers, the goal of conceptual analysis is to clarify philosophical problems by showing that they are simply matters of confusion about grammar and syntax.[151] The second interpretation is metaphysical and holds that philosophy does not "interact much with the culture in which it develops."[152] Floridi has in mind a cynical critique that he associates with Wittgenstein and some of the logical positivists, which hold that philosophers create the problems that they seek to solve.[153] For analytic philosophers, the goal of conceptual analysis is intended to eradicate philosophical problems by showing that they are simply matters of confusion about grammar and syntax.[154] Both of these interpretations are realist in the sense that they rest on a presumption that there is an intelligible world that philosophers can investigate.[155] They deny Kant's claim that phenomena do not give knowledge of *noumena* (things in themselves).[156] PI seeks a new

147. *Id.*

148. *See id.*

149. *See id.* at 17–18.

150. *See* Alexander Bird, *Thomas Kuhn*, STAN. ENCYCLOPEDIA OF PHIL. (2011), https://plato.stanford.edu/entries/thomas-kuhn/; *see* Thomas Nickles, *Scientific Revolutions*, STAN. ENCYCLOPEDIA OF PHIL. (2013), http:// http://plato.stanford .edu/entries/scientific-revolutions/.

151. *See* George Rey, *The Analytic/Synthetic Distinction*, STAN. ENCYCLOPEDIA OF PHIL. (2013), https://plato.stanford.edu/entries/analytic-synthetic/ (describing the distinction between analytic and synthetic philosophy).

152. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 18.

153. *Id.* at 19.

154. *See* Rey, *supra* note 151.

155. *See* FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 17–19. This realist orientation aligns Floridi with the recent revival of interest in speculative realism inspired by the French philosopher, Gilles Deleuze. Both take mathematical relations to be foundational and both look to understand how selective repetition allows for ontological realism and a new approach to understanding creativity in the age of digitalized production, where objects are no longer individuated by unique traits. This conception of creativity is foundational for the ethics of PI. *See generally* DELEUZE, *supra* note 123 (describing Deleuze's theory regarding Leibniz's writings).

156. Grier writes the following:

way forward for philosophy that incorporates the new understanding of information into epistemology and ontology.[157]

In discussing this sweeping vision, Floridi makes use of a metaphor of humanity as Demiurge, who appears as a character in the "useful myth" that Socrates describes in the *Timeaus*.[158] Floridi views the "history of contemporary philosophy" in the following way: "[T]he emergence from the demiurgic Ego, which overcomes the death of god by gradually accepting its metaphysical destiny of fully replacing god as the creator and steward of reality, and hence the ultimate source of meaning and responsibility."[159]

Since the confidence in an intelligible universe no longer rests on the firm foundation of dogmatic conviction, it was up to the philosophers to defend it, although they failed to do so.[160] They sought instead to outsource the responsibility by turning to the natural sciences.[161] But, this turn to naturalism, itself, is increasingly a turn to information. The sciences look to information theory to recast their disciplines in order to take advantage of the extension of cognition made possible by ICT. And, this informational turn suggests that the boundaries between mind and world are not as sharp as the early modern philosophers theorized.[162]

The demiurge of the *Timeaus* works on the fabric of information to bring about a new human self-understanding.[163] The demiurge is computa-

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> Throughout the Analytic, Kant elaborates on this general view, noting that the transcendental employment of the understanding, which aims towards knowledge of things independently of experience (and thus knowledge of "noumena"), is illicit. It is in this connection that Kant states, famously, in the Analytic, that ". . . the proud name of ontology, which presumes to offer synthetic *a priori* cognitions of things in general . . . must give way to the more modest title of a transcendental analytic". Filling this out, Kant suggests that to take ourselves to have unmediated intellectual access to objects (to have "non-sensible" knowledge) correlates with the assumption that there are non-sensible objects that we can know. To assume this, however, is to conflate "phenomena" (or appearances) with "noumena" (or things in themselves). The failure to draw the distinction between appearances and things in themselves is the hallmark of all those pernicious systems of thought that stand under the title of "transcendental realism." Kant's transcendental idealism is the remedy for these. (citations omitted).

Michelle Grier, *Kant's Critique of Metaphysics*, Stan. Encyclopedia of Phil. (2012), http://plato.stanford.edu/archives/sum2012/entries/kant-metaphysics/.

157. Floridi, The Philosophy of Information, *supra* note 106, at 19–20.

158. *Id.* at 22–23.

159. *Id.* at 23.

160. *Id.*

161. *Id.*

162. *Id.* at 25.

163. *See generally* Floridi, The Fourth Revolution, *supra* note 15, at 59–86.

tional—it exists where computation leads to the transformation of human self-understanding into new ontological forms.[164] In the infosphere, this happens at a level familiar to the natural sciences: when a nanotechnology engineer creates a new material, when a cellular biologist creates a new species of bacteria, or when a computer engineer creates a quantum computer. But, it also happens when an investment banker creates a new instrument that directs capital into a globalized commodity, when a group of radicals unites into a terrorist network, or when a regulatory regime creates a new network of lobbyists.[165]

Floridi refers to the human agent in the infosphere with the neologism as an "inforg," which is a blend of "information" and "cyborg" to indicate that the abilities normally thought of as human have been extended through ICT into the information ontology.[166] PI, therefore, is a form of modest epistemological realism[167] in the sense that it accepts that questions about epistemology can be recharacterized in terms of informational structures.[168] Human beings are information agents who struggle to understand the world in which they awaken through informational relations.[169]

2.   The Definition of Philosophy of Information

With this background in mind, Floridi defines PI in the following passage: "The philosophy of information (PI) is the philosophical field concerned with (a) the critical investigation of the conceptual nature and basic principles of information, including its dynamic, utilization, and sciences; and (b) the elaboration and application of information-theoretic computational methodologies to philosophical problems."[170] This definition has two parts. The first part is concerned with understanding the nature of the concept

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164. *Id.* at 72 ("In light of the fourth revolution, we understand ourselves as informational organisms among others.").

165. Floridi uses the phrase "political apoptosis" to describe "the gradual and natural process of renovation of sovereign states as they develop into information societies." *Id.* at 118.

166. Floridi, Information: A Very Short Introduction, *supra* note 17, at 9–10, 96–98.

167. Floridi, The Philosophy of Information, *supra* note 106, at 25 ("PI can . . . be presented as the study of the informational activities that make possible the construction, conceptualization, and semanticization and finally moral stewardship of reality, both natural and artificial, both physical and anthropological.").

168. *Id.* ("[The philosophy of information] will affect the overall way in which we address new and old philosophical problems, bringing about a substantial innovation in philosophy. They will represent the *information turn* in philosophy.").

169. Floridi, The Fourth Revolution, *supra* note 15, at 69 ("The self is seen as a complex informational system, made of consciousness activities, memories or narratives. From such a perspective, you are your own information.").

170. Floridi, The Philosophy of Information, *supra* note 106, at 14.

"information."[171] In the contemporary context, information is used to refer to many phenomena that are semantic, computational, physical, and biological. Is there a common definition of a family resemblance? What are the implications for traditional philosophical problems? What opportunities exist to offer better solutions? The second part of the definition of PI refers to the methodological implications of information science for philosophy. What improvements to philosophical inquiry are suggested by the new conceptualizations of information?

To investigate these questions, PI develops an Informational Structural Realism (ISR) committed to a minimal ontological realism that posits the existence of structural objects, and a corresponding structural epistemology that maintains the possibility of knowledge of structural entities.[172] ISR is a development of Structural Realism, a widely influential theory that is supported by many realist and anti-realist philosophers.[173]

3. Defining Informational Structural Realism

Structural Realism (SR) has a long intellectual history, but was developed in its most influential contemporary form by John Worrall.[174] In his essay, Worrall attempted to respond to two conflicting views of scientific knowledge.[175] One account is realist, which holds that sciences give knowledge of a world existing separately from the mind.[176] On this account, when a scientific theory predicts the existence of a hidden entity, such as a fundamental atomic particle, that entity should be believed to exist. The most influential argument for the realist position is one developed by Hilary Putnam, who argued that only the existence of such entities can explain the success of science, absent some magical agent.[177]

A contrasting anti-realist view holds that belief in hidden entities should be tentative or even suspended all together.[178] The most influential anti-realist argument is that scientific theories have a record of sweeping change that

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171. *Id.* ("(a) the critical investigation of the conceptual nature and basic principles of information, including its dynamic, utilization, and sciences . . . .").

172. *See* Kevin P. Lee, *Jurisprudence and Structural Realism*, 5 Legal Issues J. 63, 100–02 (2017) (discussing PI and ISR).

173. *See generally* John Worrall, *Structural Realism: The Best of Both Worlds?*, 43 Dialectica 99, 99–124 (1983) (discussion the influence of structural realism).

174. *Id.*

175. James Ladyman, *Structural Realism*, Stan. Encyclopedia of Phil. (2014), https://plato.stanford.edu/archives/win2016/entries/structural-realism/.

176. *Id.*

177. *Id.*

178. *Id.*

cannot be accounted for if the entities it proposes actually exist.[179] Many philosophers, including Willard Quine, took this anti-realist view.[180]

Worrall argued, using the change from Fresnel's solid ether theory of light to Maxwell's electromagnetic theory as an example, that we should neither believe that scientific theories give knowledge of hidden entities, nor believe, as with the anti-realists, that they cannot.[181] On the Structural Realist account, we should commit to believing only the structural or mathematical content of the theories. That is to say, scientific knowledge is knowledge of the formal structure among empirical observations.[182]

These formal structures do not change as theory changes. For example, Fresnel's equations fit into Maxwell's theory.[183] This approach does not rely on a magical agent to explain the success of the sciences; it only requires a minimal ontological and epistemological realism.[184] SR has had some influence although it is far from being universally accepted.

Floridi argues that, despite its successes, SR does not adequately explain the nature of the structures to which it refers.[185] As he puts it, "it leaves unspecified the nature of the *relata* in the structures."[186] His conception of ISR attempts to resolve this issue by claiming a minimal ontological commitment, which SR recognizes in favor of the existence of structural objects—*relata* between existing entities, is incomplete.[187] Awareness of *relata* and the relations among and between them is achieved through information of different types. This knowledge occurs at different levels of abstraction (LoA), a central feature of the methodology of PI.[188] Floridi defines ISR as follows:

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179. *See* Steven French & James Ladyman, *Remodeling Structural Realism: Quantum Physics and the Metaphysics of Structure*, 136 Synthese 31–56 (2003).

180. *See* Quine, *Response to Leemon McHenry*, *supra* note 126, at 171–73 (describing Anti-Realism).

181. Worral, *supra* note 173, at 115–21.

182. *Id.* at 122.

183. French & Ladyman, *supra* note 179, at 36–37.

184. Worral, *supra* note 173, at 122 ("On the structural realist view what Newton really discovered are the relationships between phenomena expressed in the mathematical equations of his theory, the theoretical terms of which should be understood as genuine primitives.").

185. Floridi, The Philosophy of Information, *supra* note 106, at 341.

186. *Id.*

187. *Id.*

188. Level of abstraction (LoA) is defined as follows:

> A finite but not-empty set of observables. No order is assigned to the observables, which are expected to be the building blocks in a theory characterized by their very definition. As LoA is called discrete (respectively

> Explanatorily, instrumentally and predictively successful models (especially, but not only, those propounded by scientific theories) a given LoA [Level of Abstraction] can be, in the best circumstances, increasingly informative about the relations that obtain between the (possibly sub-observable) informational objects that constitute the system under investigation (through the observable phenomena).[189]

The LoA is a key concept.[190] At the lowest levels most proximate to the *relata*, the LoA mediates knowledge most directly. At higher LoAs, knowledge is not directly knowable but may still be "epistemologically interactable."[191] That is, it may be possible to draw out inferences about the structural *relata* at higher levels of abstraction.

4. Defining Information

Before turning to the LoA methodology, it is useful to elaborate further on the many roles that concepts of information play in the many areas of academic inquiry. The new awareness of information associated with the ICT revolution is changing the way we understand ourselves and the world. Yet, information itself is notoriously difficult to define and understand. Floridi begins his analysis by acknowledging that, not only do different philosophical accounts of information exist, but there also are different uses of "information" in other disciplines outside of philosophy, of which biology and physics are particularly influential.[192]

The existence of these multitude of meanings makes the concept difficult to define. Shannon described the issue in the following way:

> The word *information* had been given different meaning by various writers in the general field of information theory. It is likely that at least a number of these will prove sufficiently useful in certain applications to deserve further study and permanent recognition. It is hardly to be expected that a single concept of information would satisfactorily account for the numerous possible applications of this field.[193]

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analogue) if and only if all its observables are discrete (respectively analogue); otherwise it is called hybrid.

Id. at 52.

189. *Id.* at 361.

190. See *infra* Part III.B for a discussion of LoA.

191. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 370.

192. *See generally* Pieter Adriaans, *Information*, STAN. ENCYCLOPEDIA OF PHIL. (2012), https://plato.stanford.edu/entries/information/ (providing an overview of the historical and contemporary concepts of information).

193. Floridi, *Open Problems in the Philosophy of Information*, *supra* note 3, at 560.

Floridi concludes that "[i]nformation is notoriously a polymorphic phenomenon and a polysemantic concept so . . . it can be associated with several explanations."[194]

The concept is part of a fluid, interconnected network of concepts that "emerge from the collective practices through the situated, changing, meaningful use of language of communities of users."[195] Floridi identifies six specific theoretical orientations towards information: (1) the communications theory, a mathematical theory developed by Shannon and Weaver; (2) the probabilistic theory developed by Bar-Hillel and Carnap; (3) the modal theory, which applies moral logic to examine a modal space; (4) the systemic approach, which defines information in terms of states, space, and consistency; (5) the inferential approach which defines information by its dependence on valid inference relevant to the receiver; and (6) the sematic approach, endorsed by Floridi, where information is defined as well-formed and truthful data.[196]

The above family of theories shares its concern with the probability that uncertainty will be reduced by the reception of information. Thus, "information can be understood as a range of possibility (the opposite of uncertainty); as correlation (and thus structure), and . . . as code, as in DNA."[197] While some researchers still seek a unified theory of information (UTI), progress has been slow to come. One of the most promising approaches involves complex systems theory.[198]

Under what Floridi calls the standard General Definition of Information (GDI), semantic content is present only if: (1) there is data (mathematical information); (2) the data is well-formed; and (3) the well-formed data are meaningful.[199] Law in ICT is semantic content under the GDI because it is data (mathematical information) that is well-formed in highly organized data structures and carries meaning that can be extracted by a system of interpreters, which includes computers and human beings.

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194. Luciano Floridi, *Semantic Conceptions of Information*, STAN. ENCYCLOPEDIA OF PHIL. (2015), http://plato.stanford.edu/archives/fall2016/entries/information-semantic/.

195. Crnkovic & Hofkirchner, *supra* note 11, at 330.

196. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 31.

197. Crnkovic & Hofkirchner, *supra* note 11, at 332.

198. *See id.* (the approach looks at information concepts as independent, but it is systemically coupled and seeks to avoid reducing information to some common essence by instead seeking ways to describe information as the term is used in coupled systems).

199. *See* FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 83–84; *see* Pieter Adriaans, *A Critical Analysis of Floridi's Theory of Semantic Information*, 23 KNOWLEDGE TECH. & POL'Y 41, 49 (2010) (one philosopher of information disagreeing that this is a generally accepted definition of semantic information).

ISR suggests that information is the medium through which knowledge is gained and communicated. This commitment requires an additional trait to the three traits of the GDI. The fourth trait is truth. Floridi argues that semantic information must be true.[200] A person turns to an information source to gain knowledge and often for use in guiding actions. For example, YouTube is an information source that many home owners turn to for home repairs. If someone watches a YouTube video on how to replace a toilet valve or how to grow potatoes, they watch with the expectation that the semantic information provided in the video is true and accurate. Similarly, if someone turns to an online source for law or legal knowledge, they expect that the law is accurately reported. In either case, if the provided information is inaccurate there could be undesirable outcomes. Similarly, in the case of legal information, the consequences of inaccurate information could be quite severe. Floridi explores the claim that "well-formed and meaningful data do not yet qualify as semantic information because they need to be truthful as well."[201] This means he explicitly excludes false information from his definition of semantic information.[202] False information is not really information at all; it is pseudo-information.[203]

Since ISR requires truth as an element of information, it is particularly concerned with failures of justification.[204] At least since the early twentieth century, mainstream accounts of epistemology have considered knowledge to be "justified true belief" (JTB).[205] This was once taken to be an unassailable

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200. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 93–97.

201. *Id.* at 82, 93–104.

202. *Id.* at 93–97.

203. *Id.* at 97–104.

204. *Id.* at 209–17.

205. The following is a statement of this common view of knowledge:

> Belief. The person believes that p. This belief might be more or less confident. And it might—but it need not—be manifested in the person's speech, such as by her saying that p or by her saying that she believes that p. All that is needed, strictly speaking, is for her belief to exist (while possessing at least the two further properties that are about to be listed).
> Truth. The person's belief that p needs to be true. If it is incorrect instead, then—no matter what else is good or useful about it—it is not knowledge. It would only be something else, something lesser. Admittedly, even when a belief is mistaken it can feel to the believer as if it is true. But in that circumstance the feeling would be mistaken; and so the belief would not be knowledge, no matter how much it might feel to the believer like knowledge.
> Justification. The person's belief that p needs to be well supported, such as by being based upon some good evidence or reasoning, or perhaps some other kind of rational justification. Otherwise, the belief, even if it is true,

definition,[206] but the American philosopher, Edmund Gettier, challenged the JTB approach in a short essay by pointing out cases where one might have a justified belief that is not true.[207] The Gettier cases are ones where a belief is justified and true, but not considered knowledge because the belief is true by chance.[208] This happens when one draws an inference from data that is justified but not true like where there is correlation in the data without causation. An inference might be true by chance, but not true by causal necessity. This is the case in the old saying that a broken watch is correct twice a day.[209] The watch happens to display the correct time on the occasion of the actual time corresponding to the displayed time. But, there is no causal connection between displayed and actual time. The question of whether this kind of truth by coincidence can be reconciled with JTB is known as the Gettier problem.[210]

Although there have been many attempts to solve the Gettier problem,[211] Floridi believes that it is unsolvable within the structure of the JTB analysis because justification and falsification involve coordinating information and drawing inferences between the resources of truth and justification.[212] Although earlier attempts have sought to rely on logical necessity,[213] a more modest approach is needed. Floridi develops a contexualist analysis showing that assessments of truth and justification require common contexts.[214] Floridi concludes:

> Since GP [Gettier Problem] is demonstrably unsolvable, it follows not only that the tripartite account [JTB] is logically inadequate as

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may as well be a lucky guess. It would be correct without being knowledge. It would only be something else, something lesser.

Stephen Hetherington, *Gettier Problems*, Internet Encyclopedia of Phil., http://www.iep.utm.edu/gettier/#H2 (last visited Jan. 25, 2018).

206. *Id.*

207. *See* Edmund Gettier, *Is Justified, True Belief Knowledge?*, 23 Analysis 121 (1963).

208. *See* Linda Zagzebski, *What is Knowledge*, *in* The Blackwell Guide to Epistemology 92, 92–116 (John Greco & Ernest Sosa eds., 1999) (discussing the Gettier problem).

209. *E.g.*, *Even a Broken Clock is Right Twice a Day*, Urban Dictionary.com, http://www.urbandictionary.com/define.php?term=Even%20a%20broken%20 clock%20is%20right%20twice%20a%20day (last visited Jan. 25, 2018).

210. *See* Zagzebski, *supra* note 208, 92–116.

211. Hetherington, *supra* note 205, at 23 ("The issues involved are complex and subtle. No analysis has received general assent from epistemologists, and the methodological questions remain puzzling. Debate therefore continues.").

212. Floridi, The Philosophy of Information, *supra* note 106, at 209–23.

213. Hetherington, *supra* note 205.

214. Floridi, The Philosophy of Information, *supra* note 106, at 209–23.

it is, but also that it is irretrievably so in principle. GP is not a mere anomaly, requiring the rectification of an otherwise stable and acceptable account of propositional knowledge. It is proof that the core of the approach needs to be abandoned. But what needs to be abandoned?[215]

Floridi goes on to argue that it is necessary to distinguish among "knowing," "believing," and "being informed."[216] He asserts a contextualist theory that focuses on "being informed."[217] This naturalized theory is non-psychological in the sense that he is not relying on any mysterious psychological process. Indeed, Floridi believes that his theory would be capable of describing the knowledge states of artificial knowledge agents.[218] The key concept is his call for a clarification of the logic of being informed, which is an aggregative process of gaining information rather than a culmination or achievement of an isolated subjective mind.[219]

5.   The Dynamics of Information

To summarize the description of PI, Floridi holds that a revolution in human self-understanding is still developing from the far-reaching consequences of information and computer technologies.[220] Although the full significance of this revolution is evolving, Floridi believes that it has already profoundly changed human self-understanding.[221] In particular, against the metaphysical dichotomy of the Cartesian mind-body dualism, the information revolution emphasizes the systemic coupling that occurs between people and their environment.[222] The human being is not an isolated physical mechanism, as with Hobbes' conception of the automata. Human beings are better understood as information agents—informs.[223] Viewed in this way, humans are information agents among information agents, whose complex interactions and emergent behaviors, taken together, make up the information environment. Again, the human being is decentered. Turing started this revolution when he posited the possibility of computers, which were not

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215. *Id.* at 223.

216. *Id.*

217. *Id.* at 243.

218. *Id.*

219. *Id.*

220. *See* discussion *supra* Part II.B.

221. *See* discussion *supra* Part II.C.

222. *See* Floridi, The Ethics of Information, *supra* note 73, at 20–21.

223. *See* Floridi, The Fourth Revolution, *supra* note 15, at 94–96.

human beings.[224] His concept of computation, and his ambitious vision for it, is continuing to revolutionize philosophical anthropology.[225]

A significant implication of these claims is that human beings are becoming aware that information interacts in complex systems. Systems interact with each other within networks, typically without direct human intervention, and in ways that increasingly involve intelligent agents, whose workings are not fully open to human understanding. They create a new artificial environment in which human activities, including law, take place. This is what Floridi means by the neologism "infosphere."[226]

B.   The Methodology of Philosophy of Information

1.   Levels of Abstraction and Formal Methods of Verification

PI adopts the method of LoA from a branch of computer science known as Formal Methods of Verification; a study of formal, mathematical techniques used by computer scientists use to prove that concrete code will fit the specifications of a computer.[227] Formal Methods of Verification are used to mathematically model the logic of the hardware circuits to predict whether a software program will function properly.[228] They are not programing languages as they do not produce executable code. Formal Methods of Verification convert computer behavior into the language of contemporary mathematics. There are many types of methods for formal analysis. Floridi has been influenced by two types that do not seek to identify every possible variable: *Z* and *VDM*.[229]

LoA calls attention to the shared contextual levels that exist between systems of philosophical propositions.[230] Traditional distinctions among philosophical topics are examples of what Floridi calls "levelisms."[231] For exam-

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224. *See* Gleick, *supra* note 80, at 210–11 (discussing the Turing machine).

225. *See id.* at 12.

226. *See* Floridi, Routledge Handbook, *supra* note 11, at 1–3.

227. Floridi, The Philosophy of Information, *supra* note 106, at 52.

228. *See, e.g.*, Yuji Kukimoto, *Introduction to Formal Verification*, Donald O. Pederson Ctr. for Elec. Sys. Design (Feb. 6, 1996), https://embedded .eecs.berkeley.edu/research/vis/doc/VisUser/vis_user/node4.html.

229. *See id.* (introducing formal methods).

230. Level of abstraction [LoA] is defined as follows:

   [A] finite but not-empty set of observables. No order is assigned to the observables, which are expected to be the building blocks in a theory characterized by their very definition. As LoA is called *discrete* (respectively *analogue*) if and only if all its observables are discrete (respectively analogue); otherwise it is called *hybrid*.

   Floridi, The Philosophy of Information, *supra* note 106, at 52.

231. *Id.* at 47.

ple, epistemology is concerned with levels of observation or interpretation; ontology is concerned with levels of organization; and methodology is concerned with levels of reducibility among theories.[232] These levelisms are combined into an amalgamation in systematic philosophies.[233] The development of ICT has contributed a new concept, "simulation," particularly relevant in the field of artificial intelligence.[234] This concept concerns systems functioning correctly in the LoA, which the systems are intended to address.[235]

Floridi likens LoA to computer/user interfaces, where the interface exists between the system of the computer and the system of the person.[236] They meet successfully only where there are shared frames of reference for the two systems.[237] These shared frames can be presuppositions about the data exchanged between the systems. For example, to use a graphic user interface (GUI), the user must know what the icons mean. The icons are chosen because their meaning is obvious to the user.[238] The functionality of the GUI depends upon a shared set of assumptions about the conventions of the interface—a click will cause a file to open, the desktop is a workspace, etc. When the shared assumptions breakdown, the GUI is confusing to the user. LoA focuses on the conditions for functional outcomes in such systemic interactions.

A LoA is defined as "a finite but non-empty set of observables."[239] An observable is a variable with a specified type, and types of variable with values that can be assigned to the variable.[240] An example that Floridi discusses at length is Gassendi's *Fifth Set of Objections to Descartes's Meditations*.[241] For example, imagine wine experts discussing wine. The observables of concern to a wine connoisseur will include factors like: grape species, color, aroma, taste, body, etc. The factors are analogue variables with standard types. Connoisseurs have common terms for assessing shades of color and subtle differences in aroma, taste, and body. Wine merchants, however, have substantially different concerns in their set of observables like variables such as price, availability, and future value. Each of these sets of observable values define a level of abstraction.

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232. *Id.*

233. *Id.*

234. *Id.*

235. *Id.* at 47–48.

236. Floridi, The Philosophy of Information, *supra* note 106, at 52.

237. *Id.*

238. *Id.*

239. *Id.*

240. *Id.* at 48.

241. *Id.* at 50 (citing Pierre Gassendi, *Fifth Set of Objections to Descartes's Meditations*, *in* Disquisitio Metaphysica (Bernard Rochot ed., 1644)).

The second step in determining the LoA is modeling the relationship among the observables.[242] Called the behavior of the LoA, the models consist of a predicate whose free variables are observables of the LoA.[243] Wine connoisseurs might, for example, state that a wine made from an Italian Piedmont grape, like a sangiovese, characteristically has a particular deep red-purple color and a particular pallet, which is bold, full bodied, and full of raspberries and pepper. Linking these observables together is termed a "behavior" of the LoA for wine connoisseurs. In the GUI example, a behavior might be a user stating that placing files in the trash can icon allows for its deletion. The formal statement of a system behavior is "a predicate whose free variables are observables at that LoA."[244]

When two or more LoA are compared, a more complex set of relationships may be involved. The PI method involves stating these relationships in terms of sets using Z set theory.[245] Floridi looks to Z set theory, invented by Ernst Zermelo, to describe these relationships because Z applies a number of axioms that describe the relationships among sets and elements of sets.[246] LoAs are sets of observables of specific types, so the axioms of Z are immediately applicable to the definition of LoA.[247] Zermelo intended to account for iterative sets, which are sets of sets.[248] A particularly useful application of Zermelo's axioms involves comparing iterative sets. For example, the set of observables that are elements of the wine connoisseur's practice are themselves sets.[249] A set of observables exists for color, taste, terroir, etc. The wine merchant might have these terms and also price, shipping terms, ports,

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242. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 53.

243. *Id.*

244. *Id.*

245. For a parallel to the three-prong Abstraction-Filtration-Comparison test developed, see Comput. Assocs. Int'l, Inc. v. Altai Inc., 982 F.2d 693, 706 (2d Cir. 1992) (applying when a software copyright holder claims that another program infringes on its exclusive rights by being substantially similar to the copyright holder's work). The Second Circuit asked district courts to review such as cases by "analytically dissecting" the software to determine whether the challenged work is substantially similar to the copyrighted work. *Id.* at 707. In the course of doing this dissection, the court will look to levels of abstraction. Although the procedure is similar, the court does not mean to refer to the formal methods of definition of LoA that Floridi discusses.

246. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 52.

247. *Id.*

248. *See* Michael Hallett, *Zermelo's Axiomatization of Set Theory*, STAN. ENCYCLOPEDIA OF PHIL. (2016), https://plato.stanford.edu/archives/win2016/entries/zermelo-set-theory (discussing Zermelo's axioms); *see also* J. M. SPIVEY, UNDERSTANDING Z: A SPECIFICATION LANGUAGE AND ITS FORMAL SEMANTICS (1988) (introducing the Z Formal Specification Language).

249. *See, e.g.*, FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 50.

availability dates, etc. Two LoAs composed of two sets of distinct hybrid observables may overlap (jointed) or may be wholly contained in another (nested).[250] A novice wine enthusiast, for example, will have very basic terms for describing taste as sweet, tangy, tart, etc. These terms are the observables of the LoA for the novice. But, the connoisseur can make many fine distinctions like "earthy with notes of tobacco and sage." The connoisseur still uses the novice terms, if only to refer to the finer distinctions. The novice's LoA is said to be nested in the connoisseur's LoA and is lower in the hierarchy of abstraction because it has fewer details and cannot accommodate finer distinctions. This concept of hierarchy among LoAs describes a gradient of abstraction (GoA).[251] Two important forms of GoA include the disjointed GoA, where the LoAs contain no common observables, and the nested GoA, where the observables of one LoA are contained within another LoA.[252] GoAs can be subtle, complex, and branching.

2. Application of Levels of Abstraction as Methodology

The analysis of LoA can be useful for philosophers. To illustrate his point, Floridi applies the LoA analysis to Kant's discussion of the antinomies in *The Critique of Pure Reason*.[253] Kant identified four pairs of claims that he used in a defense of his transcendental idealism.[254] He sought to show that if each of these pairs was taken to rely on a distinction among *noumena* (things in themselves) rather than *phenomena* (perceptions), the claims lead to absurdity.[255] The four antinomies are:

> *First Antinomy of Time and Space*
> *Thesis*: The world is finite; it has a beginning in time and space.
> *Antithesis*: The world is infinite; it has no beginning in time or space.
>
> *Second Antinomy of Atomism*
> *Thesis*: Every composite substance in the world is made up of simple parts, and nothing anywhere exists save the simple or what is composed of the simple.
> *Antithesis*: No composite thing in the world is made up of simple parts, and there nowhere exists in the world anything simple

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250. Let LoA(c) equal the wine concessioner's set of observables, and let LoA(m) equal the merchant's set of observables. It is quite clear that there is also a third set: LoA(c) U LoA(m).

251. Floridi, The Philosophy of Information, *supra* note 106, at 54.

252. *Id.* at 56.

253. *Id.* at 58–60.

254. Immanuel Kant, The Critique of Pure Reason 243–62 (J.M.D. Meiklejohn trans., 1990) (developing the four Antinomies in the Second Division of the Transcendental Dialectic); *see also* Henry E. Allison, Kant's Transcendental Idealism 35–61 (1983) (discussing Kant's Antinomies).

255. Kant, The Critique of Pure Reason, *supra* note 254, at 156–67.

Third Antinomy of Spontaneity and Causal Determinism
Thesis: Causality in accordance with laws of nature is not the only causality from which the appearances of the world can, one and all, be derived. To explain these appearances it is necessary to assume that there is also another causality, that of Spontaneity.
Antithesis: There is no Spontaneity; everything in the world takes place solely in accordance with laws of nature.

The Fourth Antinomy of Necessary Being or Not
Thesis: There belongs to the world, either as its part or as its cause, a being that is absolutely necessary.
Antithesis: An absolutely necessary being nowhere exists in the world, nor does it exist outside the world as its cause.[256]

To illustrate the LoA method, consider the first antinomy, wherein Kant attempts to argue that both thesis and antithesis lead to absurdity.[257] His argument is not for one side or the other but against the questions themselves.[258] He believes that each of the questions in the pairs of the antinomies are unconstrained in the sense that they seek unconditional answers to fundamental problems.[259] Floridi reads Kant as being concerned with levels of abstraction.[260] He explains:

> [T]he attempt to strive for something unconditional is equivalent to the natural, yet profoundly mistaken, endeavor to analyze a system (the world itself for Kant, but it could also be a more limited domain) independently of any (specification of) the level of abstraction at which the analysis is being conducted, the questions are being posed and the answers are being offered, for a specified purpose. In other words, trying to overstep the limits set by the LoA leads to a conceptual jumble.[261]

Kant treats his antinomies as two pairs: the first and second antinomy confuse space/time and continuity/discontinuity "as features of the system, rather than as constituted by the LoA."[262] Similarly, the remaining two antinomies, of freedom and of the necessity of a Creator, could be equally true or false.

256. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 58–59.

257. KANT, THE CRITIQUE OF PURE REASON, *supra* note 254, at 240 (discussing the skeptical method); *see also* ALLISON, *supra* note 258, at 35–39 (analyzing Kant's skeptical method).

258. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 59.

259. *See* KANT, THE CRITIQUE OF PURE REASON, *supra* note 254, at 240; *see also* ALLISON, *supra* note 258, at 35–39.

260. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 59.

261. *Id.*

262. *Id.*

Floridi argues that the questions confuse features of the question with features of the system being questioned.[263] One begins with an apprehension, considered a pre-linguistic intuition of an absolute, such as the divine or freedom.[264] From this apprehension, the question is put to the system of predicates that are used to describe the state of affairs: Does the divine exist and is there freedom? But, the question might contain something of the apprehension while the system of linguistic propositions does not. It is a reduction from actual experiences and, therefore, lacks the detailed nuances of actual lived phenomena. This is the confusion that Kant and Floridi agree is commonplace and leads to the sort of naïve realism that animated the medieval scholastic philosophies.[265]

This analysis of Kant's antinomies hold three lessons of the LoA method: (1) it is Kantian in nature since it considers the grounds for the possibility of the analysis of a particular system; (2) it is anti-metaphysical in the classical sense because it views classical metaphysics as a naïve realism based on the conflation of traits in questions to traits in the system to which the question is put; and (3) it is a powerful tool for philosophers.[266]

C.   The Ethics of the Philosophy of Information

1.   A New Beginning for Ethics

This section argues that information ethics (IE) proceeds from this new philosophical anthropology to develop an ethical theory that blends aspects of both of the two principle alternatives in Western philosophy virtue ethics: Aristotle's *Nichomachean Ethics* and Kantian deontological ethics.[267] These two theoretical orientations (virtue and deontology) have been viewed as principle alternatives in Western philosophy ethics because moral theorists "must choose between the basic commitments of the two theories."[268] IE's foundational claim is the belief that the information revolution decentered

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263. *Id.*

264. *Id.*

265. *See* ALLISON, *supra* note 254, at 3–4 ("[A]ccording to the standard picture, Kant's transcendental idealism is a metaphysical theory that affirms the unknowability of the "real" (things in themselves) and relegates knowledge to a purely subjective realm of representations (appearances)."); *see also* FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 60 (noting that PI is "antimetaphysical, again in the Kantian sense.").

266. FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 60.

267. The author is indebted to Franklin I. Gamwell for this analysis of moral theories. Gamwell is particularly useful for this analysis because he is a process theorist who is indebted to Whitehead. He argues for an "appropriation and integration" between Aristotelian ethics and Kantian ethics that bears some similarity to Floridi's IE. *See* FRANKLIN I. GAMWELL, THE DIVINE GOOD: MODERN MORAL THEORY AND THE NECESSITY OF GOD 19–60 (1990).

268. *Id.* at 19.

human beings from the privileged place that they once had in philosophy.[269] Thus, ethical theories must describe moral norms in terms of the construction of a flourishing information environment and must view human beings as inforgs living among other inforgs in that environment. In IE, moral rights and moral duties result from the dynamics of information flow in the context of an evolving information environment.[270] IE is a sophisticated and nuanced, though admittedly provisional, early formulation in a complex and evolving field that suggests that moral theories today cannot be either virtue theories or Kantian theories, but must integrate the concerns and interests of each alternative.

2.   Information Ethics' Relationship to Virtue Ethics

Floridi notes that the field of virtue ethics has gained interest in recent years in some areas, particularly in the area of cyberspace ethics.[271] But, he does not believe that IE can be a form of virtue ethics.[272] Nonetheless, it retains a "constructionist" theme, which, as described below, is similar to the traditional virtue axiological theory of the moral good.

To understand this claim it is useful to reconstruct virtue ethics to identify the thematic elements of the Aristotelian exemplar that can be maintained, as well as those aspects that must be disregarded. Consideration begins with the modern recovery of virtue ethics, which is sometimes attributed to Elizabeth Anscombe.[273] In the influential essay, *Modern Moral Philosophy*, Anscombe argues that modern ethical theories are "legislative," meaning they have only a minimal conception of the moral good.[274] As she describes it, virtue ethics follow a pattern exemplified by Aristotle.[275] Anscombe contrasts modern ethics with virtue ethics by observing that in the modern form, looking to Hume as the exemplar and distinguishing between factual and moral propositions, the brute facts of what "is" are difficult to

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269. FLORIDI, THE ETHICS OF INFORMATION, *supra* note 73, at 15 (regarding the informational context of contemporary ethics); *see also* FLORIDI, INFORMATION: A VERY SHORT INTRODUCTION, *supra* note 17, at 8–9 (regarding the historical displacement of human beings in philosophy).

270. FLORIDI, THE ETHICS OF INFORMATION, *supra* note 73, at 15.

271. *See id.* at 161–67, for Floridi's discussion of virtue ethics; *see, e.g.*, Lawrence B. Solum, *Virtue Jurisprudence, A Virtue-Centered Model for Judging*, 4 METAPHILOSOPHY 177, 180 (2003) (regarding the continued interest in virtue ethics in jurisprudence).

272. FLORIDI, THE ETHICS OF INFORMATION, *supra* note 73, at 166–68.

273. *See generally* G. E. M. Anscombe, *Modern Moral Philosophy*, *in* VIRTUE ETHICS 26–44 (Roger Crisp & Michael Slote eds., 1998).

274. *Id.* at 29–30.

275. *Id.*

relate to what "ought" to be.[276] That is to say, modern moral philosophy lacks the means to connect brute facts to moral meaning. She writes:

> In present-day philosophy, an explanation is required how an un-
> just man is a bad man, or an unjust action is a bad one; to give
> such an explanation belongs to ethics; but it cannot even be begun
> until we are equipped with a sound philosophy of psychology. For
> the proof that an unjust man is a bad man would require a positive
> account of justice as a "virtue." This part of the subject matter of
> ethics is, however, completely closed to us until we have an ac-
> count of what type of characteristic a virtue is—a problem, not of
> ethics, but of conceptual analysis—and how it relates to the ac-
> tions in which it is instanced: a matter which I think Aristotle did
> not succeed in really making clear. For this we certainly need an
> account at least of what a human action is at all, and how its
> description as "doing such-and-such" is affected by its motive and
> by the intentions in it; and for this an account of such concepts is
> required.[277]

Her point is that in order for prescriptive terms like "should" or "ought" to have express *moral* meaning, some account of moral psychology is needed.[278] And, whereas Aristotle had some resources for considering these issues, the Christianization of the term "moral" thematized a legislative obli-
gation associated with the divine.[279]

The resources in Aristotle for approaching this question are related to his claim that "the intellect itself . . . moves nothing, but only the intellect that aims at an end is practical."[280] Aristotle's point here is that moral action cannot be identified independently of the desire that motivates it. This does

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276. *Id.*

277. *Id.*

278. *Id.*

279. Anscombe writes:

> So, Hume discovered that situation in which the notion "obligation" sur-
> vived, and the word "ought" was invested with that peculiar force having
> which it is said to be used in a "moral" sense, but in which the belief in
> divine law had long since been abandoned . . . . The situation, if I am right,
> was the interesting one of the survival of a concept outside of the frame-
> work of thought that made it a really intelligible one.

Anscombe, *supra* note 273, at 31.

280. Gamwell, *supra* note 267, at 20 (quoting Complete Works of Aristotle, Vol. 2, at 1798 (Johnathan Barnes ed., 1995)).

not deny the importance of reason for Aristotle, who argues that moral action must also be in accord with a rational rule or principle.[281]

Some take this general description of moral life to mean that Aristotelian ethics is teleological.[282] The argument is neatly summarized by Franklin I. Gamwell:

> "[D]esire" may be formulated generally and without fundamental injustice to Aristotle in the following way: Desire is a living being's positive relation to some future possibility, the appetition for or attachment to some future state of affairs or characteristic of existence, and can "move" an agent because this attachment affirms that the possibility should be realized. To say that the intellect itself moves nothing means that reason, in distinction from desire, is devoid of particular reference to past or future; reason involves an agent's relation to forms or universals independently or abstracted from their exemplification in any temporally particular state of affairs. It is also to say that human action as such is identified by its telos. For desire implies a telos, that is, some state of affairs or existential characteristic to be pursued, and, conversely, a telos of human activity implies desire, that is, some positive relation to the future.[283]

If Gamwell is correct in his reading of Aristotle, then the teleological character of his moral philosophy is an essential aspect of distinguishing between moral and non-moral.[284] For Aristotle, ethics seeks to "be the good and the chief good"[285] of human life, known through "first principles,"[286] which he achieves through his conception of dialectic. The method has to do with the opinions of those who are considered to be moral.[287] Aristotle concludes that virtue consists in maximally expressing the distinctly human life, which "has

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281. COMPLETE WORKS OF ARISTOTLE, VOL. 2, *supra* note 280, at 1748 ("Excellence, then, is a state concerned with choice, lying in a mean relative to us, this being determined by reason and in the way in which a man of practical reason would determine it.").

282. *See generally* GAMWELL, *supra* note 267, at 19–60 (discussing teleology in Aristotelian ethics).

283. *Id.* at 21.

284. *Id.* (for Aristotle's virtue ethics, therefore, the moral life is defined by desire) ("[A] telos of human activity implies desire, that is, some positive relation to the future.").

285. COMPLETE WORKS OF ARISTOTLE, VOL. 2, *supra* note 280, at 1729.

286. Aristotle's philosophical method requires finding first principles. *See* TERRANCE IRWIN, ARISTOTLE'S FIRST PRINCIPLES 3–4 (1988) (discussing Aristotle's philosophical method).

287. COMPLETE WORKS OF ARISTOTLE, VOL. 2, *supra* note 280, at 1731.

a rational principle."[288] Thus, moral virtue for Aristotle means having the "state of character concerned with choice"[289] guided by a rational desire.[290]

Gamwell notes that there is a problem of circular logic in Aristotle's argument since Aristotle defines virtue as "a state of character concerned with choice, lying in a mean, i.e., the mean relative to us, this being determined by a rational principle."[291] But, Gamwell notes that the complete definition is as follows: "and by that principle by which the person of practical wisdom would determine it."[292] Gamwell suggests that "[v]irtuous activity is identified through appeal to the activity of virtuous people."[293] He concludes, "[i]n anticipation of the contrast with Kant, we may also express Aristotle's appeal to virtuous people and activities by saying that the ground or principle of good action is not a priori."[294] Aristotle thus denies that the grounds of moral reasoning has the legislative imperative, which Kant finds in *a priori* reasoning and Anscombe likens to divine command.[295] In the conclusion of her essay, Anscombe notes the Aristotelian approach that "it can be seen that philosophically, there is a huge gap, at present unfillable as far as we are concerned . . ." between the Aristotelian conception of virtue and the modern conception described by Anscombe.[296] Modern philosophy rejects Aristotle's appeal to opinion as logically flawed and his appeal to divine command as illiberal.[297] Nonetheless, the gap "needs to be filled by an account of human nature, human action, the type of characteristic a virtue is, and above all of human 'flourishing.' "[298] Anscombe notes that the concept of human flourishing "appears the most doubtful."[299]

IE takes its first principles from the account of epistemology described above. IE is similar in some respects to the description of Aristotelian ethics as it views ethics as being concerned with achieving the moral good as a telos, although Aristotle's conception of the telos is not rooted in a description of human desire. Floridi argues, however, that IE is not a form of virtue

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288. *Id.* at 1735.

289. *Id.* at 1748.

290. *Id.*

291. Gamwell, *supra* note 267, at 26.

292. *Id.*

293. *Id.*

294. *Id.* at 27.

295. Anscombe, *supra* note 273, at 43.

296. *Id.* at 43.

297. *Id.*

298. *Id.* at 43–44.

299. *Id.* at 44.

ethics because virtue ethics is "*egopoetic*," meaning that it is concerned with human self-creation.[300] Floridi explains:

> [A]ll brands of virtue ethics share the same agent-oriented kernel. This is not say that they are all subjectivist but rather, more precisely, that they are all concerned with the proper *construction* of the moral subject, be that a self-imposed task or an educational goal of a second party, like parents, teachers, or society in general. To adopt another technical expression, virtue ethics is intrinsically "*egopoetic*."[301]

Floridi also refers to the construction of the moral self and to the theme of the moral life as involving a "making" (*poesis*) of the self, referred to as "constructivism."[302] Floridi believes that IE cannot be a form of virtue ethics because, by being *egopoetic*, it retains the outdated anthropocentric orientation that has been displaced by the information revolution.[303]

He argues IE is not "*egopoetic*" because human beings have been displaced from the privileged place granted in traditional ethics.[304] Floridi clarifies this claim:

> Because virtue ethics remains limited by its subject-oriented approach and the specific philosophical anthropology it presupposes, it cannot provide, by itself, a satisfactory ethics for a globalized world in general and for the information society in particular. If misapplied, it fosters ethical individualism, as the agent is more likely to mind only her own self-construction.[305]

Thus, virtue ethics is no longer valid if it is understood as achieving a particular conception of *human* flourishing.

IE seeks, instead, a conception of the moral virtue described in terms of the entire infosphere.[306] The theme of construction (*poesis*) need not be abandoned but only modified. Floridi explains, "the limits of virtue ethics should not lead to an overall rejection of any *constructionist* approach."[307] The construction of the self, while not irrelevant, is only an instance of the construction of the infosphere. In this respect, IE, at least initially, appears to endorse

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300. FLORIDI, THE ETHICS OF INFORMATION, *supra* note 73, at 164.

301. *Id.*

302. *Id.* at 164–66.

303. *Id.* at 168.

304. *Id.*

305. *Id.* at 167.

306. FLORIDI, THE ETHICS OF INFORMATION, *supra* note 73, at 18 ("The task is to formulate an ethical framework that can treat the infosphere as an environment worth moral attention and care for the human inforgs who inhabit it.").

307. *Id.* at 167.

an *a posteriori* method that would appear to be at odds with the radical *a priori* claims of Kantian ethics. The following examination of IE's relationship to Kant aids in understanding this claim.

3. Information Ethics' Kantianism

Having distinguished IE from virtue ethics, Floridi describes IE as a modified Kantian ethics.[308] This is a complex and nuanced claim, however, since IE also rejects much of what is distinct to Kant.[309] To understand Floridi's claim, it is useful to begin with a brief review of Kant's moral philosophy.

The foundational claim is Kant's assertion that rationality is the essentially human trait, which he equates with the moral law. Kant makes this claim directly in the opening sentence of the *Groundwork of the Metaphysics of Morals*, writing, "[i]t is impossible to conceive of anything in the world, or even out of it, which can be called good without qualification, except a *good will*."[310] For Kant, "a moral obligation is one that an agent cannot reasonably choose not to have."[311] The moral law cannot rest on an *a posteriori* condition that a moral agent can reasonably deny. Kant rejects Aristotle and virtue ethics because such an *a posteriori* condition would result in only a hypothetical imperative.[312] But, the moral law is a categorical imperative, unconditional and without qualification. Kant makes this point in a number of places, but notably in the *Second Critique* he explains: "For reason to be legislative, it is required that reason need presuppose only itself because the rule is objectively and universally valid only when it holds without any contingent subjective conditions which differentiate one rational being from another."[313]

Another dimension to this claim, particularly important to Kant, is that the moral law is radically nonteleological.[314] By claiming that "*nothing* can be called good without qualification *except a good will*," Kant denies that a moral good can be identified by a telos that human beings ought to pursue.[315] He makes this claim more explicitly: "The purpose which we may have in

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308. *Id.* at 110 n.7.

309. *Id.* at 123.

310. Immanuel Kant, Groundwork of the Metaphysics of Morals 61 (H. J. Paton trans., 3d ed. 1956).

311. Gamwell, *supra* note 267, at 31.

312. *Id.* (explaining that Aristotle defines the good in terms of a desired state, which may or may not be obtainable).

313. *Id.* at 32 (quoting Immanuel Kant, The Critique of Practical Reason 19 (Lewis White Beck trans., 1956)).

314. Floridi, The Ethics of Information, *supra* note 73 (discussing the anti-metaphysical claims of Kant).

315. Gamwell, *supra* note 267, at 38–46 (discussing the non-teleological character of Kant's ethics).

view of our actions, or their effects regarded as ends or springs of the will, cannot give to actions any unconditional moral worth."[316] This means the moral law must be identified "without regard for any object of desire."[317] The moral law is a dictate of the *a priori* principles that Kant calls pure reason.[318]

The nonteleological character of Kantian ethics is an extension into the *Second Critique* of the critique of classical metaphysics in the *First Critique*, where Kant denied the possibility of knowing "things-in-themselves."[319] He disregarded the naïve belief that perception reveals the metaphysical essences of beings, which includes their teleology, as being a transcendental illusion. The moral law is a constitutive choice that is always good, and, therefore, the freedom to choose the moral law is constitutive of the good. The moral law demands that every moral agent respect the will of every rational agent. The most famous formulation of the categorical imperative exemplifies this conclusion: "[A]ct so as to treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as means only."[320]

Floridi begins his analysis of Kant by examining the following passage from the *Groundwork of the Metaphysics of Morals*: "In the kingdom of ends, everything has either a price or a dignity. What has a price can be replaced by something else as its equivalent; what on the other hand is raised above all price and therefore admits of no equivalent has a dignity."[321] Floridi argues against Kant, claiming that the categorical dichotomy between absolute moral value and instrumental value is too sharply drawn. He states two objections: first, "that different entities may have different degrees of relative value . . . ."; and second, "that life, biological organisms, or the absence of pain in sentient beings can all have a great deal of moral value and deserve a corresponding amount of respect."[322] He concludes that "Kant seems to unduly restrict the sense of 'relative value' to meaning only contingent worth depending on the agent's interest."[323]

Floridi assigns this error to Kant because they disagree somewhat about epistemological commitments. Floridi accepts Kant's denial of the possibility of the knowledge of things in themselves, but leaves open the possibility that informational relation is constitutive of knowledge.[324] Thus, where Kant denies that the moral law can be known *a posteriori*, Floridi argues for a mini-

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316. Kant, Metaphysics of Morals, *supra* note 310, at 38.

317. *Id.* at 40.

318. *Id.* at 5; *see also* Gamwell, *supra* note 267, at 32.

319. Kant, Metaphysics of Morals, *supra* note 310, at 59.

320. *Id.* at 45.

321. Floridi, The Ethics of Information, *supra* note 73, at 114 (quoting Kant, Groundwork of the Metaphysics of Morals, *supra* note 310, at 46).

322. *Id.* at 115.

323. *Id.*

324. *Id.* at 123.

malist axiology that derives moral meaning from information and views moral knowledge as informational.[325] He explains:

> What, then, is the most general possible common set of attributes that characterize an entity as intrinsically valuable and an object of respect, without which an entity would rightly be considered intrinsically worthless (not just instrumentally useless or emotionally insignificant) or even positively unworthy and therefore rightly to be disrespected in itself? The least biased and most fundamental solution is to identify the minimal condition of the possibility of an entity's least intrinsic worth with its nature as an information entity by adopting an information ontology.[326]

For Floridi, an entity has moral worth because it is informational: "[B]eing an *qua* informational entity is the minimal condition of possibly of having moral worth. . . ."[327]

Floridi also modifies Kant's conception of the "good will."[328] As referenced above, Kant requires reason to be *a priori*, which means that it presupposes nothing other than itself.[329] Floridi, however, describes the good will as acting in accordance with reason and an attitude of moral concern for others: "Our Good Will is expected to exhibit a willingness to engage with the world for its own sake and an attentiveness to (that is, interest in, concern with, and compassion for,) its well-being."[330] It appears, then, that Floridi rejects Kant's nonteleological commitment and offers in its place a desire and concern for the Other conceived in terms of an informational entity. Thus, the person of good will is for the well-being of other informational entities and desires to care for the entire informational environment.

This slight modification of Kant's conception of the good will allows Floridi to reconcile the Aristotelian and Kantian positions. IE is a "constructionist" ethics that has a weak teleological commitment. It is a naturalist axiology in the sense that the conception of the good is derived through a naturalist epistemology. And, the role of desire in the moral life is adjudicated in favor of Aristotle's idea that "reason alone moves nothing." Desire in the form of a caring attitude is an essential commitment of the person of good will.

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325. *Id.*

326. *Id.*

327. Floridi, The Ethics of Information, *supra* note 73, at 123.

328. Kant, Metaphysics of Morals, *supra* note 310, at 61 ("It is impossible to conceive of anything at all in the world, or even out of it, which can be taken as good without qualification, except a good will.").

329. *Id.* at 62 ("A good will is not good because of what it effects or accomplishes—because of some fitness for attaining some end: it is good through its willing alone—that is, good in itself.").

330. *Id.*

IV.   THE PHILOSOPHY OF LEGAL INFORMATION

A.   The Descriptive Claims of the Philosophy of Legal Information

The foregoing analysis in the previous two sections, Part II and Part III, suggested that PLI seeks an information-theoretic general description of law. "Information-theoretic" means that it seeks to understand the informational *relata* that the law embodies, as well as the inputs and outputs of legal reasoning and legal action. A general description of law is one that is applicable to any legal system. It uses the LoA analysis as a method of investigating these relationships by paying close attention to the sets of observables that are engaged in legal argument and legal institutions. The following are some tentative general claims that a PLI might assert.

1.   The Changed Context for Legal Theory

ICT has brought rapid change to the law in the last two decades. In 2000, Lawrence Lessig published his book, *Code and Other Laws of Cyberspace*, which calls attention to the way digital information was shaping the law.[331] Lessig argued that information technologies are competing with law, markets, and social norms to regulate of human behavior.[332] He focused his attention on copyright law, which first felt the impacts of the ICT.[333] What followed has been described as a tidal wave of information. Researchers at Berkeley's School of Information Management estimated in 2003 that humanity accumulated about 12 exabytes of data in the entire course of human history up to that point.[334] According to a more recent study, the amount of data increased by five-fold to 988 exabytes in less than a decade.[335] Today, the measure of total data exceeds 10 zetabytes, 1,000 exabytes, and continues to grow exponentially.[336] Processing power has had a similar exponential growth realizing a million-fold increase over the past forty years.[337] Unsur-

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331. Lawrence Lessig, Code and Other Laws of Cyberspace (2000).

332. *See id.* at 23–28 (arguing that "regulability," "regulation by code," "latient ambiguity," and "competing sovereigns" define the evolution of thinking about the relation between government and the Internet).

333. *Id.* at 171 ("Of all the different types of property, this type is said to be the most vulnerable to the changes that cyberspace will bring.").

334. Peter Lyman & Hal R. Varian, *How Much Information?* Berkley Univ. (2003), http://groups.ischool.berkeley.edu/archive/how-much-info-2003/; *see also* Press Release, Kathleen Maclay, Amount of New Information Doubled in Last Three Years, UC Berkeley Study Finds, UC Berkeley News (Oct. 28, 2003), http://www.berkeley.edu/news/media/releases/2003/10/28_information.shtml.

335. Lyman & Varian, *supra* note 334; *see also* Maclay, *supra* note 334.

336. Lyman & Varian, *supra* note 334; *see also* Maclay, *supra* note 334.

337. Lyman & Varian, *supra* note 334; *see also* Maclay, *supra* note 334.

prisingly, many observers see this transformation as a revolutionary change in the structure of society and self-understanding.[338]

Law is becoming digital information, but jurisprudence was, and still is, predominately unaffected by the transformation. Legal philosophers have given little consideration to the processes of turning the semantic expression of law into the binary expression of the information. Nonetheless, there is much for legal philosophers to consider. For example, a common application of ICT in law is the use of artificial intelligence in legal search engines.[339] This is accomplished through a multitude of techniques. But, two are worth considering here: constructing legal ontologies and the use of artificial intelligence. First, an important technique involves constructing legal ontologies. Here, the word "ontology" refers to its usage in library science.[340] An ontology is a deliberate attempt to structure information in a way that promotes effective searches.[341] This is accomplished manually, but using artificial intelligence also has a potential to automate the process.

Artificial intelligence is also being used in legal analyses. Notably, AI is used in advanced methods for predictive analytics.[342] A growing number of use-cases exist that demonstrate the power of ICT to reliably and accurately provide fine-grained quantitatively measured predictions about the outcomes of legal actions.[343] Machine learning holds significant promise for furthering such analyses. The impact these information structures are having on the nature and practice of law is difficult to determine at present. PLI could help bring clarity and guide responsible development. Similarly, Blockchain and related technologies are attempting to formalize many legal-related processes.[344] These run from smart contracts, which are self-executing contractual exchanges, to proposals to develop a common code for all law-re-

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338. Lyman & Varian, *supra* note 334; *see also* Maclay, *supra* note 334.

339. Many claim to use advanced Artificial Intelligence in their legal research tools. *See, e.g.*, CASE TEXT, https://casetext.com/ (last visited Jan. 26, 2018); RAVEL LAW, http://ravellaw.com/ (last visited Jan. 26, 2018); ROSS INTELLIGENCE, http://www.rossintelligence.com/ (last visited Jan. 26, 2018).

340. *See generally* APPROACHES TO LEGAL ONTOLOGIES: THEORIES, DOMAINS, AND METHODS (Giovanni Sartor et al. eds., 2013) (discussing an overview of legal ontology research).

341. *Ontology*, OXFORD ENGLISH DICTIONARY (7th ed. 2012), https://en.oxforddictionaries.com/definition/ontology ("A set of concepts and categories in a subject area or domain that shows their properties and the relations between them.").

342. RICHARD SUSSKIND, TOMORROW'S LAWYERS 53–54 (2d ed. 2017).

343. *See* CASE TEXT, *supra* note 339; LEX MACHINA, https://lexmachina.com/ (last visited Jan. 26, 2018); RAVEL LAW, *supra* note 339; ROSS INTELLIGENCE, *supra* note 339 (describing example general use cases).

344. *See, e.g.*, Bernard Marr, *Practical Examples of How Blockchain will be Used in Legal Firms*, FORBES (Aug. 15, 2017), https://www.forbes.com/sites/bernard

lated text. Again, the precise impact these developments might have on the nature of law and its function in a democratic polity bears scrutiny, and it seems quite likely that PLI can be useful in these analyses.

While little thought has been given to the nature of law as digital information, Lessig's work suggests substantial questions to be explored.[345] For example, seemingly essential questions for building the legal "ontology" include the following: What are the dynamics by which a series of bits express and create legal knowledge? What is the potential for, and what are the limits of, computational methodologies to perform legal reasoning? And, how might the digital representation of law help to investigate traditional questions in legal philosophy? For example, does the ability to data mine enormous amounts of legal text constitute a new direction for legal realism? Does it pose new research agendas that merge complexity, social network theory, and legal process theory? And, what are the moral and political consequences of these new informational relations? These are philosophical questions that require an informational analysis to be answered.

2.   Law is Relational

The information revolution has created a new horizon for legal philosophy. For nearly a century, the dominant methodology of Anglophone jurisprudence has been conceptual analysis, with a few notable exceptions.[346] For example, Brian Leiter has argued for a naturalized jurisprudence that draws from Willard Quine's epistemological naturalism.[347] This seems to be a necessary step for understanding the informational nature of law. Nonetheless, while Quine argued for a turn toward the exact sciences, he did not endorse an informational foundationalism.[348] His work furthers the anti-foundationalism of Otto Neurath, who specifically rejected foundationalism.[349] For Neurath, naturalism is the turn to the natural sciences, which are viewed through a coherentist holist epistemology.[350]

ISR is an alternative path to a naturalizing jurisprudence, which is rooted in an epistemology that has wider acceptance in the exact sciences. Through ISR, the nature of law can now be seen as containing evolving,

marr/2017/08/15/practical-examples-of-how-blockchains-will-be-used-in-legal-firms/#6f23902c66a7.

345. *See* Lessig, *supra* note 331.

346. Kenneth Einar Himma, *Conceptual Jurisprudence. An Introduction to Conceptual Analysis and Methodology in Legal Theory*, Revus: J. for Const. Theory & Phil. of Law 65–92 (2015).

347. Brian Leiter, Naturalizing Jurisprudence 36 (2007).

348. *See* W.V. Quine, Quintessence: Basic Readings from the Philosophy of W. V. Quine 31–53, 259–74 (Robert F. Gibson ed., 2004).

349. *See* Ladyman, *supra* note 175 (discussing Neurath and Quine).

350. *Id.*

dynamic informational systems. This is a new horizon in which the assumptions of analytic jurisprudence should be re-examined. A significant part of this new philosophical horizon is the shift towards Structural Realist epistemology. This shift portends a considerable change for legal theory. Through ISR, law can now be seen as containing dynamic bodies of information in and interacting with an information environment. Given the new awareness of various types of existing information, law must be understood through the various understandings of information, including semantics *and* mathematics. Moreover, a robust informational theory of law should account for the ways that law is coupled to other information systems.

PLI is a new methodological approach to legal theory, which attempts to describe the informational nature of law and its relation to other information systems. In particular, it is concerned with the legal significance of the ontological, epistemological, and ethical implications of the informational turn in philosophy, described by Floridi and outlined above in Part III.[351] PLI is the attempt to develop a general theory of law that is harmonized with the philosophy of information and is capable of providing insights into the changed nature and context of law and legal institutions in the information revolution, which has profoundly changed the context for legal theories.

A basic claim of PLI, then, is that law determines and is determined by informational relation. Rather than focusing primarily on the boundaries between law and other related concepts, PLI focuses on describing the relations between law and other closely allied informational structures. Like PI, PLI is open to a fundamental relational ontology that views the foundational ontological principle in terms of relation. As noted above, this was a common claim among Leibniz, Pierce, Whitehead, Deleuze, and some contemporary speculative realists, who were antecedent to PI.[352] As a legal theory, PLI does not need to comment on this issue. To the extent that legal claims imply ontological and anthropological claims, they do so as consequences of the relational claims associated with the informational condition of law.

PLI holds that general legal theories must account for the informational relations. Thus, although PLI is open to the ontological claim of PI that speculates on the primacy of relation as a fundamental ontological category, PLI does not insist that relation is *the* fundamental ontological category. Although, such a comprehensive relational ontology might be correct. PLI does not seek to endorse any fundamental ontological commitment. Whatever fundamental ontological categories might exist, PLI weakly asserts the all beings are relational in the sense that human beings are aware of or concerned about a being through the relations that a being has to other beings and persons. To the extent that all beings are of concern to legal philosophy, all beings have relation. Therefore, the informational turn seeks to understand law as informational relations across all classes of information.

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351. *See* discussion *supra* Part III.C.

352. *Id.*

3.   Law is Informational

A second foundational claim of PLI is that the essence of law is information. Laws describe and structure informational relation. Any legal theory must come to terms with the ways that law determines how one information entity relates to another. H.L.A. Hart appears to acknowledge this in his foundational work, *The Concept of Law*, where he describes the work as an exercise in analytical jurisprudence that seeks to clarify the general framework for legal thought by distinguishing the social phenomenon of law from coercion and morality.[353] He adds the following:

> [T]he book may be regarded as an essay in descriptive sociology; for the suggestion that inquiries into the meanings of words merely throw light on words is false. Many important distinctions, which are not immediately obvious, between types of social situations or relationships may best be brought to light by an examination of the standard uses of the relevant expressions and of the way in which these depend on a social context, itself often left unstated. In the field of study it is particularly true that we may use, as Professor J. L. Austin said, "a sharpened awareness of words to sharpen our perception of the phenomena."[354]

Hart appears to conclude that a theory of law must include a description of the relations that instantiate legal reasoning, rules, and institutions. It appears that he took conceptual analysis, the primary investigative tool of analytic philosophy, to be the instrument for such an evaluation. Today, however, the exclusive focus on law as semantic information is unwarranted given the new context of law wherein the relations between law and other types of information might occur in non-semantic forms. For example, legal information systems coupled with financial information systems in market regulation.[355]

Similarly, PLI must also be understood through the various forms of communitive legal theory that views law expressly as a linguistic communication.[356] PLI includes this theoretical commitment but extends it to include

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353. *See generally* H.L.A. Hart, The Concept of Law (1961).

354. *Id.*

355. *See* Daniel Katz et al., *Law on the Market? Abnormal Stock Returns and Supreme Court Decision-Making* (May 14, 2017), *available at* https://ssrn.com/abstract=264972.

356. A note is needed regarding the relation between PLI and communicative legal theory, which has been put forward by Mark Greenberg, Andrei Marror, Larry Alexander, Paul Campos, Steven Knapp, Scott Soames, and others. Greenberg describes the "general outlook of this view" as follows:

> Legal texts are linguistic texts, so the meaning or content of a legal text is an instance of linguistic meaning generally. It therefore stands to reason that, in order to understand the meaning of an authoritative legal text or utterance, such as a statute or regulation, we should look to our best theo-

other forms of information and information processes. PLI, like PI, does not endorse a single definition of information but instead looks to understand law through multiple conceptions of information. The scope of PLI includes the logical and linguistic structures that are examined in conceptual jurisprudence. But, it also considers law as other sorts of information that are non-linguistic. This includes the informational structures of the formal processes of law and legal reasoning. And, it includes law as mathematical information, which is PLI's form in ICT.

The relation between the semantic and mathematical natures of law, as it exists today, has many overlooked dimensions, which PLI seeks to make explicit and investigate. Consider, for example, the relation between law and energy. A commonplace view of this relation might focus exclusively on how law regulates the production and consumption of electrical energy. In this commonplace understanding, the *physis* and *techne* are separate. The nature of law has to do with its content as a means of social control. The common understanding views the content as separate from the artifact of law, which is the form in which the content is stated whether that be in papyri scrolls or printed books or the patterns of electronic pulses that deliver content through the ICT. Viewed from an informational perspective, the relation is more nuanced and complex than the commonplace understanding. The content of law is semantic, and the artifact of law as an information entity is fundamentally tied to its nature as mathematical information. Semantic legal information effects physical and biological information environments sometimes in surprising ways. A trivial, yet insightful, example involves law's relationship to energy. A commonplace understanding might suggest that the content of law will have an effect on energy production and consumption since both are regulated. Law as an artifact—as mathematical information—seems to have only a trivial impact on energy consumption. But, Claude Shannon's theory of information entropy has been interpreted as requiring

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ries about language and communication. Those theories tell us that a text or utterance has linguistic content—call it *communicative content*—that may go well beyond the semantic context of the text.

Mark Greenberg, *Legislation as Communication? Legal Interpretation and the Study of Linguist Communication*, *in* Philosophical Foundations of Language in the Law 217 (Andrei Marmor & Scott Soames eds., 2013). Relatedly, Oliver Goodenough and Mark Flood have argued that the communicative content of legal documents should be scripted in a common markup language to promote computational analysis. *See* Oliver R. Goodenough & Mark D. Flood, *Contract as Automation: The Computational Representation of Financial Agreements* (Office of Fin. Research, Working Paper No. 15-04, 2015), *available at* https://ssrn.com/abstract=2648460. The thesis advanced in this article is more similar to Goodenough and Flood, however, it seeks to understand how law exists as information of different types. Whereas Goodenough and Flood are concerned with the practical implication of streamlining law in common information formats, PLI is concerned with understanding the various informational phenomena in which law is constituted.

that all information has an energy cost.[357] This means that the storage and processing of information cannot be achieved without a base energy cost.[358] This is true of all mathematical information, however stored. Thus, it is a necessary conclusion of the contemporary understanding of the types of information that *law has an unavoidable minimum energy cost* and, if the total amount of information of a law can be stated, then the total minimum energy cost of it can be calculated. If informational demands of law, particularly the private law of contractual relations, were to become encrypted and distributed, as suggested by some blockchain enthusiasts,[359] then the energy demands might be overwhelming. Law as an artifact of mathematical information has an energy nature; as it regulates the production and distribution of energy, and consumes some of the energy it creates. At first, this may seem like a trivial concern. But, it points to a feature of the law in relation to the environments it affects: law has an impact, both as semantic information and as mathematical information.

A goal of the American Legal Realists was, perhaps, an awareness of the complex interplay of various types of information at work in legal systems. It may well be that they were proto-legal information philosophers.[360] Law not only exists in multiple informational forms but also couples with multiple information systems. The distinction among information types blurs as law becomes manipulated and analyzed by new forms of information entities and information agents. Legal search, legal prediction, and various types of AI agents shape the outcomes of legal matters by manipulating the artifacts of law as mathematical information. PLI seeks to understand these relationships, make them explicit, and incorporate them into a general theory of law.

4.   Law is Not a Uniquely Human Phenomenon

Given the forgoing account of law that has been developed throughout this essay, it should be clear that law in the information revolution cannot be

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357. *See, e.g.*, STONE, *supra* note 91, at 31–44 (introducing information entropy); *id.* at 180–82 (discussing the relation between information entropy and thermodynamic entropy).

358. *Id.*

359. Computational contracts have been advanced by Mark D. Flood and Oliver Goodenough. *See* Goodenough & Flood, *supra* note 356; Harry Surden, *Computable Contracts*, 46 U.C. DAVIS LAW REV. 629 (2012).

360. Brian Leiter argued as early as the late 1990's that American Legal Realists were proto-naturalists. BRIAN LEITER, NATURALIZING JURISPRUDENCE 36 (2007). The term "natural" refers here to the same meaning that Willard Quine used the term in his influential 1969 essay. Willard Quine, *Epistemology Naturalized*, *in* ONTOLOGICAL RELATIVITY AND OTHER ESSAYS 69 (1969). A description of relationship between naturalized jurisprudence and PLI is an essential next step for PLI.

viewed as simply a human phenomenon.[361] Since it is relational, law extends to relations that are not human. For example, an environmental regulation extends to, and is in some sense coupled with, the environment that is affected by the regulation. Market regulations extend to markets. International trade law extends to the systems of shipment, credit, insurance, etc., which make possible the movements of goods across national boundaries. Viewed in this sense, law exists as relationships among information entities. Some of the entities are information agents; others are passive entities. Law creates and describes relations between information agents. At times, it incorporates complex dynamic systems that are coupled with other social systems. Information agents, seeking non-systemic goals, shape the structure of law.

Systems research suggests complex relationships among coupled social systems.[362] Some of the features, such as emergence, self-organization, systemic coupling, and agent-based objects, are useful for developing computational models of law, particularly in areas where the law is strongly connected to a market or market analogues.[363] Computational theories of complex adaptive systems are being developed, particularly in economics,[364] and a promising direction for PLI is to evaluate the presuppositions of these computational models against the traditional philosophical approaches. For example, PLI considers epistemological commitments of various measures of probability, in particular Bayesian analysis, since these methods of analysis are gaining ground in models of legal analysis that are being deployed in areas like legal search engines, legal assistants, and predictive modeling of judicial behavior.[365] PLI considers the relationship between these new computational models and traditional issues in legal philosophy. This is a developing area in legal scholarship today. While complex systems theory will no

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361. *See* discussion *supra* Part II.B.

362. *See* JOHN H. MILLER & SCOTT E. PAGE, COMPLEX ADAPTIVE SYSTEMS: AN INTRODUCTION TO COMPUTATIONAL MODELS OF SOCIAL LIFE 1–8 (Simon A. Levin & Steven H. Strogatz eds., 2007) (general introduction to complex dynamic systems); J. B. Ruhl, *Law's Complexity: A Primer*, 24 GA. ST. UNIV. L. REV. 885–911 (2008); Gregory Todd Jones, *Dynamical Jurisprudence: Law as a Complex System*, 24 GA. ST. UNIV. L. REV. 873–83 (2008); Daniel M. Katz et al., *Social Architecture, Judicial Peer Effects and the 'Evolution' of the Law: Toward a Positive Theory of Judicial Social Structure*, 24 GA. ST. UNIV. L. REV. 977–1001 (2008) (discussing law as a complex dynamic system).

363. *See* Bryon Holz, *Chaos Worth Having: Irreducible Complexity Pragmatic Jurisprudence*, 8 MINN. J.L. SCI. & TECH. 303 (2007) (discussing quantitative approaches to law's complexity).

364. *See, e.g.*, Jones, *supra* note 362.

365. *See, e.g.*, Daniel Martin Katz et al., *A General Approach for Predicting the Behavior of the Supreme Court of the United States* (Jan. 16, 2017), https://ssrn.com/abstract=2463244.

doubt be an important contributor to PLI, it is not reducible to systems theory.[366]

5.   Law and the Harmonization of PHYSIS and *Techne*

Another theme in PI is the harmonization of *physis* (nature) and *techne* (artifact). For Floridi, this means, "sort of holistic environmentalism," that "requires a change in our metaphysical perspective about the relationship between *physis* . . . and *techne* . . . ."[367] Because PI identifies the moral good in terms of informational environment, Floridi advocates for a view of the harmonization of *physis* and *techne* as promoting the integrity of the informational environment.[368] Understood in this way, PLI seeks to avoid privileging the *physis* over *techne*. Today, as the boundaries between the multiple forms of legal information and other types of information, which the ICT makes possible, blur, the distinction between nature and artifact also blurs. And, it will, most likely, continue to do so. In this context, the distinction between natural and made loses meaning. In the Anthropocene, humans have changed the earth into a monoculture for human flourishing and are beckoning toward the planets.[369] Soon, even human nature itself will become an object of human making.

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366. A similar note should be observed about the relationship between PLI and the field of Artificial Intelligence and Law. Floridi notes this, suggesting that the philosophy of AI was premature in the sense of having arrived before a clear sense of the nature of information had emerged. *See* FLORIDI, THE PHILOSOPHY OF INFORMATION, *supra* note 106, at 2–3.

367. FLORIDI, INFORMATION: A VERY SHORT INTRODUCTION, *supra* note 17, at 119.

368. *Id.*

369. The term, "Anthropocene" is a proposal for a description of the current geological epoch. It is described in this passage:

> The "Anthropocene" is a term widely used since its coining by Paul Crutzen and Eugene Stoermer in 2000 to denote the present time interval, in which many geologically significant conditions and processes are profoundly altered by human activities. These include changes in: (1) erosion and sediment transport associated with a variety of anthropogenic processes, including colonisation, agriculture, urbanisation and global warming; (2) the chemical composition of the atmosphere, oceans and soils, with significant anthropogenic perturbations of the cycles of elements such as carbon, nitrogen, phosphorus and various metals; (3) environmental conditions generated by these perturbations; (4) global warming, ocean acidification, and spreading oceanic "dead zones"; and (5) the biosphere both on land and in the sea, as a result of habitat loss, predation, and species invasions.

> Jan Zalasiewicz, *Working Group on Anthropocene*, QUATERNARY, http://quaternary.stratigraphy.org/workinggroups/anthropocene/ (last visited Jan. 26, 2018).

The law must anticipate that human nature, culture, and social systems are creatively interacting and changing in ways that cannot be anticipated by contemporary information agents. And the law must find the resources to respond responsibly to these changes. A threat posed by the coming changes is that the liberation of the person will become an impossible goal in the face of a tyrannous wall of immanence that is indifferent to the liberation of those whom it is intended to serve. This is not to say that the ICT is literally a tyrant as some have suggested possible.[370] It is, instead, the claim that the ICT can alter conditions for the assumptions that underwrite democracies—assumptions about how democratic discourse works to liberate persons rather than enslave them. And, having so altered the conditions, the ICT may create communication structures that short circuit the foundational protections intended to insulate democracies from those who would otherwise rise to power, which political theorists since Plato have cautioned as a weakness of the democratic form.[371]

When law is understood as being composed of various types of information and a multitude of informational relations, its connection to the natural world is altered. Law is not separate from the physical and social worlds that it seeks to control. The separation between law as *techne* (artifact) and law as *physis* (nature) can only be harmonized by a clear recognition of the full spectrum of informational interactions. Legal philosophers should play a substantial role in critiquing the changes that the ICT brings to the rule of law and the possibilities for democracy in the coming ages. Questions about how the ICT might change the nature of law should not be left to market forces and engineering geniuses. Philosophers, trained in thinking about foundational questions of epistemology, ontology, ethics, and politics, are able to grasp the concepts of the ICT sufficiently well as to understand the risks and opportunities the ICT presents. The philosophers are information agents capable of thinking and acting responsibly to defend individual liberties and promote the general welfare of the information environment. PLI holds resources for this undertaking.

B.   The Normative Claims of Philosophy of Legal Information

1.   Philosophy of Legal Information's Analysis of Legal Positivism

Acting responsibly as a moral agent requires moral knowledge. Moral reasoning is information intensive. A foundational claim for the EI is the epistemological conclusion that Floridi reached in relation to the Gettier Problems.[372] Part II describes Floridi's conclusion that these problems are

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370. *See* Franklin Foer, World Without Mind: The Existential Threat of Big Tech (2017) (describing a recent negative assessment of ICT).

371. Plato, *The Republic, Book VI, in* Plato: The Collected Dialogues 710–47 (Edith Hamilton & Huntington Cairns eds., Lane Cooper trans., 1961).

372. Floridi, The Philosophy of Information, *supra* note 106, at 6–18.

illustrative of a shift required in the philosophy of information from the conventional formula of knowledge as JTB to a formulation of knowledge as informed true belief.[373] This shift is necessary because the information revolution has shown that human beings are information systems that make use of available information to form beliefs about the world. The high bar of "justification" in conventional epistemology is rarely satisfied and impossible to absolutely satisfy.[374] Floridi's discussion suggests that the desire for logically necessary foundations for knowledge is a result of conflating LoA between the question and the field in which the question is sought, which he illustrates with his discussion of Kant's antinomies.[375] On this reading, moral knowledge is also informed true belief. Human beings, as information agents, seek to act purposefully for moral goals that are warranted by information, but not justified in most cases as rationally necessary.

Given this conception of moral knowledge, PLI offers an alternative perspective on the core claims of legal positivism, which holds that law and morality are dichotomously related.[376] An influential formulation of this claim was advanced by the English jurist John Austin (1790–1859).[377] Austin influentially formulated this statement of legal positivism: "The existence of law is one thing; its merit and demerit another. Whether it be or be not is one enquiry; whether it be or be not conformable to an assumed standard, is a different enquiry."[378]

In its most basic form legal positivism is the claim that law and morality are conceptually distinct and separate.[379] Although there are several claims that support the separation of law and moral norms, the core claim, itself, known as the separability thesis, is the focus here.

A well-known development of the separability thesis occurred in 1958 debate between H.L.A. Hart and Lon Fuller.[380] At the time, both Hart and Fuller were at the peak of their careers.[381] Hart's essay, which is a defense of

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373. *Id.* at 27–29.

374. *Id.* at 18.

375. *Id.* at 23–27.

376. *See* Hilary Putnam, The Collapse of the Fact/Value Dichotomy (2002) (describing an account of the fact and value dichotomy).

377. *See* Guy Longworth, *John Langshaw Austin*, Stan. Encyclopedia of Phil. (2017), http://plato.stanford.edu/archives/sum2015/entries/austin-jl/.

378. John Austin, The Province of Jurisprudence Determined 157 (W. Rumble ed., 1995).

379. Kenneth Einar Himma, *Legal Positivism*, Internet Encyclopedia of Phil., http://www.iep.utm.edu/legalpos/ (last visited Jan. 26, 2018).

380. *Practical Positivism Versus Practical Perfectionism: The Hart-Fuller Debate at Fifty*, N.Y.U. L. Rev., http://www.law.nyu.edu/conferences/hartfuller (last visited Jan. 26, 2018).

381. *Id.*

positivism, was delivered as the Oliver Wendell Holmes Lecture while he visited at Harvard from his home institution, Oxford University.[382] Fuller was the Carter Professor of General Jurisprudence at Harvard and demanded equal time to defend his natural law perspective.[383] The debate was published and became an instant reference for understanding the distinction between Hart and Fuller.[384]

While the debate is complex and subtle, the aspect of it considered here is formulated by Hart in a footnote listing one of the main principles of positivism, "[t]he contention that there is no necessary connection between law and morals or law as it ought to be . . . ."[385] The separability of these is an essential claim for Hart's general theory of law, which means that he took this claim to be true of all legal systems.[386] The rule states that the essential nature of law does not include a moral property and, therefore, is law even if an otherwise valid law lacks morality. The claim does not deny that laws may have a moral trait and, therefore, may be an "intersection" of law and morality.[387] That is to say, there may be an accidental relationship between law and morality such that morality may influence law and moral norms may be shaped by legal norms. But, no necessary relationship exists between them.

In his lecture, Hart attempted to defend this claim from the criticism that, although morality may not be necessary for any particular law, the legal

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382. *Id.*

383. *Id.*

384. *Id.*

385. H. L. A. Hart, *Positivism and the Separation of Law and Morals*, 71 Harv. L. Rev. 593, 601 n.25. (1958). Hart's positivism is "inclusive" in the sense that it allows for moral and legal overlap. A more formally exclusive separation between law and moral norms is advanced by Joseph Raz. *See* Joseph Raz, The Authority of Law: Essays on Law and Morality 49–50 (1979). Raz writes:

> [T]he law on a question is settled when legally binding sources provide its solution. In such cases judges are typically said to apply the law, and since it is source-based, its application involves technical, legal skills in reasoning from those sources and does not call for moral acumen. If a legal question is not answered by standards deriving from legal sources then it lacks a legal answer[,] the law on such questions is unsettled. In deciding such cases courts inevitably break new (legal) ground and their decision develops the law . . . . Naturally, their decisions in such cases rely at least partly on moral and other extra-legal considerations.

> *Id.*

386. *See* Hart, *Positivism and the Separation of Law and Morals*, *supra* note 385, at 593–94 (for a discussion of the Separability Thesis).

387. *See* Raz, *supra* note 385, at 53.

system as a whole must demand a moral foundation.[388] This argument is advanced by Bentham and Austin.[389] Against this criticism, Hart concedes that there is a moral necessity borne of the need for pre-moral goods like safety, nourishment, and other goods.[390] Law provides for these with rules that protect against murder, bodily harm, theft, and so on; this is what Hart would later call the minimum content of the natural law.[391] He also concedes that there are basic norms within law that have moral origins.[392]

388. Leslie Green explains:

> Of course, by this Hart didn't mean anything as silly as the idea that law and morality should be kept separate (as if the separation of law and morals were like the separation of church and state.) Morality sets ideals for law, and law should live up to them. Nor did he mean that law and morality are separated. We see their union everywhere . . . . To pacify the literal-minded, Hart might have entitled his Lecture, "Positivism and the Separability of Law and Morals." That captures well his idea that "there is no necessary connection between law and morals or law as it is and law as it ought to be." (citations omitted).

Leslie Green, *Positivism and the Inseparability of Law and Morals*, 83 N.Y.U. L. Rev. 1035–36 (2008).

389. *See* Hart, *Positivism and the Separation of Law and Morals*, *supra* note 385, at 594–600; Leslie Green, *Legal Positivism*, Stan. Encyclopedia of Phil. (2003), https://plato.stanford.edu/archives/fall2009/entries/legal-positivism/ (discussing the historical development of legal positivism, including Bentham and Austin).

390. Hart writes:

> They [the Utilitarians] certainly accepted many of the things that might be called "the intersection of law and morals." First, they never denied that, as a matter of historical fact, the development of legal systems had been powerfully influenced by moral opinion, and, conversely, that moral standards had been profoundly influenced by law, so that the content of many legal rules mirrored moral rules or principles. It is not in fact always easy to trace this historical causal connection, but Bentham was certainly ready to admit its existence; so too Austin spoke of the "frequent coincidence" of positive law and morality and attributed the confusion of what law is with what law ought to be to this very fact.

Hart, *Positivism and the Separation of Law and Morals*, *supra* note 385, at 598–99.

391. *See* Green, *supra* note 388, at 1046.

392. Green explains:

> [T]he relationships between necessary and contingent truths often contribute to our interest in the necessary ones. Every legal system necessarily contains power-conferring norms that play an important role in explaining how law governs its own creation. But power-conferring norms are also important because they provide facilities to certain agents on certain

For example, the basic duty of fairness requires like cases be treated alike. This fundamental legal principle holds a sense of moral rectitude and, therefore, represents an overlap between the moral and the legal. Fuller agreed that law has a moral overlap, but for him the overlap was substantially broader.[393] Hart's two concessions commit him only to the claim that the overlap of law and morality plays a role in the formation of law. Immoral law may result from minimal moral overlap. In Fuller's broader view, the inner morality of law is reciprocal with an external morality that is foundational for the authority of law.[394]

The example of the "Grudge Informer" illustrates the difference between Hart and Fuller.[395] The case concerns the legal status of an unjust law.[396] The informer in the case was a German wife who wanted to get rid of

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> terms, such as the powers to legislate or appropriate. They therefore have a contingent relation to the distribution of social power within a society, a matter of the first importance in legal and political theory.

Id. at 1043.

393. Fuller explains:

> Law, as something deserving loyalty, must represent a human achievement; it cannot be a simple fiat of power or a repetitive pattern discernable in the behavior of state officials. The respect we owe to human laws must surely be something different from the respect we accord to the law of gravitation. If laws, even bad laws, have a claim to our respect, then law must represent some general direction of human effort that we can understand and describe, and that we can approve in principle even at the moment when it seems to us to miss its mark.

> Lon L. Fuller, *Positivism and Fidelity to Law: A Reply to Professor Hart*, 71 Harv. L. Rev. 630, 632 (1958).

394. This is a claim that Hart develops more fully in *The Concept of Law*. He explains:

> The difference may seem slight between the analysis of a statement of obligation as a prediction, or assessment of the chances, of hostile reaction to deviation, and our own contention that though this statement presupposes a background in which deviations from rules are generally met by hostile reactions, yet its characteristic use is not to predict this but to say that a person's case falls under such a rule. In fact, however, this difference is not a slight one. Indeed, until its importance is grasped, we cannot properly understand the whole distinctive style of human thought, speech, and action which is involved in the existence of rules and which constitutes the normative structure of society.

> Hart, The Concept of Law, *supra* note 353, at 88.

395. *See* David Dyzenhaus, *The Grudge Case Revisited*, 83 N.Y.U. L. Rev. 1000–03 (2008) (for a discussion of the Grudge Informer).

396. The Grudge Case refers to a case identified by the German legal scholar, Gustav Radbruch, that Fuller describes to illustrate what he takes to be the moral

her soldier husband when he returned from the Eastern Front.[397] When they were alone together, he made statements that were critical of the war and Adolf Hitler.[398] Such statements were proscribed by German law and punishable by death.[399] She turned him in, he was sentenced to die, but the sentence was not carried out.[400] Nonetheless, he was imprisoned, freeing her from the burden of an unwanted marriage. After the war, she was tried for wrongfully imprisoning her husband.[401] Hart argued that she had committed no illegal act since the Nazi law clearly required her to act as she did.[402] Punishment of the wife by a post-war court should apply an *ex post facto* law.[403] Fuller argued that the Nazi law was invalid because it had quite clearly violated the morality of a valid law.[404] He believed that gross violations of the inner morality of the law can invalidate the law, which was clearly the case with the grudge informer. For Fuller, the inner morality of the law requires a greater overlap between law and morality.

Using the LoA method, PLI focuses on the shared observable types of information. Viewed this way, the Grudge Informer illustrates that the difference between Hart and Fuller can be described in terms of sets of observables. For Hart, the observables are the positive statement of the law and the minimal content of natural law. These are observed as the objective text of the law criminalizing statements critical of Hitler, and the equal application of the law to all. This can be summarized by the following:

$$\text{Hart} = \{\text{law, moral norms for legitimating law}\}$$

Hart's observables are derived from his analysis of the concepts of law and moral norms.

Fuller's observables include Hart's observables and extend beyond. He too looks to the positive statement of the law. But, he develops conception of morality, which is broader than Hart's in *The Morality of Law*.[405] Fuller describes morality in teleological and deontological perspectives, which he calls, respectively, the morality of aspiration and duty.[406] Like Floridi, he

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content of law. *See* Fuller, *Positivism and Fidelity to Law*, *supra* note 393, at 648–57.

397. *Id.* at 652–53.

398. *Id.* at 655.

399. *Id.*

400. *Id.*

401. *Id.*

402. Fuller, *Positivism and Fidelity to Law*, *supra* note 393, at 655.

403. *Id.*

404. *Id.* at 656.

405. *See* Lon L. Fuller, The Morality of Law (1969).

406. *Id.* at 5–9.

sought to integrate the teleological and deontological ethics.[407] But for Fuller, the integration occurs in the balancing of the functional consequences of the ethical styles.[408] Fuller explains that the morality of law is discerned from experience and is summarized as follows:

$$\text{Fuller} = \{\text{law, moral aspiration, moral duty}\}$$

Since Fuller's observables include legal rules and moral principles, Fuller's set of social norms is broader than Hart's propositional analysis. In Floridi's terms, there exists GoA between Fuller and Hart such that Hart's set of observable data types is nested within Fuller's.

This analysis suggests that the objects of analyses by Fuller and Hart occur at different levels of abstraction. Hart analyzes the concept of law in order to state the function of law through propositional statements of moral norms.[409] The meaning of primary legal rules is set within the context of language that is common within the entirety of the primary rules and supplemented by other principles as needed according to procedures described in secondary rules.[410] Hart's LoA is specified by the limited scope of his inquiry. His question is limited and precise, and his observed moral norms are limited to moral legitimation of legal procedures. Fuller, however, sought an absolute answer to the following question: What is the moral meaning of law? That is to say, Fuller sought an unconditional answer to the fundamental question of moral meaning. In this sense, a comparison can be made to Floridi's analysis of Kant's antimonies. Fuller's inquiry oversteps the limits of Hart's propositional analysis by looking for evidence in contrasting types of moral claims. In the Hart-Fuller debate, a conceptual jumble results from the aporetic relationship between their LoA.

2. Philosophy of Legal Information's Normative Claim

Viewed within the background assumptions of PI, several interrelated points stand out. First, the encounter between law and morality occurs within the infosphere where information agents seek to operate successfully in a preexisting social environment. Inforgs exist in a preexisting infosphere that includes legal and social rules. Distinguishing between the two is of some value to them, but negotiating among other people is critical to their success. To operate effectively, a human being must synthesize different types of social information to anticipate social reaction.

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407. *Id.*

408. *Id.* at 29–30.

409. *See id.* at 102–10.

410. *See* Lawrence Solum, *Legal Theory Lexicon 039: Primary and Secondary Rules*, LEGAL THEORY LEXICON (Aug. 28, 2016), http://lsolum.typepad.com/legal_theory_lexicon/2004/06/legal_theory_le_2.html (introducing Hart's distinction between primary and secondary rules).

Second, analysis of how this synthesis occurs in the individual is critical to understanding the nature of law in relationship to morals. And yet, this analysis is not the focus of either Hart or Fuller. Hart's set of observables is limited to law, since he is focused on the analysis of boundaries of the concept of law. Fuller's concern is broader. Fuller seeks to develop a theoretical account of the moral context in which law functions. Both Hart and Fuller pursue their analysis with similar methods of conceptual analysis. Neither Hart nor Fuller are concerned with the details of the way that an individual gains information about law and ethics or the ways in which information about social and legal rules shape the agency of the individual.

Third, PLI suggests that greater attention needs to be paid to systems of theories for analysis of precisely how the primary and secondary rules interact with each other and with other social norms. Hart's account of the interaction between moral norms and law is reductive and blunt. Given that the development of social systems theories were written nearly a century ago, it seems likely that a more nuanced account could be developed to take account the various concepts of information. It seems likely that the relationships, particularly the indirect relationships between changes in moral norms and changes in primary rules, might benefit from computational complexity theories. Advanced computational systems today have allowed for new relational patterns to be discerned.

Of particular concern is the science of complex systems, which has developed computational techniques that assist in developing new models of systemic interactions.[411] While traditional analysis has assumed relatively static and homogenous situations, computational techniques allow for models of complex adaptive systems, which are presumed to have dynamic interaction. The application of these models to legal systems has been met with some support and some resistance. But, as Ruhl explains, theoretical understanding of the law might benefit from embracing it:

> One might accept the presence of invisible hands throughout social life and the value of using complex adaptive systems theory to understand them better, but nonetheless resist applying complex adaptive systems theory to legal systems on the ground that the law is where humans write the rules for other social systems. But this misses two fundamentals. First, the legal system, as a source of rules for regulating other social systems, should take into account how those systems operate. If one wishes to regulate a complex adaptive social system, one ought to think like a complex adaptive social system. Second, law, as in the collection of rules and regulations, is the product of the legal system, a collection of people and institutions. Law, in this sense, is simply an emergent

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411. *See generally* John H. Holland, Signals and Boundaries: Building Blocks for Complex Adaptive Systems (2014) (introducing the mechanisms of complex adaptive systems).

property of the legal system the same way prices are an emergent property of markets.[412]

The new awareness of information that Floridi advances might further the investigation of whether and how law operates as a complex adaptive system, coupled with other social systems.

PLI is, therefore, a normative jurisprudence. Robin West describes revitalized normative jurisprudence that "centralizes, rather than marginalizes, the concept of the individual, common, social, and legal good and the varying accounts of human nature that might inform such understandings."[413] Critically, West prescribes a reconsideration of conceptions of human nature—philosophical anthropology—in determining how to develop a progressive normative jurisprudence that is capable of addressing social need.[414] PLI rejects the anthropocentrism in West's proposal, but develops a progressive normative jurisprudence that considers the moral good sought by law in the context of the overall quality of the information environment. PLI promotes legal rules and institutional structures that are conducive to effective information agents in a richly varied information environment.

V.   CONCLUSION

This article is a preface to PLI. It is intended to introduce the field and describe some features in a broad outline. It is not a detailed study, and it has skirted the edges of complex, technical issues in the hopes of stimulating interest among a diverse audience of legal philosophers, legal scholars, computer scientists, and others with an interest in the interface of law and information technology. Since it suggests and leaves open many questions, it is the Author's hope that it will provoke writing in the field.

The contemporary era of vast amounts of data and immense networked computational power radically affects society by changing nearly every aspect of human life and self-understanding. Not only is it reordering political power structures at every level, but it is also changing the conditions for understanding human beings place in the world. Basic philosophical categories need to be rethought, and new forms of knowledge must be acknowledged. This is changing the basic assumptions of philosophy. It is against this background of massive change that the nature of law must be rethought as well.

Today, an information theory of law is needed that seeks to understand law in its contemporary form as digital information, existing within the context of a revolution in human self-understanding. It suggests new insights into traditional questions in legal philosophy and raises new agendas for ex-

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412. Ruhl, *supra* note 6, at 897.

413. Robin West, Normative Jurisprudence: An Introduction 10 (Brian H. Bix & William A. Edmundson eds., 2011).

414. *Id.*

ploration. Law has been evolving in the way that it has been recorded, distributed, analyzed, and authorized. It has moved toward an increased democratic rule of law as information technologies have made the delivery of legal information more widely accessible. This movement was also accompanied by developments in logic that have made the contemporary computational age possible.

The information age is upon us. It requires a fundamental shift in thinking that decenters the human being by showing computation and information as common features of natural systems. Viewed in this new light, law is not a determinate order waiting to be discovered by a wholly formed individual mind, as understood by natural law theory. Nor is it simply the command of the sovereign, as Austin imagined. And, it is not an amoral social system.

PI holds that human minds emerge into a world that already exists and which is already populated by other minds. It is a world where information is everywhere and pooled in reservoirs that give the world organization and intelligibility. The mind interacts with and is shaped by information about the world, even as world shapes the mind. Law is information too. The mind gives structure and organization to culture, even while it is being shaped by it. Law carries cultural understanding of the world, and yet it is also constitutive of that understanding.

A philosophy of legal information investigates the nature and moral meaning of law as information, seeking to be responsible for the legal system in all its aspects. Legislatures and judges not only need to take on the responsibility for the legal system, but so do lawyers and law professors, as well as legal technology developers, investors, and enthusiasts. The part of the infosphere that is populated by legal information entities exceeds the boundaries of Hart's description of law. And yet in the contemporary ethos, the most significant agents might soon be the non-human intelligences shaping legal search, predicting legal outcomes, and reifying fluid human relations in fixed distributed ledgers and registries.

Whether these new technologies liberate or enslave societies will depend on the care and wisdom of those who design and implement them. Philosophers can and should take on these issues by asking how these new questions meet the traditional topics of philosophical inquiry. This is relevant in speculative areas, such as metaphysics and epistemology, but even more so in the areas of practical reason, such as ethics and political theory.

Legal philosophy integrates the speculative and the practical. It investigates the nature of law as such, but it also seeks to understand the relation between the positive statement of law and the moral legitimization of it. There is change all around: the positive nature of law is evolving into a system of data mediated by technology, and human self-understanding is evolving as we become aware of the reality of our existence as information agents. Legal philosophy needs to acknowledge these developments and take on the challenges of the new setting. PLI is not a triumphal system that solves all issues. Philosophical reasoning is always limited by human awareness and the fragile and conditional nature of logical analysis. Nonetheless, it suggests

a way ahead for legal philosophy, which is urgently needed in the rapidly changing legal field. To quote Alan Turing, "We can only see a short distance ahead, but we can see plenty there that needs to be done."[415]

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415. Alan Turing, *Computer Machinery and Intelligence*, 49 MIND 433, 460 (1950).