

STREAM READINGS

**PROPERTY, INFORMALITY
AND BLOCKCHAIN
TECHNOLOGY**



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Property, Informality and Blockchain Technology

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Description

Property takes different forms and serves different functions. This stream focuses on informal property interests: squatter holdings, agrarian reform beneficiaries, profit expectations of foreign investors. Our stream explores the nature of these claims. Are these inferior forms of property, mere expectations that may or may not ultimately be formalized, legally enforceable alternative social relations ? Additionally, the stream focuses on blockchain technology. Will this new technology have the effect of truncating the questions above ? Will blockchain technology inexorably narrow the range of standard property rights, or rather provide for more diversity in structuring legally protected interests?

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-DEVELOPING COUNTRIES

The Missing Ingredient What poor countries will need to make their markets work

by Hernando de Soto

Those countries which have market economies have prospered so much more than those which have not that today nobody dares propose a solution underdevelopment that is regarded as heretical. Every year international agencies and successful capitalist nations spend billions of dollars trying to export market-economic systems to the rest of the world. Yet with a few notable exceptions in East Asia, these efforts have failed. Today only some 25 of the 185 nations of the world have made the jump to a developed market economy.

I predict that in the next 150 years the countries in Latin America and elsewhere joining these 25 will be those that spend their energies ensuring that property rights are widespread and protected by law, rather than those that continue to focus on macroeconomic policy.

Why? Because there is no doubt that property in developing countries is not making work. The difference between developed and underdeveloped countries, after all, is not that the former have markets and the latter do not. Markets are an old and universal tradition. Christ threw merchants

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out of the temple 2,000 years ago and we Peruvians were taking our products 10 miles long before Columbus reached America. The difference between developed and

underdeveloped countries is the difference between buying gold futures on the London Metal Exchange and buying gold nuggets on a pavement in Madre de Dios, Peru. In Britain the legal system has created property rights that can be exchanged in an expanded market, whereas in Peru it has not. Britain is a property economy, Peru is not. Britain is a property economy, Peru is

To be exchanged in expanded markets, property rights must be "formalised" - in other words, embodied in universally obtainable, standardised instruments of exchange that are registered in a central system governed by legal rules. This affords holders indisputable proof of ownership, and protection from uncertainty and fraud. Property rights can then enter the marketplace in a form adapted to massive and frequent exchange - such as shares, certificates, promissory notes, bonds, contracts, warehouse receipts or chattel paper - which facilitates their transfer to resources to their highest valued use. Modern market economies generate growth because widespread formal property rights permit massive, low-cost change, thus fostering specialisation and greater productivity. Without formal property, a modern market economy cannot exist.

When it comes to land, property rights are embodied in formalised titles. A piece of

own-land without such a title is simply worthless at low cost is extremely hard to transfer. In the absence of formal titles, the

Does the seller own the land and have the right to transfer it? What are its boundaries? Will the new owner be accepted as such by those who enforce property rights? What are the effective means to exclude other claimants? Finding the answers is difficult, then there will be no exchange at all, or exchange will be restricted to closed circles of trading partners who trust one another.

Property rights for land represent a large portion of people's wealth. In the United States they account for over 40% of family assets, and in developing countries like my own some 70% of family assets consist of land. Yet more than 90% of rural land and of urban property rights in Peru are not protected by formalised titles - that is, they are "informal". The situation does not seem to be all that different in the rest of the world, whether it be Algeria, Brazil or Indonesia: the absence of formal titles means that the assets of most people in these countries remain outside the market economy.

When people have formalised titles, they feel that property is under their own legal control and they therefore have the incentive to invest their intelligence and work in improving it. In Peru investment in property tends to increase ninefold when squatters obtain formalised titles to their homes and in Costa Rica farmers who are formally titled have much higher incomes than those who

are not. Formalised titles open the door to credit. In the United States, up to 70% of the credit that new businesses receive comes from using formal titles as collateral for mortgages.

Civilised living in market economies is not simply due to greater prosperity but to the order that formalised property rights bring. When poor people have confidence that land is formally theirs, their respect for other people's land increases too. The Viet Cong yesterday in Vietnam and the Shining Path today in Peru made gains among peasants by settling boundary disputes and protecting them from expropriation. Formal titles give the poor of the Amazon basin legal alternatives to selling coca leaves to drug traffickers. As long as the farmers who grow

coca remain informal, the government cannot find them, identify them, or reach an enforceable crop-substitution agreement with them. And police can act more selectively, thus reducing human rights abuses - if they know who lives where.

Finally, when formal title is not there to provide security of tenure, planning horizons are shorter and so the incentives to protect land, water and forests are missing. Investments to improve the soil, reduce erosion and control the accumulation of rubbish are less likely to be made; informal ownership introduces a bias against the intensive development of existing land and in favour of expansion on to virgin land. When ownership is uncertain, there is a tendency to "mine" the land by maximising its short-run production at the expense of preserving its long-term value. Crops, such as trees whose cultivation can enhance the environment but which require many years before they turn a profit, are simply not planted.

A WELL-KEPT SECRET

Because the history of Europe, North America and Japan has not been written with an eye to the transition to formal property, few have made the connection between property rights and the development

of a market. One reason why the connection is difficult to see is that the transformation took place over a long period of time as the customs and norms of the peasants were slowly absorbed into formal law. In Germany, for example, the process by which property was formalised began in the 12th century, when written documents first replaced the informal oral rules used by the peasantry, yet it was not completed until 1896 when the *Grundbuch* system for recording land transactions was extended to the whole country.

A second reason why the connection between formalisation and the market has largely been overlooked is that responses to pressures by informal tenants to convert patrimonial land and political concessions into widespread formal property have been remembered as a response to apparently unrelated events.

Thus, the appearance of widespread property ownership in France is recalled as the triumph over feudalism rather than the beginning of a formalisation process. The concessions on property extended to German peasants at the beginning of the 19th century are remembered as a tactic for enlisting their support against Napoleon and insulating them from the effects of the French Revolution, rather than as the official initiation of awarding title to common folk. The granting of formal property rights to homesteaders and squatters in North America is recounted as a political strategy for expanding territory by pushing back Indians, Mexicans and European colonists. In Japan, South Korea and Taiwan after the second world war the massive campaign to formalise the property of farmers is fixed in the memory as a policy to contain communism and weaken local elites, rather than as one of the most important measures taken for market economy systems to flourish.

What this implies is that the genesis of formalised property appears to be from the bottom up to a great extent the surfacing of an informal law that ran counter to official

law. The transition to formalised property was essentially unpremeditated, something the developed world stumbled into not long ago. The laws that formalised modern property rights only came later, somewhat unconsciously and gradually, and were built on existing informal systems of legal relationships.

For decades informality was considered to be about marginally in developing countries like black markets, poverty or unemployment in the developed countries. It was someone from anthropology, like Margare Mead, and later Mother Teresa, to worry about. But the explosion of informal activity about the sprawling illegal cities - *lavas* in Brazil, ranchos in Venezuela, *barrios marginales* in Mexico, *pueblos jóvenes* in

Peru, *bidonvilles* in former French colonies, slum towns in former British ones and massive rural squatting in the third world over the past 50 years are nothing more than spontaneous, unbridled emergence of informal property, a process which will require formalisation if this energy is to be channelled into organised and prosperous market economies.

Widespread informal land holdings in developing countries show that leaders have yet to grasp the full significance of informal life. If they had, they would have realised that the difference between the developed and the developing countries is in no small measure the difference between countries where property has been formalised and those where it has not. Third world leaders are basically facing the same challenge as the political leaders of western nations dealt with 100-200 years ago - massive informal appears when governments cannot make the law coincide with the way people live and work. The difference is that today thanks to dramatically larger populations and the communications revolution, there has been a much speedier consolidation of informal property law.

The problem is not that governments develop countries are unwilling to recognise property rights. Nearly all their constitutions make the right to property fundamental

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<p>mental, and they are parties to treaties such as the Universal Declaration on Human Rights which say that equal access to property rights is part of the fundamental rights of human-kind.</p> <p>Nor is the problem that they do not appreciate the benefits of widespread ownership of property by their citizens. In Latin America, for example, large tracts of land were expropriated and given to poor farmers as part of collectivist agrarian reform programmes, but without reference to informal law. In most cases these reforms did not create satisfactory market economies, not only because farmers proceeded to break up the collective units into de facto small informal land holdings, but also because the individual rights to land were not recognised or formalised.</p> <p>So far efforts to formalise land and thus to bring it into the market economy have largely failed. One reason for this is that the \$9 billion spent each year on surveying and mapping are geared to the needs of nations that have already formalised land tenure. Although mapping reveals many important things about the surface of the land, it says nothing about who owns what and what is required to formalise property - especially massively and cheaply.</p> <p>THE PROPERTY OWNERSHIP BUREAUCRACY</p> <p>What stands in the way of the formalisation of land is not engineering or surveying or economics. It is law that defines the relationship between rights and people. Property is a collection of rights defined by law which makes no sense outside it. People do not own a parcel of land, or a real-estate unit, but rather what they have are certain rights over the property - to buy to sell, to mortgage - which are recognised by law. Indeed the governance of a market system is essentially legal: corporations, limited liability, contracts and an adequate business environment are impossible outside the law.</p>	<p>The problem that has to be faced in developing countries is that most rights over property and ownership arrangements are defined by informal law, and informal law has no efficient way to connect with them. As a result, if governments follow official law they have to mean for identifying or localising informal settlements nor determining the boundaries of informal parcels. Laws that could help formalisation are borderline because they incorporate requirements unrelated to the certification of ownership.</p> <p>Moreover, no single institution is responsible for formalising property responsibility is spread across a myriad of government departments. And the procedures for formalising individual parcels are expensive and time-consuming, adverse possession proceedings can take seven years of continuous use. Furthermore, traditional informal property registration systems are designed to manage gradual changes in land ownership and are not geared to the task of registering a massive number of informal properties. They are centralised and cannot reach remote places nor process information with the ease and speed required for a market economy.</p> <p>To make things worse, in Latin America the system demands obsessive concern with paper and the details of authenticity and verification. Well within colonial traditions - even after 170 years of independence from Spain - Latin jurists have been taught to create law through the exegesis of adaptation of foreign legal texts. What is missing are techniques that involve citizens, participation, accountability, transparency or common law practices. As a consequence what these lawyers are really good at is adapting law to documents, not adapting law to people. They know much about how property rights are exchanged, but little or nothing on how they are generated.</p> <p>Chana will therefore probably have to come from outside the established legal profession or like legal mavericks. Traditional</p>
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able.⁵³ As such, they are perennially available as grounds for new rounds of reform. Described below are the ways in which this concept has been marshaled to promote titling programs for untitled housing on state land.

IV. Titling as a means of reducing informality

The reduction of informality is a principal argument for titling squatters on state lands. The case has been forcefully made by neo-liberal reformers using this rhetoric. In the context of Latin America, specifically, this argument promotes privatization and strong property rights.⁵⁴ Internationally-supported, development reform has targeted land registry offices and land plotting technologies.⁵⁵ Monies have been lent to improve the efficiency of these offices and to make clear the rightful property owners at any time.⁵⁶ According to the World Bank loan documents supporting Panama's titling program:

Informality is one of the main issues of both, the urban and rural sector. To address some of these

⁵³ *Id.* (considering urban land specifically independent of housing policy). See generally Karst, *supra* note 37; DE SOTO, *supra* note 41; Sassen, *supra* note 33, see Dyal-Chand, *supra* note 42; David Kennedy, *Laws and Developments, in* CONTEMPLATING COMPLEXITY: LAW AND DEVELOPMENT IN THE 21ST CENTURY (Amanda Perry-Kessaris & John Hatchard eds., 2003).

⁵⁴ See Thomas T. Ankersen & Thomas Rupert, *Tierra y Libertad: The Social Function Doctrine and Land Reform in Latin America*, 19 TUL. ENVTL. L. J. 69 (2006) (arguing the significant elimination of social conceptions of property as a result of neo-liberal reforms).
⁵⁵ See, e.g., The World Bank, *Poverty and Social Development in Peru, 1994-1997* (1999).

⁵⁶ World Bank, Panama Land Administration Project http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2001/01/12/000094946_00122905320369/Rendered/PDF/multi_page.pdf (last visited Sept 5, 2008) (granting a \$58.7 million loan to be administered by Panama's Programa Nacional de Administración de Tierras).

problems, the Government has developed a Poverty Reduction Strategy in which land tenure security is a fundamental issue. The proposed Project will help the Government to implement this strategy.⁵⁷

In short, in its latest law-and-development iteration, the “informality” argument purports to turn the existing legal interests of squatters into classical property rights. This position, it bears noting, supports the neo-liberal agenda of de-regulation, privatization, and free markets. At the same time, the argument strikes a populist tone by asserting that “informals” will be better off. This is essentially the position advanced by Hernando de Soto and his followers.⁵⁸ The formula has become a generalized if unproven mantra. Again, the structure of the argument is not unlike early twentieth century legal theories advocating the “social” or social relations as a determinate source of legal norms.⁵⁹ The “informal” comes to occupy a similar role within the prescriptions of neo-liberal reformers. Indeed, turning to this domain has much the same flavor of socio-legal projects. It appears to offer a determinate, non-political source of legal rules and a populist one at that.

The promise of titling is providing greater access to home values. The premise is that these settlements are, for all intents and purposes, permanent. As such, settlers are at a minimum in possession of the land and most likely are so

⁵⁷ World Bank, Panama Land Administration Project, [http://wbinfo018.worldbank.org/LAC/PA_LandAdmin/Doclib.nsf/4145387661f08830852565a3005f4a64/411b2ffa283aafc85256a02005b3aab/\\$FILE/PO5050595.pdf](http://wbinfo018.worldbank.org/LAC/PA_LandAdmin/Doclib.nsf/4145387661f08830852565a3005f4a64/411b2ffa283aafc85256a02005b3aab/$FILE/PO5050595.pdf) (last visited May 9, 2008) (projecting 45,000 titles to be granted within Panama’s urban centers).

⁵⁸ See generally DE SOTO, THE OTHER PATH, *supra* note 41; HERNANDO DE SOTO, THE MYSTERY OF CAPITAL: WHY CAPITALISM TRIUMPHS IN THE WEST AND FAILS EVERYWHERE ELSE (Basic Books 2000).

⁵⁹ See Kennedy, A CRITIQUE OF ADJUDICATION *supra* note 46; see also Belleau, *The “Juristes Inquiets,”* *supra* note 46.

indefinitely. Yet, this form of land tenancy and the economic value that it represents are not available for circulation in the economy. So, if vested with a more cognizable property interest, *de facto* right-holders would be able to draw on the equity of their interests. This could take the form of borrowing against home equity or more freely alienating, leasing or otherwise disposing of the value in the full bundle of property rights. Promoted as being primarily beneficial to the poor, the preferred bundle of rights and privileges—urged by Developmentalists—are the classical and neo-liberal elements of full legal title. In fact, the argument is that this recognition merely cashes out the economic transfer of stable tenure already granted by the state.

In Panama City, several factors are salient: an overcrowded city, low incomes, high unemployment, low-skilled workers, short supply of affordable housing, and relative lack of government money for low income housing. Reporting on illegal occupations in 2002, the Panamanian press noted that the state at that point offered no housing programs for these low income groups.⁶⁰ The Panamanian Ministry of Housing currently reports four different government housing programs: public housing for 500 families in the interior of the country, a total of 1,000 awards of a \$2,000 subsidy for families obtaining commercial mortgages for properties under \$16,000; neighborhood infrastructure improvement projects and job training; and the sale of three large public lots to private developers for the building of mixed low income (under \$300/month) and lower income (over \$300/month) housing.⁶¹

The Ministry also claims that the national government between 2004 and 2006 issued a total of 30,095 titles

⁶⁰ José Arica, *Camino al precarismo*, LA PRENSA, May 8, 2002.

⁶¹ See República de Panamá, Ministerio de Vivienda, Programas, <http://www.mivi.gob.pa/paginasprincipales/programas07.html> (last visited Apr. 11, 2008).

to property nation-wide.⁶² Funded by the World Bank and the Inter-American Development Bank, the Panamanian agency charged with land titling is the Programa Nacional de Administración de Tierras (PRONAT).⁶³ The World Bank fund targets 25,000 new titles issued in urban areas and 12,000 more nationally, between 2006 and 2009.⁶⁴ Over the same period, the Inter-American Bank fund aims at 150,000 new titles.⁶⁵ Clearly, with the scant public investment in the sector, the Panamanian government is primarily counting on the titling of squatted land as the centerpiece of its housing policy. Whether or not titling self-built housing on public land is the best alternative for the poor, however, is a question best answered by analyzing the positives and negatives of the different legal options.

A. Questionable benefits

The position in favor of strong private rights has in the not so distant past been firmly championed by the propertied classes.⁶⁶ Indeed, one of the generally accepted reasons and diagnoses of the deficiency of Latin American democracies has been attributed to the unequal concentration of private land holding, represented by the striking image of the vast *latifundios* in the hands of an elite few.⁶⁷ The principal remedy for this concentration of power and wealth proposed throughout most of the twentieth century—although not very widely achieved except possibly in

Cuba (and there by abolishing private property)—has been agrarian reform. In effect, the process requires expropriating land from large landholders, not making productive use of their property, and transferring it to landless agricultural workers. There have also been movements, notably in Brazil, to extend this same procedure for the benefit of urban dwellers. In any case, the principal legal obstacle to land reform has been the figure of vested rights. If anything, the plight of the property-less and squatters has been understood as worsened by the restrictions on government policy imposed by an unyielding conception of private rights. Such formal rigidity has had the effect of impeding either imaginatively or constitutionally (or both) the ability of governments to more equitably redistribute legal entitlements.

Curiously, this more recent re-alignment of strong property rights as a benefit to the poor raises some questions about this one-time government transfer.⁶⁸ It is not clear that these programs fulfill their own stated objectives of increasing mortgage credit, improved lending conditions, greater investment in home improvement, and a deeper secondary home sales market.⁶⁹ Some scholars have noted the wide support for these efforts even though its benefits remain unproven:

⁶⁸ See Copello, Mercedes & Smolka, *infra* note 91 (stating that preliminary estimates in various places indicate that property values increase post titling by approximately 30%).

⁶⁹ Compare Cockburn, *supra* note 35, at 43-44 (In Peru these projects have been most far-reaching. There is some evidence of increased investment in housing and increases in prices of titled housing. However, note that formalization is only one among explanatory factors in a list including “various public and social policies, formalization and its diffusion, the subsidized credits of the Materials Bank, the initiatives of public services providers, and the assistance of multilateral institutions.”), with Karst *supra* note 37, at 569 (“the key motivation to investment in barrio housing appears to be the occupant’s ownership of the house [not the land]”).

⁶² *Id.*

⁶³ Decreto Ejecutivo No. 125, República de Panamá, Sept. 12, 2001.

⁶⁴ PRONAT, *Objetivos y Metas*, http://www.pronatpanama.org.pa/web/index.php?option=com_content&task=view&id=14&Itemid=44 (last visited May 8, 2008).

⁶⁵ *Id.*

⁶⁶ Joseph Thome, *The Process of Land Reform in Latin America*, 1968 WIS. L. REV. 9, 20-22 (1968).

⁶⁷ *Id.* at 10-14.

Analysts associated with the World Bank argue for legalization on the grounds that it increases land and housing values and provides access to credit for housing improvements. They do so in spite of growing evidence that tenure legalization is not required for investment in housing improvements. Squatters may even consolidate their houses faster than those with formal tenure. Both the advocates of legalization and the more skeptical, however have concentrated their attention on “technical” questions, and overlooked the political uses of illegality.⁷⁰

In Peru, where mass titling programs since 1996 have been widespread, “[a]ccess to mortgage loans by virtue of owning registered property has been negligible” and “there is no evidence that formalization is leading to the development of formal land markets among the low income population.”⁷¹ At the end of the day, these programs may not advance their own much vaunted goals. Instead, their only effect may be to consolidate a more rigid conception of private property rights. Furthermore, it is not clear that a monolithic slate of property rights is preferable in all cases to different modes of asset allocation. At a minimum, the overwhelming push for titled property rights limits possibilities for other alternatives.

B. The mystifying effect of arguments based on informality

As noted above, there are many different sorts of legal informality. They are common to modern legal sys-

tems.⁷² For example, socio-legal scholars have amply demonstrated the variation, adaptation, and only partial relevance of legal rules to social relations generally.⁷³ As such, legal informality is the common experience of life in law and society. In addition, the legal realists showed us that legal rules, by themselves, provide no static guarantee of individual expectations on the meaning of property.⁷⁴ The latter are subject to regular changes in the law, the competing forces of economic exchange, and plain legal non-recognition.⁷⁵ Thus, there is no autonomous separate private (or informal) domain independent of legal regulation and non-regulation combined. Moreover, classical private law property contains a variety of different legally protected interests—not solely grants of actual rights.⁷⁶ These different legal relations can vary in terms of formalization. Either way, these alternatives to the single logic of formal rights are equally options within law. As a result, the representation of informality and other legal interests as non-official law is misleading. The formal-informal distinction primarily demarcates alternative legal devices. As such, the concept of legal informality needs to be disaggregated if it is to mean anything at all.⁷⁷

⁷² See Macaulay, *supra* note 33.

⁷³ *Id.*

⁷⁴ See Robert Hale, *Coercion and Distribution in a Supposedly Noncoercive State*, 38 *Political Science Quarterly* 470 (1923), reprinted in *THE CANON OF AMERICAN LEGAL THOUGHT* 106-07 (David Kennedy & William W. Fisher III, eds., 2006) (discussing the inescapable exposure to vicissitudes of “legitimate expectations” framed as legal rights).

⁷⁵ *Id.*

⁷⁶ See Wesley Newcomb Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 *YALE L.J.* 16 (1913).

⁷⁷ See generally Alejandro Portes & Manuel Castells, *World Underneath: The Origins, Dynamics, and Effects of the Informal Economy*, in *THE INFORMAL ECONOMY: STUDIES IN ADVANCED AND LESS DEVELOPED COUNTRIES* 12 (Alejandro Portes, Manuel Castells & Lauren A. Benton eds. 1989).

⁷⁰ Ann Varley, *The Political Uses of Illegality: Evidence from Urban Mexico*, in *ILLEGAL CITIES: LAW AND URBAN CHANGE IN DEVELOPING COUNTRIES*, 172 (citations omitted).

⁷¹ Cockburn, *supra* note 35, at 44-45.

Defining informality symptomatically as either separate social norms or self-help deregulation obscures the pre-reform legal relations among squatters, the state, and third parties. Conversely, it unjustifiably equates formalization with classical property rights.⁷⁸ This convoluted reasoning advances the cause of broad rights and privileges to title-holders.⁷⁹ The sleight of hand is that the claimed source of the new proposed rights derives from areas where the state applies a different *de facto* property regime or where the state tolerates regulatory non-compliance.⁸⁰ Therefore, the change propounded is, in effect, either a change to a different form of property and/or the expansion of regulatory exemptions.

The classical rule of adverse possession provides a useful example here. This conventional legal doctrine regularly turns illegal trespassers into legal owners and thus routinely validates past periods of irregular—or informal—possession. In Peru, the period for adverse possession was shortened to one year, on the strength of this same argument characterizing squatters as “informals.”⁸¹ There may indeed be good policy reasons to shorten the period of adverse possession. For example, it may lead to greater

⁷⁸ See Horwitz, *supra* note 45, at 163-67 (describing Hohfeld’s and Hale’s understanding of the bundle of legal relations constituting property).

⁷⁹ See generally Daniela Caruso, *Private Law and State-Making in the Age of Globalization*, 39 N.Y.U. J. INT’L L. & POL. 1 (2006); Hohfeld, *supra* note 76 (describing more precisely some of the “rights,” “privileges,” “immunities,” and “powers” bestowed by law to property title-holders).

⁸⁰ See, e.g., George L. Priest, The Informal Economy: *The Ambiguous Moral Foundations of the Underground Economy*, 103 YALE L.J. 2259 (1994) (highlighting the high levels of informal activity in the U.S., distinguishing among types of informal activity, and defending the preference for aggregating moral justification and value of informal markets).

⁸¹ Winter King, *Illegal Settlements and the Impact of Tiling Programs*, 44 HARV. INT’L L.J. 433 (2003).

tenure security, regulatory compliance, social justice, personal savings, and the like. Alternatively, there may be good reasons against quickly increasing the stock of titled property rights. The latter permit a number of excesses, if not outright abuses, by titleholders often externalizing social costs, such as the harms associated with over-building, reduced quality of life to neighbors, and pollution. Commoditization of titles encourages practices of financial speculation on assets serving multiple needs, like sufficient housing.⁸² An expansive allocation of property rights may frustrate other public policy goals. However, the force of arguments based on “reducing informality” has the effect of pre-empting more transparent consideration of the various pros and cons.

Accordingly, in relation to the housing context in particular, it may be more useful to speak in terms of different legal relations and distributional rules rather than formal and informal law.⁸³ For neo-liberals, the preferred rules are expansive interests for private property holders.⁸⁴ It is not clear whether or not this reduces or raises the actual aggregate amount of legal non-compliance across society.⁸⁵ Irrespectively, by claiming to end informality through titling, the law is changed and government regulation, planning, and more significant redistribution are made more difficult. Marshalling the argument of informality either to reinforce property rights—as in the 1990’s neo-development—or to loosen vested property rights—as in the 1960’s law and development, however, obscures the

⁸² See generally Claire Priest, *Creating an American Property Law: Alienability and its Limits in American History*, 120 HARV. L. REV. 385 (2006).

⁸³ See Hale, *supra* note 74.

⁸⁴ See Ankersen & Ruppert, *supra* note 54.

⁸⁵ See Alejandro Portes & Richard Schauffer, *Perspectives on the Latin American Informal Sector*, 19 POPULATION AND DEV. REV. 33 (1993) (discussing measures of informality).

multiple policy decisions and regulatory options represented by these categories.

Indeed, marshalling informality as a *stand-alone argument* in favor of titling classical property rights eclipses the range of other policy questions implicated by squatter settlements. The latter involve not merely asset transferability, liquidity, mortgage-ability and the type of security provided by registered titles. They also include questions about access to housing, building requirements, safety, habitability, disclosure, transportation, public health, environment, and the like. These other objectives need to be better addressed, possibly even with international development assistance. Moreover, the possibilities for reform advanced by the concept of informality—advocating a change in the law—are never fully extinguished by title formalization. As the examples below will show, legitimate expectations and democratic will can be frustrated despite rights to legal title. New legislation, ministry regulations, and judicial pronouncements can reinterpret rules, apply standards, under-enforce regulations, or simply presume entitlements in favor of one right-holder versus another. These points are more fully addressed further below.

V. An alternative conception of property

A common way of conceptualizing untitled property, as argued above, is as a failing of the formal law. This form of “informality,” it is argued, is a malfunctioning of state legal systems. Its very existence is advanced as the rationale for law reform. Recent reforms, furthermore, seek to formalize a *particular* conception of property. Within the neo-liberal program, this conception is a neo-classical version of property rights.⁸⁶

By contrast, a more precise understanding of untitled property holding unveils the operation of a different

⁸⁶ See Ankersen & Rupert, *supra* note 54.

type of legal relationship. Shorn of the negative connotations of “informality,” untitled housing on state land simply constitutes a different set of legal relations. It reveals the exercise of a privilege to build and reside on state land, informally yet still officially recognized by the government.⁸⁷ This form of tenancy is both subordinate to certain superior rights of the state, and the subject of a number of legal privileges.⁸⁸ It responds to demands for affordable housing at the expense of other public uses and proper regulatory compliance. Describing the Mexican context, for example:

Land tenure regularization in Mexico may be understood primarily as a means for routine, low-cost, state intervention in the production of urban land and housing for the low-income population...regularization programmes give clear expression to the predominant laissez-faire approach to housing the poor: official tolerance of illegal subdivision ensuring an abundant supply of inexpensive housing plots, and the post hoc legitimization of this process in tenure regularization programmes.⁸⁹

Indeed, the *de facto* government policies that enable this form of tenancy reflect implicit policy decisions. This is not to say that in a context of more or different resources, policy makers would not affirmatively make different choices and regulations in the area of housing. Of course, it

⁸⁷ See generally Pérez-Perdomo and Nikken, *supra* note 38.

⁸⁸ See generally Hohfeld, *supra* note 76 (for example, the privilege to exclude other non-right holders from possession and *de facto* immunity from building code enforcement action).

⁸⁹ Antonio Azuela & Emilio Duhau, *Tenure Regularization, Private Property and Public Order in Mexico*, in ILLEGAL CITIES: LAW AND URBAN CHANGE IN DEVELOPING COUNTRIES 157, 168 (Edésio Fernandes & Ann Varley, eds., 1998).

Introduction

The constructed opposites of formality and informality have been a constant of the development discourse for more than half a century. They have anchored theoretical, empirical, and policy discussion in many disciplines as they have studied the development process. In the 1940s, the Dutch anthropologist Boeke (1942) developed a vision of a developing economy as a 'dual' economy, comprised of the market economy part of the world and a part which lay outside. In the 1950s, Arthur Lewis (1954) conceptualized an influential two-sector model of development in which one sector had modern capitalist firms that maximized profit, while the other sector was comprised of peasant households where the rules for sharing output were different. In the 1970s, the Harris and Todaro (1970) model in development economics brought the dual economy into the standard two-sector framework of equilibrium economics. In development studies more generally, however, the paper by Keith Hart (1973) and the ILO mission to Kenya (ILO 1972) established the importance of the dichotomy, and led to an outpouring of research and policy focus. It has helped to organize thinking, it has served to structure official statistics, and it has generated a series of policy measures to 'help' the informal sector.

Despite this pedigree, the usefulness of the formal–informal dichotomy has constantly been debated in the literature. Early critiques include that by Bromley (1978). Lipton (1984) defends the usefulness of the concept of the informal sector, but argues for care and nuance in application. Over the past 30 years, this 'to and fro' has continued as new evidence from new areas has been brought to bear on the debate. For example, detailed work, in the 1980s and the 1990s, on the management of common property regimes has shed new light on what were once considered to be 'informal' arrangements (McCay and Acheson 1987; Ostrom 1990; Bromley et al. 1992). Policies introduced to 'formalize' these arrangements have been criticized in light of their sometimes counterproductive consequences (Platteau 2004; Platteau and Gaspart 2003; Agrawal and Gupta 2005). In the last few years, the idea of extending formal legal property rights to the 'informal' sector has taken hold as a possible powerful policy tool to help the poor make the best of their assets (de Soto 1989, 2003; but see Alden Wily, chapter 15, this volume). In light of these developments, it is appropriate to consider once again the conceptual and empirical basis of the formal–informal divide, and to assess carefully its policy implications.

[...]

Conceptualizing Formal and Informal

Given the prominence of the formal–informal dichotomy in the development discourse, one might expect to see a clear definition of the concepts, consistently applied across the whole range of theoretical, empirical, and policy analyses. We find no such thing. Instead, it turns out that formal and informal are better thought of as metaphors that conjure up a mental picture of whatever the user has in mind at that time.

In his early defense of the informal sector (IS) concept, Lipton (1984: 196) set out the problem as follows: 'The IS concept has become discredited on account of three alleged deficiencies: misplaced dualism, misplaced isolation and confusion'. He then goes on to specify each critique and to mount a defense against it. Misplaced dualism refers to the fact that in practice there is no clear split between formal and informal; rather, there is a 4 continuum. The defense is that a dichotomy can nevertheless prove useful in analytical terms. Misplaced isolation is the neglect of the fact that the relationships of the informal sector to the rest of the economy are not investigated. While this is a valid critique of some of the literature, as Lipton also notes, we agree with Lipton that this is not an inherent weakness of the dichotomy, but rather of the uses to which it is put.

characteristics are used to define IS. These are: (1) 'substantial overlap between providers of capital and providers of labour in each enterprise' (pp. 198–200); (2) 'prevalence of perfect, or rather ... near-perfect, competition' (p. 200); and (3) 'IS consists largely of "unorganised," unincorporated enterprises, to which legal restrictions on employment (wage minima, regulations affecting working conditions, etc.) and on acquisitions of non-labour inputs (licences, quotas, etc.) do not apply ...' (pp. 200–201).

However, in the literature since Lipton (1984), the tendency to use many different characterizations has persisted. A bewildering range of (often only implicit) definitions are used to discuss the formal and the informal. Reviews since Lipton (1984) have concluded that there are competing perspectives rather than a single dichotomy (Portes and Schaffer 1993; Cross 1998), and this view is supported by the most recent examinations of the literature (Christensen, chapter 3, this volume; Sindzingre, chapter 4, this volume). And discussions of the formal and the informal have been enriched considerably by the literature of the past two decades on (self) organization of common property regimes (Ostrom 2005), and by the push in some policy circles to extend property rights to groups of individuals who do not currently 'enjoy' such rights (de Soto 2003).

Not surprisingly, the views on the entities that comprise the informal sector also differ greatly. Lipton (1984) argued strongly for the 'Family Mode of Production' as a general category that fell naturally into this category. In official statistics, different countries use the terms differently in detail even when they might mean the same thing in a general sense (Muller and Esselaar 2004; Narayana, chapter 6, this volume; Sindzingre, chapter 4, this volume). The international official definitions, for example as codified by the ILO, have been expanding. The current official definition of 'informal sector' was adopted by the 1993 International Conference of Labor Statisticians based on characterizing an enterprise as informal. In 2003, guidelines were introduced to expand the definition to include informal employment outside informal enterprises, with an appropriate definition of the former (Chen, chapter 5, this volume).

From this mass of alternative uses of the terms and alternative characterizations, we would like to highlight two strands that are particularly relevant for the current policy dialogue. The first strand is the notion of informal as being outside the reach of different levels and mechanisms of official governance and formal as being reachable by these mechanisms. This notion underlies many official definitions of 'informal enterprises' as those that are not registered and are legally outside the tax net. It also underlies many analytical investigations of enterprises and activities that operate illegally, in violation of formal state rules and regulations, even though informality and illegality are not considered to be equivalent in this notion. This notion also animates the lively policy debate on the extent to which the informal sector owes its existence to 'overly constraining' official regulations which lead to economic activity taking place outside this net, either by organizing so that the regulations do not formally apply, or operating in contravention of the regulations. And, of course, this is also the dimension that best captures different views on the benefits or otherwise of extending the reach of official structures to where they currently do not reach (e.g., legal property rights), or of reducing this reach (e.g., labour regulations).

The second strand that can be discerned in the discourse, and which we believe to be important in shaping policy responses, has to do with the nature of organization. The informal is often identified with 'lacking structure' and the formal with 'structured'—the term 'unorganized sector' is often used. Other cross-cutting themes one finds are 'simple' versus 'complex' or 'irregular' versus 'predictable' (Hart, chapter 2, this volume). In the policy discourse, the association of the informal with unstructured has been a powerful impetus for interventions that have often led to disaster. A striking illustration of this is the attempt to nationalize forests in Nepal, based on the analysis that deforestation was being caused by the inability of small local communities to prevent environmental degradation (Ives and Messerli 1989). In fact, as we now know, the local communities had better structures in place to deal with the deforestation that was the result of population and other pressures (Arnold 1993; Varughese and Ostrom 2001). These structures were not recognized, and were replaced by the formal state structures which proved to be ineffective and corrupt leading to even faster deforestation (Gilmour and Fisher 1991; Walther-Toews et al. 2003). Now, the government of Nepal is trying to reverse its earlier policy and is turning many forests over to Forest User Groups that it organizes (Nagendra and Ostrom, forthcoming).

Exactly the opposite is true of the software industry of India, now recognized as a world leader. It flourished under the entrepreneurship of some highly skilled and far-sighted individuals, quickly becoming the fastest growing export sector of India. Its current reforms notwithstanding, India still remains a fairly regulated economy, but the

government was surprisingly non-interfering as far as the software sector was concerned. Even until very recently, the industry's output and exports were categorized as 'miscellaneous' in India's national accounts (as opposed to being called 'manufacturing' or 'services'), such was the degree of informality. The initial abstinence of the government was indeed a blessing in disguise.

These two dimensions—the reach of official governance and the degree of structuring—need to be further specified and made precise, but they provide an initial entry to a framework for capturing the many definitions that abound in the literature. In this conception, an economic activity can be characterized along two dimensions. The first is the extent to which it interacts with, or comes into the net of, the structures of official governance at the national or local levels. The question of whether an employer is registered or not with a governmental unit would be a simple illustration of this dimension (see chapters 2-6 in Part 1 of this volume). The second dimension is the extent to which an activity and the interactions among its constituent individuals are structured according to a predictable framework (not necessarily one that is written down). Muller and Esselaar (2004), for example, refer to the casualization of employment as involving employees of both registered and unregistered firms who lack a written contract or any form of employee benefits. They find that a significant number of employees have a casual (e.g., unstructured) relationship with employers in South Africa.

The distinction between the two dimensions is not redundant. This is illustrated for example by the detailed empirical work showing the highly structured interactions within groups that manage common-pool resources, far removed from any interaction with official governance (Tucker and Ostrom 2005; Ostrom 2005). Moreover, for similar levels of connection with the state tax system, we see enterprises with very different types and complexities of internal structure.

The two dimensions do, however, interact. On the one hand, attempts by official governance to extend its reach, for example, by widening a regulation to an area where it was not previously applied, will in general lead to a response that may move some activities outside the reach of the regulation (legally or illegally). In so doing, it may well change the structuring of the activities that escape the official net. It has been observed, for example, that relationships within illegal activities are often very highly structured, sometimes more so than in legal activities, as a response to the risks of the activity in question (Gambetta 1996). By the same token, some types of (re)structuring of activities make official intervention easier, or may even be predicated by the nature of the official governance frameworks. For example, as an enterprise expands, it can be monitored and taxed more easily. As another example, if an enterprise wants to become a publicly held company, it can only do so within the framework of existing company law, by definition.

Thus both dimensions are needed to adequately characterize activities and to analyze interventions. And it is not helpful to say that activities to one extreme of both dimensions—for example with high official intervention and highly structured interactions—are 'formal' while those at the other end are 'informal'.

On the policy front, as the chapters in this collection make clear, the policy issue is not one of 'greater' or 'lesser' reach of government being better in general, as it is so often characterized, but one of the 'right' reach of government (Söderbaum, chapter 9, this volume; Shuaib 2004). This 'right' reach has to take into account (1) the objectives of intervention, (2) the implementation of the intervention, and (3) the response of the structuring of activities to this intervention—it being recognized that 'more' or 'less' structured does not necessarily correlate with 'good' or 'bad' (Nugent and Swaminathan, chapter 12, this volume).

What then are we to do with the terms 'formal' and 'informal'? It seems clear that they cannot be suppressed—they are now too well ingrained in the academic and policy discourse. And, as Lipton (1984) argues, their continued use despite all the debates perhaps suggests a continued utility. We would propose, therefore, especially in light of official statistical conventions already adopted, that the formal-informal continuum apply strictly to the continuum between relatively high and relatively low levels of the reach of official governance mechanisms, suitably specified and measured in each context. This relates the terminology directly to the policy discourse on the nature and extent of government intervention in economic activity. This is our preferred option. However, even in this case we would prescribe a health warning—informal does not mean unstructured and chaotic, and does not invite policy intervention on those grounds! More generally, we would keep the 'reach of government' as a purely descriptive term, leaving the issue of whether it is a good thing or a bad thing to be decided on a case by case basis, taking into account the self-organizing structures that communities are capable of producing, within or without the reach of official structures.

Thus, while specifics matter greatly and no general rules can be formulated, a number of themes run through the chapters of this book which can perhaps be brought together as a small number of lessons learnt to serve as recommendations for future work or evaluative criteria that could be applied. These include:

- *Subsidiarity in a multi-level system.* Place the intervention as close as possible (in terms of level of government and/or geographically) to where it is meant to influence markets or groups, but inbed it in a larger system that supports the autonomy of lower level governments and provides them essential back-up services including conflict resolution.
- *Balance between 'formal' interventions and 'informal' practices.* In other words, 'formal' interventions are more effective if they are not meant to replace or 'crowd out' 'informal' rules, but help fine-tune them instead.
- *Implementation capacity.* Design the intervention to be consistent with the implementation capacity of government, and the absorptive capacity of people it is meant to help.
- *Complementary interventions.* Interventions that work are usually in the form of a package. Complementary measures are needed to support the core intervention for it to work.
- *Use voting with their feet as an evaluation criteria.* If people try to move out of the net of an intervention in significant numbers, its presumed efficacy for their well-being must be questioned. If on the other hand people move into the net of an intervention (including when that intervention is reduced), this is a signal of its efficacy.

COERCION AND DISTRIBUTION IN A SUPPOSEDLY
NON-COERCIVE STATE

“And while the House of Peers withholds its legislative hand,
And noble statesmen do not itch
To interfere with matters which
They cannot understand,
As bright will shine Great Britain’s rays
As in King George’s glorious days.”

—From W. S. Gilbert’s *Iolanthe*.

THE so-called individualist would expand this philosophy to include all statesmen, whether noble or not, and to include all economic matters as among those which they cannot understand. The practical function of economic theory is merely to prove to statesmen the wisdom of leaving such matters alone, not to aid them in the process of interfering. And in foreign as well as in domestic affairs, they should make no effort to control the natural working of economic events. This would seem to be the general view of Professor Thomas Nixon Carver,¹ although he likewise speaks frequently as a nationalist. But a careful scrutiny will, it is thought, reveal a fallacy in this view, and will demonstrate that the systems advocated by professed upholders of *laissez-faire* are in reality permeated with coercive restrictions of individual freedom, and with restrictions, moreover, out of conformity with any formula of “equal opportunity” or of “preserving the equal rights of others.” Some sort of coercive restriction of individuals, it is believed, is absolutely unavoidable, and cannot be made to conform to any Spencerian formula. Since coercive restrictions are bound to affect the distribution of income and the direction of economic activities, and are bound to affect the economic interests of persons living in foreign parts, statesmen cannot avoid interfering with economic matters, both in domestic and in foreign affairs. There is accordingly a need for the development of economic and legal theory to guide them in the process.

To proceed to an examination of Professor Carver’s system. His “individualism” is not entirely orthodox, for he is conscious of a certain amount of restriction of liberty in the scheme he advocates.

¹ *Principles of National Economy*. By Thomas Nixon Carver. New York, Ginn and Company, 1921.—vi, 773 pp.

Indeed his statement on page 747 is altogether too pragmatic to please the doctrinaire disciple of Spencer. In each proposed case of governmental interference, he thinks, the question is to be asked, “Are the evils to be repressed greater than those that accompany the work of repression, and are the evils to be removed by regulation greater than those that accompany the work of regulation? The method of procedure must be to consider, appraise, and compare the evils on both sides.” While this test might be accepted by the so-called paternalist, as well as by the so-called individualist, Mr. Carver’s final conclusions as to governmental activity do not differ materially from those of the more orthodox of the latter. The government, he thinks, should exercise sufficient constraint to prevent destruction and deception, to standardize measures, qualities and coins, to enforce contracts, to conduct certain enterprises (like lighthouses) which cannot well be carried on otherwise, to regulate monopoly prices and to control the feeble-minded and the otherwise incompetent in their own interest. It should not coerce people to work, nor should it, with rare exceptions, undertake to direct the channels into which industry should flow. It should, however, prevent any private person or group from exercising any compulsion. The government must also impose taxes; it should restrict immigration and furnish educational opportunities. Such a scheme has the appearance of exposing individuals to but little coercion at the hands of the government and to none at all at the hands of other individuals or groups. Yet it does in fact expose them to coercion at the hands of both, or at least to a kind of influence indistinguishable in its effects from coercion. This will shortly appear more clearly, it is hoped. Meanwhile, let it be kept in mind that to call an act coercive is not by any means to condemn it. It is because the word “coercion” frequently seems to carry with it the stigma of impropriety, that the coercive character of many innocent acts is so frequently denied.

What is the government doing when it “protects a property right”? Passively, it is abstaining from interference with the owner when he deals with the thing owned; actively, it is forcing the non-owner to desist from handling it, unless the owner consents. Yet Mr. Carver would have it that the government is merely preventing the non-owner from using force against the owner (pp. 104–5 and 106). This explanation is obviously at variance with the facts—for the non-owner is forbidden to handle the owner’s property even where his handling of it involves no violence or force whatever. Any lawyer could have told him that the right of property is much more extensive than the mere

right to protection against forcible dispossession. In protecting property the government is doing something quite apart from merely keeping the peace. It is exerting coercion wherever that is necessary to protect each owner, not merely from violence, but also from peaceful infringement of his sole right to enjoy the thing owned.

That, however, is not the most significant aspect of present-day coercion in connection with property. The owner can remove the legal duty under which the non-owner labors with respect to the owner's property. He can remove it, or keep it in force, at his discretion. To keep it in force may or may not have unpleasant consequences to the non-owner—consequences which spring from the law's creation of legal duty. To avoid these consequences, the non-owner may be willing to obey the will of the owner, provided that the obedience is not in itself more unpleasant than the consequences to be avoided. Such obedience may take the trivial form of paying five cents for legal permission to eat a particular bag of peanuts, or it may take the more significant form of working for the owner at disagreeable toil for a slight wage. In either case the conduct is motivated, not by any desire to do the act in question, but by a desire to escape a more disagreeable alternative. In the peanut case, the consequence of abstaining from a particular bag of peanuts would be, either to go without such nutriment altogether for the time being, or to conform to the terms of some other owner. Presumably at least one of these consequences would be as bad as the loss of the five cents, or the purchaser would not buy; but one of them, at least, would be no worse, or the owner would be able to compel payment of more. In the case of the labor, what would be the consequence of refusal to comply with the owner's terms? It would be either absence of wages, or obedience to the terms of some other employer. If the worker has no money of his own, the threat of any particular employer to withhold any particular amount of money would be effective in securing the worker's obedience in proportion to the difficulty with which other employers can be induced to furnish a "job". If the non-owner works for anyone, it is for the purpose of warding off the threat of at least one owner of money to withhold that money from him (with the help of the law). Suppose, now, the worker were to refuse to yield to the coercion of any employer, but were to choose instead to remain under the legal duty to abstain from the use of any of the money which anyone owns. He must eat. While there is no law against eating in the abstract, there is a law which forbids him to eat any of the food which actually exists in the community—and that law is the law of property. It can

be lifted as to any specific food at the discretion of its owner, but if the owners unanimously refuse to lift the prohibition, the non-owner will starve unless he can himself produce food. And there is every likelihood that the owners will be unanimous in refusing, if he has no money. There is no law to compel them to part with their food for nothing. Unless, then, the non-owner can produce his own food, the law compels him to starve if he has no wages, and compels him to go without wages unless he obeys the behests of some employer. It is the law that coerces him into wage-work under penalty of starvation—unless he can produce food. Can he? Here again there is no law to prevent the production of food in the abstract; but in every settled country there is a law which forbids him to cultivate any particular piece of ground unless he happens to be an owner. This again is the law of property. And this again will not be likely to be lifted unless he already has money. That way of escape from the law-made dilemma of starvation or obedience is closed to him. It may seem that one way of escape has been overlooked—the acquisition of money in other ways than by wage-work. Can he not "make money" by selling goods? But here again, things cannot be produced in quantities sufficient to keep him alive, except with the use of elaborate mechanical equipment. To use any such equipment is unlawful, except on the owner's terms. Those terms usually include an implied abandonment of any claim of title to the products. In short, if he be not a property owner, the law which forbids him to produce with any of the existing equipment, and the law which forbids him to eat any of the existing food, will be lifted *only* in case he works for an employer. It is the law of property which coerces people into working for factory owners—though, as we shall see shortly, the workers can as a rule exert sufficient counter-coercion to limit materially the governing power of the owners.

Not only does the law of property secure for the owners of factories their labor; it also secures for them the revenue derived from the customers. The law compels people to desist from consuming the products of the owner's plant, except with his consent; and he will not consent unless they pay him money. They can escape, of course, by going without the product. But that does not prevent the payment being compulsory, any more than it prevents the payment of the government tax on tobacco from being compulsory. The penalty for failure to pay, in each case, may be light, but it is sufficient to compel obedience in all those cases where the consumer buys rather than go without. On pages 620-621, Mr. Carver attempts

to distinguish on the ground that in the case of the tax the government "did not produce the tobacco but only charges the manufacturer or the dealer for the privilege of manufacturing or selling." But this is equally true of the owner of the factory, if he is an absentee owner. Whether the owner has rendered a service or not bears only on the question of the justification of the income which he collects, not on whether the process of collecting it was coercive.

As already intimated, however, the owner's coercive power is weakened by the fact that both his customers and his laborers have the power to make matters more or less unpleasant for him—the customers through their law-given power to withhold access to their cash, the laborers through their *actual* power (neither created nor destroyed by the law) to withhold their services. Even without this power, it is true, he would have to give his laborers enough to sustain them, just as it is to his own interest to feed his horses enough to make them efficient. But whatever they get beyond this minimum is obtained either by reason of the employer's generosity and sense of moral obligation, or by his fear that they will exercise the threat to work elsewhere or not at all. If obtained through this fear, it is a case where he submits by so much to their wills. It is not a "voluntary" payment, but a payment as the price of escape from damaging behavior of others. Furnishing food to one's slaves is essentially different; the owner may do it reluctantly, but if there is any "coercion" it is the impersonal coercion by the facts of nature which account for the slaves' labor being less efficient without the food; he is not influenced by the will of any human being. In paying high wages to wage-earners, on the other hand, he is. But for their will to obtain the high wages, and their power of backing up that will, he has no reason for paying them. Yet he does. What else is "coercion"?

There is, however, a natural reluctance so to term it. This can be explained, I think, by the fact that some of the grosser forms of private coercion are illegal, and the undoubtedly coercive character of the pressure exerted by the property-owner is disguised. Hence the natural reaction to any recognized form of private coercion is, "forbid it." One who would not wish to take from the laboring man his power to quit the employer, or to deny him the wages that he gets for *not* quitting, is apt to resent the suggestion that those wages are in fact coercive. But were it once recognized that nearly all incomes are the result of private coercion, some with the help of the state, some without it, it would then be plain that to admit the coercive nature of the process would not be to condemn it. Yet popular thought un-

doubtedly does require special justification for any conduct, private or governmental, which is labeled "coercive", while it does not require such special justification for conduct to which it does not apply that term. Popular judgment of social problems, therefore, is apt to be distorted by the popular recognition or non-recognition of "coercion". Hence it may be worth while to run down into more detail the distinctions popularly made between coercion and other forms of influence over people's conduct.

"Threats" are often distinguished from "promises". If I tell a man I will do some positive act whose results will be unpleasant to him, unless he pays me money, and if as a result he pays it, I would usually be said to be collecting it by means of a "threat." If, on the other hand, I tell him I will do some positive act, whose results will be pleasant to him, *if* he pays me money, and he does, it would be said more commonly that I collected it by means of a "promise". Partly as a result of the moral connotation generally given to these terms, partly as its cause, the law more frequently interferences to prevent the doing of harmful acts than it does to compel the doing of helpful ones. Many (but not all) positive acts which are disadvantageous to others are forbidden; not so many positive acts that are advantageous to others are compelled. In other words, most torts and crimes consist of positive acts. Failure to help does not as a rule give rise to legal punishment or a right of action. Yet there are exceptions. Certain acts not in themselves actionable at law, may give rise to legal duties to perform positive acts. If I start an automobile in motion, I have committed no legal wrong; but if subsequently I fail to perform the act of stopping it when "reasonable care" would require me to do so, the victim of my failure to act can recover damages for my non-performance.¹ Again, and more significant, if I have promised to do certain things (with certain formalities or "consideration"), my act of promising was not a legal wrong. But if I subsequently fail to perform at the time specified, the promisee has a right of action for my failure to act. It is significant of the reluctance to admit the existence of positive legal duties, that in both cases language is used which makes my wrong conduct seem to consist of wrongful acts instead of wrongful *failure* to act. It is said, in the one case, that I "ran over" the victim, in the other that I "*committed* a breach of contract." Yet in neither was the wrong an act, but a failure to act; in the first case, my failure to make the requisite motions for stopping the car; in the second, my failure to perform the act promised.

¹ Cf. an article by Leon Green in 21 *Michigan Law Review*, 495 (March, 1923).

Now suppose that instead of actually refraining from doing the acts which the law requires, I say to a man, "Pay me a thousand dollars, and when I meet you on the road walking I will use sufficient care to stop my car or to steer it so that it will not hit you; otherwise I will do nothing about it." Is that a "threat" or a "promise"? Or if I say, "Pay me a thousand dollars and I will perform the acts I have already contracted to perform"? I believe most people would call these statements threats rather than promises. Why? It may be partly due to the misleading language which speaks of the *act* of running over and the *act* of breaking a contract. But even were the fact recognized that payment were demanded as the price of *not abstaining*, I believe the demands would still be called threats. The reason, I believe, is partly because to abstain is contrary to legal duty, partly because it is adjudged to be contrary to moral duty. Popular speech in this case seems to apply the term coercion to demands made as a price of not violating a legal or moral duty, whether the duty consists of acting or of letting alone. But this criterion will not do, either.

If an act is called "coercion" when, and only when, one submits to demands in order to prevent another from violating a legal duty, then every legal system by very definition forbids the private exercise of coercion—it is not coercion unless the law does forbid it. And no action which the law forbids, and which could be used as a means of influencing another, can fail to be coercion—again by definition. Hence it would be idle to discuss whether any particular legal system forbids private coercion. And if an act is called "coercion" when, and only when, one submits to demands in order to prevent another from violating a *moral* duty, we get right back to the use of the term to express our conclusion as to the justifiability of the use of the pressure in question; with the ensuing circular reasoning of condemning an act because we have already designated it "coercive." One is likely, that is, to have a vague feeling against the use of a particular form of economic pressure, then to discover that this pressure is "coercive"—forgetting that coerciveness is not a ground for condemnation except when used in the sense of influence under pain of doing a morally unjustified act. And obviously to pronounce the pressure unjustified because it is an unjustified pressure is to reason in a circle. Hence, it seems better, in using the word "coercion", to use it in a sense which involves no moral judgment.

But popular feeling sometimes makes another distinction. If I plan to do an act or to leave something undone for no other purpose than to induce payment, that might be conceded to be a "threat." But if

I plan to do a perfectly lawful act for my own good, or to abstain from working for another because I prefer to do something else with my time, then if I take payment for changing my course of conduct in either respect, it would not be called a threat. If a man pays me to keep out of a particular business, or if he pays me to work for him (when I am not legally bound by contract to do so), then it seems absurd to many to say that he paid me under threat of coercion—unless, in the first case, my sole motive in entering the business was to bring him to terms, and unless in the second I preferred working for him to any other occupation of my time, and my sole motive in abstaining was again to bring him to terms. For purposes of ordinary conversation, some other word than coercion may be preferred to describe payments made to a man who makes a sacrifice to "earn" them. But can a line be drawn? I believe the popular distinction along these lines is based on moral judgment. If a man gives up a job he likes, or if he works for another man, why shouldn't he be paid for it?—it will be asked. Perhaps he should. But unless the term "coercion" is applied only to conduct adjudged immoral, does the justifiability of the receipt of payment prevent it from being coercive?

If those distinctions are all invalid, then, which seek to remove the term "coercive" from some of the influences exerted to induce another to act against his will, it seems to follow that the income of each person in the community depends on the relative strength of his power of coercion, offensive and defensive. In fact it appears that what Mr. Carver calls the "productivity" of each factor means no more nor less than this coercive power. It is measured not by what one actually *is* producing, which could not be determined in the case of joint production, but by the extent to which production would fall off if one left and if the marginal laborer were put in his place—by the extent, that is, to which the execution of his threat of withdrawal would damage the employer.¹ Not only does the distribution of income depend on this mutual coercion; so also does the distribution of that power to exert further compulsion which accompanies the management of an industry. Some extremely interesting suggestions of the likelihood of control by capitalists, cooperative buyers, cooperative sellers and laborers are to be found on pages 222–225. This power is frequently highly centralized, with the result that the worker is frequently deprived, during working hours and even beyond, of all choice over his own activities.

¹ Cf. the statement on p. 530.

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FUNDAMENTAL LEGAL CONCEPTIONS

AS APPLIED IN JUDICIAL REASONING
AND OTHER LEGAL ESSAYS

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FUNDAMENTAL JURAL RELATIONS CONTRASTED WITH ONE ANOTHER

One of the greatest hindrances to the clear understanding, the incisive statement, and the true solution of legal problems frequently arises from the express or tacit assumption that all legal relations may be reduced to "rights" and "duties," and that these latter categories are therefore adequate for the purpose of analyzing even the most complex legal interests, such as trusts, options, escrows, "future" interests, corporate interests, etc. Even if the difficulty related merely to inadequacy and ambiguity of terminology, its seriousness would nevertheless be worthy of definite recognition and persistent effort toward improvement; for in any closely reasoned problem, whether legal or non-legal, chameleon-hued words are a peril both to clear thought and to lucid expression.²⁴ As a matter of fact, however, the above mentioned inadequacy and ambiguity of terms

²⁴ As an example of this, compare Lord Westbury, in *Beil v. Kennedy* (1868), L. R. 1 H. L. (Sc.), 307: "Domicile, therefore, is an idea of the law. It is the relation which the law creates between an individual and a particular locality or country." [Compare the confusion in the discussion of the same subject by Farwell, J., in *In re Johnson* [1903] 1 Ch., 821, 824-825.]

Contrast the far more accurate language of Chief Justice Shaw, in *Abington v. Bridgewater* (1840), 23 Pick., 170: "The fact of domicile is often one of the highest importance to a person; it determines his civil and political rights and privileges, duties and obligations. . . ."

²⁵ In this connection, the words of one of the great masters of the common law are significant. In his notable *Preliminary Treatise on Evidence* (1898), p. 190, Professor James Bradley Thayer said:

"As our law develops it becomes more and more important to give definiteness to its phraseology; discriminations multiply, new situations and complications of fact arise, and the old outfit of ideas, discriminations, and phrases has to be carefully revised. Law is not so unlike all other subjects of human contemplation that clearness of thought will not help us powerfully in grasping it. If terms in common legal use are used exactly, it is well to know it; if they are used inexactly, it is well to know that, and to remark just how they are used."

Perhaps the most characteristic feature of this author's great constructive contribution to the law of evidence is his constant insistence on the need for clarifying our legal terminology, and making careful "discriminations" between conceptions and terms that are constantly being treated as if they were one and the same. See e.g., *ibid.*, pp. vii, 183, 189-190, 278, 306, 351, 355, 390-393. How

unfortunately reflect, all too often, corresponding paucity and confusion as regards actual legal conceptions. That this is so may appear in some measure from the discussion to follow.

The strictly fundamental legal relations are, after all, *sui generis*; and thus it is that attempts at formal definition are always unsatisfactory, if not altogether useless. Accordingly, the most promising line of procedure seems to consist in exhibiting all of the various relations in a scheme of "opposites" and "correlatives," and then proceeding to exemplify their individual scope and application in concrete cases. An effort will be made to pursue this method:

Jural Opposites	{ right no-right	privilege duty	power disability	immunity liability
Jural Correlatives	{ right duty	privilege no-right	power liability	immunity disability

Rights and Duties. As already intimated, the term "rights" tends to be used indiscriminately to cover what in a given case may be a privilege, a power, or an immunity, rather than a right in the strictest sense; and this looseness of usage is occasionally recognized by the authorities. As said by Mr. Justice Strong in *People v. Dikeman*,²⁶

"The word 'right' is defined by lexicographers to denote, among other things, *property, interest, power, prerogative, immunity, privilege* (Walker's Dict. word 'Right'). In law it is most frequently

given the influence of those discriminations has been is well known to all students of the law of evidence.

The comparatively recent remarks of Professor John Chipman Gray, in his *Nature and Sources of the Law* (1909), Pref. p. viii, are also to the point:

"The student of Jurisprudence is at times troubled by the thought that he is dealing not with things, but with words, that he is busy with the shape and size of counters in a game of logomachy, but when he fully realizes how these words have been passed and are still being passed as money, not only by fools and on fools, but by and on some of the acutest minds, he feels that there is work worthy of being done, if only it can be done worthily."

No less significant and suggestive is the recent and characteristic utterance of one of the greatest jurists of our time, Mr. Justice Holmes. In *Hyde v. United States* (1911), 225 U. S., 347, 391, the learned judge very aptly remarked: "It is one of the misfortunes of the law that ideas become encysted in phrases and thereafter for a long time cease to provoke further analysis."

See also Field, J., in *Morgan v. Louisiana* (1876), 93 U. S., 217, 223, and Peckham, J., in *Phoenix Ins. Co. v. Tennessee* (1895), 161 U. S., 174, 177, 178.

["Every student of logic knows, but seldom realizes, the power and the actual historic influence of terms in moulding thought and in affecting the result of controversy."] Professor John Henry Wigmore, in (1914) 28 Harvard Law Review, 1. See also Beck, J., in *City of Dubuque v. Ill. Central R. R. Co.* (1874), 39 Ia., 56, 64.]

²⁶ (1852) 7 How. Pr., 124, 130.

applied to property in its restricted sense, but it is often used to designate *power, prerogative, and privilege*, . . ."

Recognition of this ambiguity is also found in the language of Mr. Justice Jackson, in *United States v. Patrick*:²⁷

"The words 'right' or 'privilege' have, of course, a variety of meanings, according to the connection or context in which they are used. Their definition, as given by standard lexicographers, include 'that which one has a *legal claim to do*, 'legal power', 'authority', 'immunity granted by authority', 'the investiture with special or peculiar rights.'"

And, similarly, in the language of Mr. Justice Shedd, in *Lomas v. State*:²⁸

"The state, then, is forbidden from making and enforcing any law which shall abridge the *privileges and immunities* of citizens of the United States. It is said that the words *rights, privileges and immunities*, are abusively used, as if they were synonymous. The word *rights* is generic, common, embracing whatever may be lawfully claimed."²⁹

It is interesting to observe, also, that a tendency toward discrimination may be found in a number of important constitutional and statutory provisions. Just how accurate the distinctions in the mind of the draftsman may have been it is, of course, impossible to say.³⁰

²⁷ (1893) 54 Fed. Rep., 338, 348.

²⁸ (1871) 3 Heisk. (Tenn.), 287, 306-307.

²⁹ See also, for similar judicial observations, *Atchison & Neb. R. Co. v. Batty* (1877), 6 Neb., 37, 40 ("The term *right* in civil society is defined to mean that which a man is entitled to *have, or to do, or to receive* from others within the limits prescribed by law."); *San Francisco v. S. F. Water Co.* (1871), 48 Cal., 531 ("We are to ascertain the *rights, privileges, powers, duties and obligations* of the Spring Valley Water Co., by reference to the general law.") [*Shaw v. Proffitt* (1910), 57 Or., 192, 201; 109 Pac., 584, 587, per Slater, J.: "The word 'right' denotes, among other things, 'property,' 'interest,' 'power,' 'prerogative,' 'immunity,' and 'privilege,' and in law is most frequently applied to property in its restricted sense."]

Compare also Gilbert, *Evidence* (4th ed., 1777), 126: "The men of one county, city, hundred, town, corporation, or parish are evidence in relation to the *rights, privileges, immunities* and affairs of such town, city, etc."

³⁰ See *Keatts v. Cordwainers' Co.* (1859), 6 C. B. N. S., 388, 409 (construing The Thames Conservancy Act, 1857, 20 and 21 Vict. c. cxlvii, s. 179: "None of the powers by this act conferred . . . shall extend to, take away, alter or abridge any right, claim, privilege, franchise, exemption, or immunity to which any owners . . . of any lands . . . are now by law entitled."); *Fearon v. Mitchell* (1872), L. R. 7 Q. B., 690, 695 ("The other question remains to be disposed of, as to whether the case comes within the proviso of s. 50 of 21 and 22 Vict. c. 98, that 'no mark . . . shall be established in pursuance of this section so as to interfere with any . . . rights, powers, or privileges enjoyed within the district by any person without his consent.'"); Cal. Civ. Code, sec. 648a: "Building and loan associations may be formed under this title with or without guarantee or other capital stock, with all

Recognizing, as we must, the very broad and indiscriminate use of the term "right," what clue do we find, in ordinary legal discourse, toward limiting the word in question to a definite and appropriate meaning? That clue lies in the correlative "duty," for it is certain that even those who use the word and the conception "right" in the broadest possible way are accustomed to thinking of "duty" as the invariable correlative. As said in *Lake Shore & M. S. R. Co. v. Kurtz*:³¹

"A duty or a legal obligation is that which one ought or ought not to do. 'Duty' and 'right' are correlative terms. When a right is invaded, a duty is violated."³²

In other words, if X has a right against Y that he shall stay off the former's land, the correlative (and equivalent) is that Y is under a duty toward X to stay off the place. If, as seems desirable, we should seek a synonym for the term "right" in this limited and proper meaning, perhaps the word "claim" would prove the best. The latter has the advantage of being a monosyllable.^{32a} In this connection, the language of Lord Watson in *Studd v. Cook*³³ is instructive:

"Any words which in a settlement of moveables would be recognized by the law of Scotland as sufficient to create a right or claim in favor of an executor . . . must receive effect if used with reference to lands in Scotland."

Privileges and "No-Rights." As indicated in the above scheme of jurial relations, a privilege is the opposite of a duty, and the correlative

the rights, powers, and privileges, and subject to all the restrictions and liabilities set forth in this title."); Tenn. Const. of 1834, Art. 9, sec. 7: "The legislature shall have no power to pass any law granting to any individual or individuals, rights, privileges and immunities or exemptions, other than . . .". [See also *State v. Conlon* (1895), 65 Conn. 478, 490, 491.]

³¹ (1894) 10 Ind. App. 60; 37 N. E. 303, 304.

³² See also *Howley Park Coal, etc., Co. v. L. & N. W. Ry.* [1913] A. C. 11, 25, 27 (per Viscount Haldane, L. C.: "There is an obligation (of lateral support) on the neighbor, and in that sense there is a correlative right on the part of the owner of the first piece of land;") per Lord Shaw: "There is a reciprocal right to lateral support for their respective lands and a reciprocal obligation upon the part of each owner. . . . No diminution of the right on the one hand or of the obligation on the other can be effected except as the result of a plain contract. . . .". Compare, to similar effect, *Galveston, etc., Ry. Co. v. Harrigan* (1903), 76 S. W. 452, 453 (Tex. Civ. App.). [See also Gray, *Nature and Sources of Law*, sec. 25: "Right is correlative to duty; where there is no duty there can be no right."]

^{32a} Stayton, J., in *Melinger v. City of Houston* (1887), 68 Tex. 45, 3 S. W. 249, 253: "A right has been well defined to be a well-founded claim, and a well-founded claim means nothing more nor less than a claim recognized or secured by law."

³³ (1883) 8 App. Cas., at p. 597.

of a "no-right." In the example last put, whereas X has a *right* or *claim* that Y, the other man, should stay off the land, he himself has the *privilege* of entering on the land; or, in equivalent words, X does not have a duty to stay off. The privilege of entering is the negation of a duty to stay off. As indicated by this case, some caution is necessary at this point; for, always, when it is said that a given privilege is the mere negation of a *duty*, what is meant, of course, is a duty having a content or tenor precisely *opposite* to that of the privilege in question. Thus, if, for some special reason, X has contracted with Y to go on the former's own land, it is obvious that X has, as regards Y, both the privilege of entering and the *duty of entering*. The privilege is perfectly consistent with this sort of duty,—for the latter is of the *same* content or tenor as the privilege;—but it still holds good that, as regards Y, X's privilege of entering is the precise negation of a duty to *stay off*. Similarly, if A has not contracted with B to perform certain work for the latter, A's privilege of *not* doing so is the very negation of a duty of *doing* so. Here again the duty contrasted is of a content or tenor exactly opposite to that of the privilege.

Passing now to the question of "correlatives," it will be remembered, of course, that a duty is the invariable correlative of that legal relation which is most properly called a right or claim. That being so, if further evidence be needed as to the fundamental and important difference between a right (or claim) and a privilege, surely it is found in the fact that the correlative of the latter relation is a "no-right," there being no single term available to express the latter conception. Thus, the correlative of X's right that Y shall not enter on the land is Y's duty not to enter; but the correlative of X's privilege of entering himself is manifestly Y's "no-right" that X shall not enter.

In view of the considerations thus far emphasized, the importance of keeping the conception of a right (or claim) and the conception of a privilege quite distinct from each other seems evident; and, more than that, it is equally clear that there should be a separate term to represent the latter relation. No doubt, as already indicated, it is very common to use the term "right" indiscriminately, even when the relation designated is really that of privilege;³⁴ and only too often

³⁴ For merely a few out of numberless judicial instances of this loose usage, see *Pearce v. Scotcher* (1882), L. R. 9 Q. B. 162, 167; *Quinn v. Leathem* [1901] A. C. 495 (*passim*); *Allen v. Flood* [1898] A. C. 1 (*passim*); *Lindley v. Nat. Carbonic Acid Gas Co.* (1910), 220 U. S. 61, 75; *Smith v. Cornell Univ.* (1894), 45 N. Y. Supp. 640, 643; *Farrum v. Kern Valley Br.* (1910), 107 Pac. 568. [For

this identity of terms has involved for the particular speaker or writer a confusion or blurring of ideas. Good instances of this may be found even in unexpected places. Thus Professor Holland, in his work on *Jurisprudence*, referring to a different and well-known sort of ambiguity inherent in the Latin "*Ius*," the German "*Recht*," the Italian "*Diritto*," and the French "*Droit*,"—terms used to express "not only 'a right,' but also 'Law' in the abstract,"—very aptly observes:

"If the expression of widely different ideas by one and the same term resulted only in the necessity for . . . clumsy paraphrases, or obviously inaccurate paraphrases, no great harm would be done; but unfortunately the identity of terms seems irresistibly to suggest an identity between the ideas expressed by them."³⁵

Curiously enough, however, in the very chapter where this appears,—the chapter on "Rights,"—the notions of right, privilege and power seem to be blended, and that, too, although the learned author states that "the correlative of . . . legal right is legal duty," and that "these pairs of terms express . . . in each case the same state of facts viewed from opposite sides." While the whole chapter must be read in order to appreciate the seriousness of this lack of discrimination, a single passage must suffice by way of example:

"If . . . the power of the State will protect him in so carrying out his wishes, and will compel such acts or forbearances on the part of other people as may be necessary in order that his wishes may be so carried out, then he has a 'legal right' so to carry out his wishes."³⁶

The first part of this passage suggests privileges, the middle part rights (or claims), and the last part privileges.^{36a}

Similar difficulties seem to exist in Professor Gray's able and entertaining work on *The Nature and Sources of Law*. In his chapter on "Legal Rights and Duties" the distinguished author takes the position that a right always has a duty as its correlative;³⁷ and he seems to

a striking instance of this blurring of ideas, see Avery, J., in *State v. Austin* (1894), 114 N. C., 855, 862: "An individual right is that which a person is entitled to have or receive from others, or to do under the protection of law." See also Channel, J., in *Starey v. Graham* [1899] 1 Q. B., 406, 411.] See also *post*, n. 38.

³⁶ *Ibid.*, 82.

^{36a} Compare also Holland, *Jurisprudence* (10th ed.), 139: "The owner of a garden has a right to its exclusive enjoyment available against no individual more than another, but against everybody"; also (page 163): "Rights to personal safety and freedom . . . limited . . . by the right of parents and guardians to chastise and keep in custody persons of tender age." The confusion continues throughout the discussion. See pp. 185, 200, 316, and n. 30, page 200.

³⁷ See *Nature and Sources of Law* (1909), secs. 25, 45, 184.

define the former relation substantially according to the more limited meaning of "claim." Legal privileges, powers, and immunities are *prima facie* ignored, and the impression conveyed that all legal relations can be comprehended under the conceptions "right" and "duty." But, with the greatest hesitation and deference, the suggestion may be ventured that a number of his examples seem to show the inadequacy of such mode of treatment. Thus, e.g., he says:

"The eating of shrimp salad is an interest of mine, and, if I can pay for it, the law will protect that interest, and it is therefore a right of mine to eat shrimp salad which I have paid for, although I know that shrimp salad always gives me the colic."³⁸

This passage seems to suggest primarily two classes of relations: first, the party's respective privileges, as against A, B, C, D and others in relation to eating the salad, or, correlatively, the respective "no-rights" of A, B, C, D and others that the party should not eat the salad; second, the party's respective rights (or claims) as against A, B, C, D and others that they should not interfere with the physical act of eating the salad, or, correlatively, the respective duties of A, B, C, D and others that they should not interfere.

These two groups of relations seem perfectly distinct; and the privileges could, in a given case, exist even though the rights mentioned did not. A, B, C and D, being the owners of the salad, might say to X: "Eat the salad, if you can; you have our license to do so, but we don't agree not to interfere with you." In such a case the privileges exist, so that if X succeeds in eating the salad, he has violated no rights of any of the parties. But it is equally clear that if A had succeeded in holding so fast to the dish that X couldn't eat the contents, no right of X would have been violated.³⁹

³⁸ *Nature and Sources of Law* (1909), sec. 48.

³⁹ Other instances in Professor Gray's work may be noted. In sec. 53 he says: "So again, a householder has the right to eject by force a trespasser from his 'estate.' That is, if sued by the trespasser for an assault, he can call upon the court to refuse the plaintiff its help. In other words, a man's legal rights include not only the power effectually to call for aid from an organized society against another, but also the power to call effectually upon the society to abstain from aiding others."

This, it is respectfully submitted, seems to confuse the householder's privilege of ejecting the trespasser (and the "no-right" of the latter) with a complex of potential rights, privileges, powers and immunities relating to the supposed action at law.

In sec. 102 the same learned author says: "If there is an ordinance that the town constable may kill all dogs without collars, the constable may have a legal right to kill such dogs, but the dogs are not under a legal duty to wear collars." It would seem, however, that what the ordinance did was to create a privilege—

Perhaps the essential character and importance of the distinction can be shown by a slight variation of the facts. Suppose that X, being already the legal owner of the salad, contracts with Y that he (X) will never eat this particular food. With A, B, C, D and others no such contract has been made. One of the relations now existing between X and Y is, as a consequence, fundamentally different from the relation between X and A. As regards Y, X has no privilege of eating the salad; but as regards either A or any of the others, X has such a privilege. It is to be observed incidentally that X's right that Y should not eat the food persists even though X's own privilege of doing so has been extinguished.⁴⁰

On grounds already emphasized, it would seem that the line of reasoning pursued by Lord Lindley in the great case of *Quinn v. Leathem*⁴¹ is deserving of comment:

“The plaintiff had the ordinary *rights* of the British subject. He was *at liberty* to earn his living in his own way, provided he did not violate some special law prohibiting him from so doing, and provided he did not infringe the rights of other people. This *liberty* involved the *liberty* to deal with other persons who were willing to deal with him. *This liberty* is a *right* recognized by law; its *correlative* is the general *duty* of every one not to prevent the free exercise of this *liberty* except so far as his own liberty of action may justify him in so doing. But a person's *liberty* or *right* to deal with others is nugatory unless they are at liberty to deal with him if they choose to do so. Any interference with their liberty to deal with him affects him.”

the absence of the duty not to kill which otherwise would have existed in favor of the owner of the dog. Moreover, that appears to be the most natural connotation of the passage. The latter doesn't, except very remotely, call up the idea of the constable's accompanying rights against all others that they shouldn't interfere with his actual killing of the dog.

See also secs. 145, 186.

[Compare the following passage from Holmes, *The Common Law*, 214: “A legal right is nothing but a permission to exercise certain natural powers, and upon certain conditions to obtain protection, restitution, or compensation by the aid of the public force.”]

⁴⁰ It may be noted incidentally that a statute depriving a party of privileges as such may raise serious constitutional questions under the Fourteenth Amendment. Compare, e.g., *Lindley v. Nat. Carbonic Gas Co.* (1910), 220 U. S., 61. [See also *Rideout v. Knox* (1889), 148 Mass., 368 (holding constitutional a statute limiting a landowner's privilege of erecting “spite-fences”).]

⁴¹ [1901] A. C., 495, 534.

⁴² See *post*, pp. 44-50.

Entitlement

The Paradoxes of Property

Joseph William Singer

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**PRESUMPTIVE CONTROL AND BURDENS
OF PERSUASION**

Property law creates presumptions about who gets to control valued resources. The ownership model suggests that ordinarily one person (or entity) controls all rights in a particular piece of property. Once we identify the owner, we can ask whether her rights should be limited because of overriding public interests or values. The burden falls on nonowners to demonstrate that these public policies are sufficiently strong to justify restricting the owner's rights. But when several people have legitimate claims to control various aspects of the same piece of property, the ownership concept may fail us by placing the burden of persuasion on the wrong party.

Instead of mechanically granting presumptive control to the person conventionally denominated the owner, we should choose consciously where to place the burden of persuasion by establishing normative criteria that embody the values we want the law to further. We should focus on the multiple claims that may legitimately be made to control the resource in question and develop an appropriate framework for judging who should have presumptive control over various aspects of the resource.

THE LEGAL-REALIST APPROACH

I have argued that the ownership model fails us because it obscures important facts about the nature of property and the necessary tasks of property law. It suppresses the tensions that exist within the concept of property and within the institution of property as implemented in law. It suggests that we award presumptive control over property to the person conventionally denominated its owner and place the burden of persuasion on all other claimants to rights in the property—a move that, as we have seen, is not always appropriate. It mischaracterizes the relationship between property and regulation by failing to recognize

that government actions conventionally decreed as regulatory are often essential to bring property into existence or to establish a form of property that coheres with our sense of which kinds of human relationships are consistent with respect for human dignity in a free and democratic society.

The defects of the classical ownership model require that it be replaced. At the beginning of the twentieth century a group of scholars known as the legal realists proposed that property be viewed as a bundle of identifiable entitlements, each of which should be considered separately to determine its meaning and scope. In the case of a public accommodation, for example, the traditional owner has the exclusive privilege to determine how the property is used—whether to sell appliances or cater weddings or prepare tax returns—but has no right to exclude nonowners, the customers, from the property on the basis of race and other arbitrary criteria. Conversely, a landlord may have the right to exclude trespassers but has no right to enter and use the units rented to tenants.

The legal-realist model recognizes that the sticks in the bundle of rights can be unbundled or disaggregated and distributed among several parties. Rejecting or limiting one right in the bundle has no necessary effect on the other rights. Because the rights accompanying ownership can be disaggregated by law or contract, the concept of ownership becomes blurry. The real question is how to define and allocate the different rights in the bundle.

This view, adopted by such legal realists as Wesley Hohfeld and Arthur Corbin, was enshrined in the American Law Institute's Restatement of Property and formed the basis of Thomas Grey's famous argument that the concept of property has disintegrated and lost its utility as a legal category; what matters are the specific entitlements in the bundle of property rights.²¹ The crucial steps are to identify the interests for which individuals seek legal protection and to use policy analysis to adjudicate conflicts among those interests and to determine the appropriate extent of legal protection for each one. Property as a category has no utility except to obfuscate the policy choices that underlie individual rules. Specific entitlements and policy concerns should replace the formalist and conceptualist attempt to imbue the concept of property with operative force in its own right.

Proponents of the legal-realist model recognize the defects of the ownership concept. They acknowledge that rights may conflict and that a resource may have more than one owner. This view is appealing because it requires attention to specific social contexts, disputes, and relations and to relevant values and policies rather than using formalistic arguments to adjudicate those disputes. It

rightfully rejects the idea that a simple, all-encompassing theory can neatly answer questions about property law and encourages a more nuanced approach to the subject.

Nonetheless, this model has its defects. It fails to recognize the cultural endurance of the concept of property for both citizens and judges. The ownership idea—for good or for ill—is extremely powerful and affects the way legal and social problems are analyzed. Demonstrating that ownership can be deconstructed does not deprive it of force as an organizing category. It retains its power to create unconscious presumptions about who should win particular disputes by appealing to commonsense assumptions about who the owner is. In addition, it affects the rhetoric of public discourse in ways that limit the creation of alternative solutions to public problems by establishing the presumption that all rights to a given property should be consolidated in a single owner and that those rights are absolute.²²

We should recognize that property concepts perform a number of rhetorical functions. First, by identifying a particular person as the owner, we commonly presume that that person wins disputes about the property. As we analyze choices among alternative property law rules, it is important to be sensitive to the persistent influence of the ownership concept in the assignment of the burden of persuasion.

Second, the property concept sometimes creates an assumption that certain sets of rights are bundled or consolidated together and must be owned by the same person. This idea is implemented, for example, through rules about estates (allowable bundles of ownership rights) and compulsory contract terms. Sometimes, however, the assumption is that particular rights can be disaggregated, as in landlord-tenant relations. The structure of property doctrine affects presumptions about allowable forms of disaggregation.

Third, calling something a property right often reflects an intuition that the right in question implicates a strong moral claim to immunity from loss by the voluntary action of both private and public actors, and it places a heavy burden on those seeking to circumscribe—read “regulate”—the right. Fourth, it fosters a strong presumption that the right in question is alienable in the marketplace and, conversely, that nonalienable interests do not count as property rights.

Given the continuing force of the classical conception in allocating implicit burdens of persuasion, it is important to bring to consciousness the hidden work of the property idea in setting presumptions such as these. In some cases

the presumptions are justified, but in others the imperatives of social justice and efficiency would be better served by challenging such fixed notions. One might begin modestly, working within the classical model, by shifting the presumption to the other party and identifying that party as the owner. Or one might recast the legal problem by describing the situation as one in which legitimate property rights exist on both sides. By reconceptualizing the dispute we can even attempt to alter burdens of persuasion in a direction that more closely accords with our moral intuitions. I do not pretend that this will be easy, but it must be done.²³

The legal realist wrongly assumes that it is possible to engage in policy analysis without implicit baselines. Conceptions of property distribute burdens of persuasion. Recognizing the role that different conceptions of property play in setting the baselines for analysis is crucial to developing an adequate conceptual vocabulary to understand and address legal disputes about the meaning and structure of rules in property law. When judges cannot figure out how to rule in a dispute between conflicting interests, values, or policies, they often fall back on presumptions and burdens of persuasion. Traditional property law, to a large extent, is about adopting those presumptions and allocating those burdens. Yet in so doing, it obscures the tensions that arise when rights inevitably come into conflict with one another and gets in the way of our addressing them imaginatively and sensibly. We need to reconstruct policy analysis by elucidating the structure of the tensions within the concept of property itself.²⁴ This, in turn, will help us make better decisions.

A decade later, in the wake of the global financial crisis, an anonymous developer known as Satoshi Nakamoto "outlined a new protocol" that left divine intervention out of the equation. It leveraged peer-to-peer technology using distributed computation to create the cryptocurrency that would become known as Bitcoin.¹⁵ This deceptively simple innovation "set off a spark that has excited, terrified, or otherwise captured the imagination of the computing world and has spread like wildfire."¹⁶ Marc Andersen, the co-creator of the first commercial browser, Netscape, has called the innovation "the distributed trust network that the Internet always needed and never had."¹⁷ Enter the "Trust Protocol"—a technology authenticated "by mass collaboration and powered by collective self-interests, rather than by large corporations motivated by profit"—that has the potential to revolutionize business and cybersecurity across numerous contexts,¹⁸ including critical infrastructure. Understanding the development of this technology, along with its potentials and pitfalls, is central to unpacking the promise of blockchains, and what—if any—regulatory steps need to be taken to ensure that they scale successfully.

This Article is structured as follows. Part 1 offers a technological and historical primer on blockchains featuring discussion of basic cryptographic principles and applications including Bitcoin and Ethereum, a smart contracts platform. Part 2 then focuses on applying blockchain technology to enhancing cybersecurity with a special emphasis on certificate authorities and critical infrastructure. Part 3 concludes the Article with an analysis of the benefits and drawbacks of regulating blockchain architecture and the promise of polycentric governance to help leverage blockchain technology to build trust and thereby promote cyber peace.

1. THE RISE OF BLOCKCHAIN AND BITCOIN: A TECHNOLOGICAL PRIMER

Despite its popularity, it could be said that Bitcoin has a "bad reputation" due in part to the extreme fluctuations in the crypto-currency's value, as well as some of the uses to which it is put (including extortion).¹⁹ A case in point is the popularity

¹⁴ See *id.*
¹⁵ *Id.*
¹⁶ *Id.*
¹⁷ *Id.*
¹⁸ *Id.*
¹⁹ *The Trust Machine*, *Economist* (Oct. 31, 2015), <http://www.economist.com/news/leaders/21677138-a-technology-lehnd-bitcoin-199ale&v.1.7064334> (2017).

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of demanding payment in Bitcoin for cybercriminal groups engaged in ransomware campaigns.²⁰ Yet at least some of this skepticism may, in fact, be misplaced. After all, the value of Bitcoin was largely stable for most of 2015 at approximately \$250 before appreciating to an all-time high of more than \$1,300 in March 2017,²¹ while financial regulators have become more enthusiastic about the prospects of the crypto-currency, a case in point was the European Court of Justice's 2015 decision to recognize Bitcoin as a currency for purposes of avoiding Value Added Tax (VAT).²² Perhaps the most often overlooked aspect of Bitcoin, though, is the blockchain technology underlying it, a technology that allows "people who have no particular confidence in each other [to] collaborate without having to go through a neutral central authority."²³ Simply put, according to *The Economist*, "it is a machine for creating trust."²⁴ and trust is exactly what is needed if we are to secure certificate authorities and critical infrastructure from misuse, overuse, and abuse. First, though, before exploring the myriad applications that blockchains can have to improve cybersecurity, it is important to distinguish between Bitcoins and blockchains.

1.1 Analogizing Blockchains

To uncover the genius of blockchain technology, consider something mundane, like sending an email. When we do that (sometimes far too frequent) task, what we are really doing is sending a copy of data, not the original.²⁵ We copy such information all the time, but we do not copy other things, like money. To do that, we rely on centralized institutions, institutions in which we have some degree of trust, like banks, governments, or even social media firms.²⁶ But relying on

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others to do such copying is not without its costs. We pay with money (think banking fees), and we pay with increased insecurity given the propensity for our information to be hacked, be it credit cards or health records.²⁷ Sometimes, we even have to pay with our privacy. Plus, such centralized systems can actually increase inequality given that up to two billion people around the world do not have bank accounts.²⁸ Enter the blockchain and one of its most popular applications to date, Bitcoin.

²⁰ <https://perma.cc/SZ39-VF7E>.
²¹ *The Trust Machine*, *supra* note 19.
²² See Tapscott & Tapscott, *supra* note 1.
²³ See *id.*

3. A ROLE FOR REGULATION AND THE PROMISE OF A POLYCENTRIC BLOCKCHAIN ARCHITECTURE

This final Part builds from the technological primer of Part 1, along with the application section from Part 2, by considering various approaches to blockchain regulation drawing from the work of regulatory modalities pioneered by Professor Lawrence Lessig, among others.¹⁵⁸ Following that, the literature on polycentric institutional analysis is introduced in order to provide a frame for examining multi-level governance options to enshrine cybersecurity best practices in blockchain providers before concluding with implications for managers and policymakers.

3.1 Unpacking the Blockchain Regulatory Landscape

As with any new technology, it is important for regulators to wait until its benefits (and faults) have been uncovered before moving to legislate best practices.¹⁵⁹ If history is any guide, including in the P2P context, "it is likely to be several years before the technology's full potential becomes clear."¹⁶⁰ Unsurprisingly, there currently exists no comprehensive black letter blockchain regulation. The application that has caught the attention of regulators the most up to this point is Bitcoin, but even there most regulators—including the Department of Treasury Financial Crime Enforcement Network—have offered guidance, not formalized rules.¹⁶¹ Still, a bevy of statutes do touch on blockchain technology (albeit indirectly), and are summarized next to highlight governance gaps and challenges.

Relevant statutes to blockchains include the 1962 Stamp Payments Act,¹⁶² the Securities Act,¹⁶³ the Electronic Funds Transfer Act of 1978,¹⁶⁴ and the Bank Secrecy Act, which features the Financial Crimes Enforcement Network to prevent laundering.¹⁶⁵ However, none of these laws are directly

applicable to the core focus of this Article being the use of blockchains to enhance cybersecurity of certificate authorities and critical infrastructure. Point agencies for Bitcoin regulation have included the FBI, which (temporarily) shut down Silk Road, a site for trading illicit property using Bitcoins.¹⁶⁶ The IRS has also gotten involved in both Bitcoin and blockchain regulation, notably in March 2014 when it issued a notice stating that the agency would treat Bitcoins as property, not a currency, in a move creating an array of complex income tax liabilities.¹⁶⁷ Similarly, the Commodity Futures Trading Commission (CFTC), which regulates commodities futures, arguably has the authority to regulate Bitcoin price manipulation, which, if accurate, could open up a slew of regulatory avenues for regulators to explore.¹⁶⁸ And even the Consumer Financial Protection Bureau's (CFPB) mission to "make markets for consumer financial products and services work for Americans"¹⁶⁹ implicates Bitcoin and blockchain technology; indeed, the CFPB has already issued a "consumer advisory statement" in Bitcoins in August 2014 warning the public about the risks.¹⁷⁰

Some states, such as New York, have gone further. New York in particular has required the placement of certain cybersecurity safeguards in blockchain applications in the name of consumer protection under the BitLicense scheme, increasing the cost of compliance to market entrants and prompting some firms at least to leave the New York market.¹⁷¹ Californian officials, particularly within the Department of Business Oversight, have also decided that state law applies to crypto-currencies like Bitcoin.¹⁷²

More innovation is happening globally with a variety of nations moving to regulate blockchain applications including Bitcoin, as seen in the European Union's 2015 decision to recognize Bitcoin as a currency referenced in Part 1.¹⁷³ Yet

¹⁵⁸ *Id.* at 1158.

¹⁵⁹ INTERNAL REVENUE SERVICE, IRS VIRTUAL CURRENCY GUIDANCE: VIRTUAL CURRENCY IS TREATED AS PROPERTY FOR U.S. FEDERAL TAX PURPOSES: GENERAL RULES FOR PROPERTY TRANSACTIONS APPLY (Mar. 25, 2014), <http://www.irs.gov/irb/2014-09/Newsroom/IRS-Virtual-Currency-Guidance> [<https://perma.cc/59AD-42VN>].

¹⁶⁰ Tsukerman, *supra* note 87, at 1161.

¹⁶¹ *Id.* at 1161.

¹⁶² *Id.* at 1163.

¹⁶³ See Michael B. Marois & Carter Dougherty, *California Says State Law Grants Right to Oversee Bitcoin*, BLOOMBERG (Dec. 4, 2014 4:28 PM), <http://www.bloomberg.com/news/2014-12-04/california-says-state-law-grants-right-to-oversee-bitcoin.html> [<https://perma.cc/59TQ3-9Z5L>].

¹⁶⁴ *The Trust Machine*, *supra* note 19.

¹⁵⁸ See LAWRENCE LESSIG, CODE: VERSION 2.0 122-125 (2006).
¹⁵⁹ *Cf. Juvial*, *supra* note 9, at 607 ("Blockchain technology is adaptable and policymakers must view it as such. Regulation designed to mitigate the risks of such a powerful technology should be encouraged").
¹⁶⁰ *The Trust Machine*, *supra* note 19.
¹⁶¹ See Juvial, *supra* note 9, at 590.
¹⁶² See Matthew Kien-Meng Ly, *Coining Bitcoin's "Legal Bias": Examining the Regulatory Framework for Bitcoin and Virtual Currencies*, 27 HAW. J. L. & TECH. 587, 598-99 (2014).
¹⁶³ *Sees & Exch. Comm'n v. Shavers*, No. 4:13- (V-416, 2014 WL 4652121, at *8 (E.D. Tex. Sept. 18, 2014).
¹⁶⁴ 15 U.S.C. §§ 1601-1693 (2012).
¹⁶⁵ See Tsukerman, *supra* note 87, 1157.

such multi-jurisdictional regulation also raise enforcement challenges given that a policy imposed by one stakeholder—such as New York—may conflict with another, potentially leading to a forked chain as discussed in Part 1.2.3. In such an instance, some jurisdictions could elect to ban the technology, which in the U.S. context could lead to First Amendment issues given that code has already been defined as speech.¹⁷⁴ Another potential scenario would be judges issuing rulings that, perhaps inadvertently, cause such hard forks, such as by ordering that one transaction be approved over another conflicting one.¹⁷⁵ But black letter law is just the beginning of blockchain regulation, which, after all, does quite a bit to regulate itself. After all, it is the inherent self-correcting "security of the system" that "makes the blockchain revolutionary."¹⁷⁶

Taking a broader view, blockchain regulation is happening at various levels and through various modalities beyond black letter law, including to use Professor Lawrence Lessig's nomenclature, norms, markets, and code,¹⁷⁷ as well as self-regulation and multilateral collaboration, all of which can contribute to enhancing critical infrastructure cybersecurity through blockchains. For example, best practices developed by blockchain technology providers—such as Ethereum, discussed in Part 1.3—inform the behavior of peer competitors, and (depending on uptake) can lead to industry norms and codes of conduct, which may in turn eventually be codified, as has happened in the power grid context. Each of these regulatory approaches has unique benefits and drawbacks, but together they contribute to a governance regime that is multi-level, multi-purpose, multi-type, and multi-sectoral in scope and that could complement the top-down critical infrastructure governance models favored by certain nations.¹⁷⁸

¹⁷⁴ See, e.g., CHRISTOPHER WOLF, THE DIGITAL MILLENNIUM COPYRIGHT ACT: TEXT, HISTORY, AND CASELAW 1053-55 (2008); Scott J. Shakkelford et al., iGovernance: The Future of Multi-Stakeholder Internet Governance in the Wake of the Apple Encryption Saga, — UNIV. OF N. CAROLINA J. OF INT'L L. (forthcoming 2017) (manuscript at 17 n. 77); Adam Satriano, *Apple-FBI Fight Asks Is Code Protected as Free Speech?*, BLOOMBERG TECH. (Feb. 23, 2016 7:55 PM), <https://www.bloomberg.com/news/articles/2016-02-24/apple-fbi-fight-asks-is-code-protected-as-free-speech> (https://perma.cc/7K52-D378).

¹⁷⁵ See, e.g., Primavera de Filippi, *A \$50M Hack Tests the Values of Communities Run by Code*, MOTHERBOARD (July 11, 2016), <http://motherboard.vice.com/read/indeed-jhttps://perma.cc/PF86-8Q11>.

¹⁷⁶ Tsukerman, *supra* note 87, at 1136 (noting "Security in the Bitcoin protocol is ensured through 'cryptographic proof' allowing the parties to deal directly with each other rather than through a third party").

¹⁷⁷ See LESSIG, *supra* note 158, at 124-125.
¹⁷⁸ For more on this topic, see Scott J. Shakkelford & Amanda N. ("raig, *Beyond the 'New Digital Dilemma': Analyzing the Evolving Role of Governance in Internet Governance and Enhancing Cybersecurity*, 30 STAN. J. INT'L L. 119, 119 (2014).

3.4 Implications for Managers and Policymakers

The promise of blockchain technology has expansive applications across a range of cybersecurity sectors, including in the CA and critical infrastructure context, as has been explored throughout this Article. The implications on organizational decision-making are manifold, ranging from the way that ledgers are created and transactions recorded, to new product lines designed to build trust in insecure systems. Managing the risks and rewards presented by such a disruptive pivot point presents numerous opportunities and challenges for managers and policymakers alike, some of which are discussed here beginning with the private sector before moving on to extending our analysis to related arenas such as the burgeoning Internet of Things.

The widespread use of blockchains will inevitably mean business disruption. After all, all businesses—and indeed entire industries that are now in the "trust business"—will need to adapt, or otherwise remake themselves.²⁴⁴ For example, blockchains could be further tailored, such as by rolling out new rules such as transactions only being cleared if they are endorsed by multiple parties.²⁴⁵

As with Napster and P2P file sharing, this type of evolution takes time, but such experimentation in the name of building trust is at the heart of the polycentric governance literature, and is squarely in line with the needs of critical infrastructure providers to secure their systems. The same goes for an array of governmental services, which could, if the myriad benefits of blockchain technology are in fact realized, handle most major life events—from a birth certificate, to a marriage license, property deed, and even a death certificate—with minimal human interference.²⁴⁶ However, there are also limitations to this technology, as are summarized below.

At a higher level, the history of finance would be an open book, potentially being a boon to sustainability and the Corporate Social Responsibility (CSR) movement. Indeed, sustainability may well be a useful paradigm to explore for lessons that could be imported to enhance the prospects for successful blockchain governance. There is a growing body of work investigating, for example, intersections between the green movement, cybersecurity, and Internet governance, including the applicability of international environmental law principles to such collective action problems as information pollution.²⁴⁷ Similarly, an underappreciated overlap occurs in the blockchain context by considering the literature on software ecology and ecosystems with blockchain governance best practices. In this vein, Bitcoin itself could be considered a common pool resource in that the public is contributing the resource in terms of time and computing power to create and transact Bitcoins, with governance of the system being distributed and shared globally.²⁴⁸ Such common pool resources are exhaustible, and are managed through a property regime in which enforcing the exclusion of a "defined user pool" can be difficult.²⁴⁹ Common examples of common pool resources

include some fisheries, pastures, and forests. What do fisheries have to do with cybersecurity? The difficulties of enforcement and oversee bind these areas together, while similar issues of scale (such as the size and number of Bitcoin transactions) echo in other commons arenas. However, Bitcoin and its underlying blockchain technology may similarly have insights that could be applied toward enhancing the governance of other classic common pool resources. Communities could learn from the power of blockchain technology to register users (or even job candidates²⁵⁰) and keep track of transactions, allowing, for example, the ability to recognize and trace complex common property relationships without the need for state intervention.²⁵¹

A further area that deserves deeper exploration, especially in the legal literature, is the application of blockchain technology to Internet of Things applications. There is a great deal of buzz surrounding the Internet of Things (IoT), which is the notion, simply put, that nearly everything not currently connected to the Internet, from gym shorts to streetlights soon will be.²⁵² The rise of "smart products" such as Internet-enabled refrigerators and self-driving cars holds the promise to revolutionize business and society. Applications are seemingly endless, and embrace an array of consumer products, including toasters.²⁵³ As stated by Dan and Alex Tapscott, "[h]ow about these billions of connected smart things that will be sensing, responding, sharing data, generating and trading their own electricity, protecting our environment, managing our homes and our health? And this Internet of Everything will need a *Ledger of Everything*."²⁵⁴ Regardless of

²⁵⁰ possible under certain conditions.")

²⁵¹ See Kimi, *supra* note 93 ("Companies like ConsenSys are developing identity systems where job prospects or prospective contractors will program their own personal avatars to disclose pertinent information to employers. They can't be hacked like a centralized database can. Users are motivated to contribute information to their own avatars because they own and control them, their privacy is completely configurable, and they can monetize their own data. This is very different from, say, LinkedIn, a central database owned, monetized, and yet not entirely secured by a powerful corporation.")

²⁵² For more on this topic, see Scott J. Shackelford, *Neither Magic Bullets Nor Lost Cause: Land Tithing and the Health of Nations*, 21 NYU ENVTL. L.J. 272 (2014).

²⁵³ See Lawrence J. Trautman, *Cybersecurity: What About U.S. Policy?*, 2015 U. IL-J.L. TECH. & POL'Y 341, 348 (2015); Daniel Burrus, *The Internet of Things Is Far Bigger than Anyone Realizes*, WIREMD (Nov. 2014), <http://www.wired.com/2014/11/the-internet-of-things-is-ginger/>

²⁵⁴ <https://perma.cc/3UZ2-JBD8> (See Richard Baguley & Colin McDonald, *Appliance Science: The Internet of Toasters (and Other Things)*, CNET (Mar. 2, 2015), <https://www.cnet.com/news/appliance-science-the-internet-of-toasters-and-other-things/> <https://perma.cc/5Y-6353>).

²⁵⁵ Tapscott & Tapscott, *supra* note 1.

whether this is, in fact, necessary, the potential for blockchains to aid in securing this range of systems requires further unpacking and research surrounding interlinked governance best practices.

The downsides of blockchain technology also need to be carefully considered, least of which is the fact that—in a public blockchain—everything is public, forever.²⁵⁶ This recalls debates over the "right to be forgotten," raising the specter of regulation, which could, in turn, be ineffective if its domestic share of the global blockchain was less than fifty percent of available computing power. Other outstanding issues also deserve consideration from managers and policymakers alike, including longevity and governance. As such, it should be clear that, despite their power, blockchains are not a panacea. For example, despite ongoing concerns about the security of the U.S. election system, including pervasive vulnerabilities on voting machines run by thousands of jurisdictions across the country,²⁵⁶ the utility of blockchain technology to make democracy harder to hack is limited. A national election with significant national security implications would be a rapid target for criminal organizations and nation states. If any one group—or some combination of these groups—were to achieve more than fifty percent of the computing power on the blockchain, they could tamper with the results.²⁵⁷ Further, introducing millions of voters to blockchain technology—and creating a system robust enough to scale upward—would raise significant technical challenges.²⁵⁸

Still, if privacy concerns and other considerations are overcome, the benefits of blockchain technology are indeed immense. Indeed, the goals of blockchain proponents are "laudable," including "speed, lower cost, security, fewer errors, and the elimination of central points of attack and failure."²⁵⁹ Consequently, although such a future will doubtless intimidate or otherwise cause some consternation across various stakeholders, given declining trust in both public and private-sector institutions,²⁶⁰ any effort to build transparency, reduce costs, and improve security will likely be welcomed by the majority.

²⁵⁶ See, e.g., Scott J. Shackelford, *Opinion: How to Make Democracy Harder to Hack*, CHRISTIAN SCI. MONITOR (July 29, 2015), <http://www.csmonitor.com/World/Passcode/Passcode-Votes/2016/0729/Opinion-How-to-make-democracy-harder-to-hack> <http://perma.cc/4AX3-DK2J>.

²⁵⁷ See *supra* note 95 and accompanying text (discussing the possibility of hacking a blockchain by accumulating more than fifty percent of the computing power in the distributed network).

²⁵⁸ For more on this topic, see Sunoo Park & Ronald L. Rivest, *Towards Secure Quadratic Voting* (2015) (unpublished manuscript), <http://people.csail.mit.edu/sunooq/TVav.pdf> <http://perma.cc/9ENJ-K7ZN>.

²⁵⁹ Tapscott & Tapscott, *supra* note 8.

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There's something of a movement going on out there—called by some the Free Software Movement (as founder, Richard Stallman puts it, free in the sense of “free speech,” not in the sense of “free beer”), and by others, the Open Source Software Movement.² The differences are important, but so are the commonalities strong.³ The aim for a world in which the fundamental software—the code—governing the Internet is software that is “open”—code whose source is available to all, to be taken, to be modified, and to be improved.

The arguments for open code are many; the reasons favoring it, different. Most argue its virtue is efficiency: that the product of this open development, like the product of any open society—this code that has revealed its flaws by revealing its source, and that has been improved by revealing its source—is more robust, more efficient, more reliable, code than the product of any closed process. Better code is the promise, and in a world where computers are as reliable as electricity in Italy, this indeed is a valuable promise.

But it is not my aim here to discuss its efficiency; my aim is its values.⁴ My question in the few minutes that I can have your attention is this: Can we learn something from the values of the Open Source or Free Software Movement that would teach us something about Internet governance, and governance generally?

* * *

Governance: to many, this idea of Internet governance will seem quite odd. This weird interactive television that somehow got connected to wildly confused libraries—what could it mean to speak about governance here?

But I mean governance in a very general sense. If you want to set up a server on the World Wide Web, you must register and receive a

TH Chi-Kent L.R. 1405, 1406 (1999)

3. Richard Stallman is the founder of this extraordinary movement and is truly its conjuring force. See Amy Harmon, *The Rebel Code*, NY TIMES MAG., Feb. 21, 1999, at 34; Andrew Leonard, *Microsoft Richard Stallman Keeps the Faith—and Gives Bill Gates the Finger* (Aug. 31, 1998) <http://www.salonmagazine.com/21stfeature/1998/08/31feature.html>.

4. The present keepers of the keys for this branch of the Free Software Movement are Eric Raymond and Bruce Perens, who founded opensource.org. See <http://www.opensource.org/board.html>.

5. I therefore completely agree with Stallman that the issues raised by this movement are primarily issues of value first. See Richard Stallman, *Reevaluating Copyright: The Public Must Prevail*, 75 OR. L. REV. 291 (1996); see also Lawrence Lessig, *The Limits in Open Code Regulatory Standards and the Future of the Net*, 14 BERKELEY J.L. & TECH. 759 (1999).

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name—a domain name—from an Internet registry, right now a company called Network Solutions.⁶ This procedure is the product of governance in the sense that I mean. When you connect to a site on the World Wide Web, your machine transmits to the site on the Web an address—your Internet Protocol (“IP”) address—so that the machine on the Web can find you in return.⁷ This protocol is the product of governance in the sense I mean. When you connect to a site with this IP address, the IP address need not provide information to identify who you are; it can be dynamic rather than static; it can be a proxy rather than real—nothing requires that the other side learn anything real about you.⁸ This is the product of governance in the sense I mean.

In each case, the governance at stake is in part a governance that has been brought about by a certain architecture in the Internet. It is the code's design that IP addresses are used to identify locations on the Net; other designs could have been chosen. It is the code's design that only the IP address is needed to connect to a site; a different design, requiring greater security, could have been selected. Thus in part, the governance that I mean is a governance brought about through code.⁹

But obviously, governance is not just code. It was not software that chose Network Solutions as the domain name registry—it was the United States government, by a contract that shifted the

6. See <http://www.netsol.com/ns>.

7. On page 103, the MICROSOFT PRESS COMPUTER DICTIONARY (3d ed. 1997) defines a communications protocol as “[a] set of rules or standards designed to enable computers to connect with one another and to exchange information with as little error as possible.”

8. See MICROSOFT PRESS COMPUTER DICTIONARY, *supra* note 7, at 357 (defining a proxy server as a computer that intercepts Internet traffic and has the ability to keep users from accessing outside Web pages); see also *id.* at 197 (defining firewall).

9. I am using the term “code” here far more loosely than software engineers would. I mean by code the instructions or control built into the software and hardware that constitutes the Net. I include within that category both the code of the Internet protocols (embraced within TCP/IP) and also the code constituting the application space that interacts with TCP/IP. Code of the latter sort is often referred to, in Jerome Salitzer's terminology, as code at the “end.” For the case of the data communication system, this range includes encryption, duplicate message detection, message sequencing, guaranteed message delivery, detecting host crashes, and delivery receipts. In a broader context the argument seems to apply to many other functions of a computer operating system, including its file system.” Jerome H. Salitzer et al., *End-to-End Arguments in System Design, an INNOVATIONS IN INTERNETWORKING* 195 (Craig Partridge ed., 1988). More generally, this layer would include any applications that might interact with the Network (browsers, e-mail programs, file transfer clients) as well as operating system platforms upon which these applications might run.

In the analysis that follows, the most important “layer” for my purposes will be the layer above the IP layer. This is because the most sophisticated regulations will occur at this level, given the Net's adoption of Salitzer's end-to-end design.

responsibility from the late John Postel.¹⁰ It was not software that established the protocols for the World Wide Web. It was a group of Internet decision-makers who put a recommendation for this design into circulation, and then recognized it as adopted.¹¹ These decision-makers were people; some of them are responsible to "the People"; their name was not Hal 2000.

Thus governance in the sense that I mean is a mix of the regulations of code and the regulations of bodies that regulate this code. It is both machine and man.

But these "regulators" regulate in ways that are very different. They are different from each other, and they are different from the regulations of real-space governments. We should understand this difference.

* * *

First, think a bit more about code—about the way that code regulates. Lawyers don't like to think much about how code regulates. Lawyers like to think about how law regulates. Code, lawyers like to think, is just the background condition against which laws regulate.

But this misses an important point. The code of cyberspace—whether the Internet, or a net within the Internet—defines that space. It constitutes that space. And as with any constitution, it builds within itself a set of values and possibilities that governs life there. The Internet as it was in 1995 was a space that made it very hard to verify who someone was; that meant it was a space that protected privacy and anonymity. The Internet as it is becoming is a space that will make it very easy to verify who someone is; commerce likes it that way; that means it will become a space that doesn't necessarily protect privacy and anonymity. Privacy and anonymity are values, and they are being respected, or not, because of the design of code. And the design of code is something that people are doing. Engineers make the choices about how the world will be. Engineers in this sense are governors.

10. See Rebecca Quick, *On-Line: Internet Addresses Spark Storm in Cyberspace*, WALL ST. J., Apr. 29, 1997, at B1.

11. See Walt Howe, *Delphi FAQ: A Brief History of the Internet* (last modified Oct. 24, 1998) <<http://www.delphi.com/name/faq/history.html>>.

Baron, O'Hanong, Marklein & Dion-Schwarz,
The Current State of Virtual Currencies

VCs have become increasingly common in recent years. So far, no VCs are fiat currencies—no government has adopted a VC as its legal tender. They do, however, represent value for a particular community that uses them as a means of exchange. VCs have been used in online gaming communities and loyalty programs, such as airline frequent-flyer programs, to keep track of redeemable membership credits that may not otherwise have value in terms of a fiat currency.⁹ VCs, such as money used in online games or frequent-flyer miles, are designed to act as a store of value, unit of account, and medium of exchange solely within their community of interest. That community of interest does not, however, need to occupy a single geographical or political unit. Some of the latest VCs, such as Bitcoin, differ from earlier VCs in that they are designed explicitly to function as currency in the real economy and are exchangeable for government-issued fiat currencies. Returning to the comparison with gold coins, Bitcoin shares many of the same characteristics of gold coins. There is a limited supply of currency in circulation. Similar to a commodity such as gold, Bitcoin's exchange rate can be volatile. Bitcoin is easily measurable and divisible. In contrast to gold, Bitcoin is easily transportable and does not need to transit through international borders as currency, which may increase its ease of use and reduce cross-border transaction costs (as well as chal-

⁸ This is the technology underlying applications, such as Google Wallet, Apple Pay, and Venmo.

⁹ Exchanges may develop to allow users to "cash out" VCs for fiat currencies, but this is neither a feature nor a requirement of VCs.

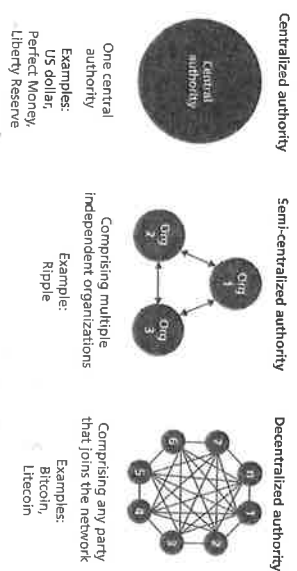
challenge law enforcement and intelligence efforts). Finally, Bitcoin does not depend on a central authority to safeguard its value.

Perhaps the most important distinction between Bitcoin and previous VCs is that while VCs do not technically require a central authority, one of Bitcoin's key features is its completely *decentralized* authority—and many VCs have followed Bitcoin precisely in this direction. As a result, VCs such as Bitcoin cannot build trust in their currencies' stability based on the policies and capacities of a central authority. Instead, users' trust in VCs depends on their trust in the decentralized mechanisms that secure and sustain a VC. Current VCs have authority structures that range from completely centralized to completely decentralized (see Figure 2.1).

Having examined the evolution to VCs from a monetary perspective, we will now examine the evolution of the VCs themselves, mainly from a technological perspective.

(in National Security, RAND 2015, Chaz 2) Implications of VCs,

Figure 2.1
Virtual Currencies Have Varied Authority Structures



14 Virtual Currencies After Bitcoin: Altcoins

Bitcoin is not the only VC that a non-state actor might choose to use or build upon for their own VC deployment; many other currencies have built upon the foundational ideas of Bitcoin that a non-state actor might also leverage.

Following the release of Bitcoin, and its subsequent wide adoption and interest, many new projects were launched, a selection of which are represented in Table 1.1. These were based on either the architecture or,

transaction fees will correspondingly increase to maintain the economic incentivization of mining, which secures the entire Bitcoin system.

¹⁹ It should be noted that this is a very high-level description of Bitcoin. An interested reader should consult other sources for a more detailed description. See, for instance, Bitcoin Help, homepage, undated; see also Bitcoin Wiki, homepage, August 13, 2015b.

²⁰ For further discussion, see Michael Bedford Taylor, "Bitcoin and the Age of Bespoke Silicon," paper presented at the *International Conference on Computers, Architecture, and Smart Infra for Embedded Systems (CASES)*, Montreal, Quebec, September 29–October 4, 2013.

Table 1.1
Examples of Appcoins and Block Chain Applications

Examples	Introduced	Application
NameCoin ^a	April 2011	DNS-like storage in block chain
Mastercoin ^b	January 2012	Planned market, smart contracts
NxtCoin ^c	November 2013	Asset exchange
Ripple ^d	December 2012	Inter-bank transactions
MaidSafeCoin ^e	April 2014	Anonymous, secured cloud computing (non-block chain)

^a Namecoin, homepage, undated.

^b See J. R. Willert, *The Second Bitcoin Whitepaper*, vs. 0.5 (Draft for Public Comment), self-published paper, undated. Also, see GitHub, "Omni Protocol Specification (formerly Mastercoin)," undated.

^c See NxtWiki, "Whitepaper NXT," modified July 13, 2014.

^d See Ripple, "FAQ," undated.

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in most cases, a near-total replication of the source code from Bitcoin. Because the block chain is specific to the Bitcoin network, these "alt-coins" used new block chains, with various modifications to the protocol. Many of these were effectively Ponzi schemes, with the creators using them to pump-and-dump the new currency, or in other ways that were never intended as legitimate currencies.²²

We highlight three classes of noteworthy alternatives to Bitcoin as a currency: the first, Pure Alcoins, primarily modified the financial and cryptographic details of Bitcoin. This included currencies that mined coins more rapidly or used different hash functions to val-

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date the block chain.²³ Yet other new coins altered the method of validating more drastically, replacing proof of work with other schemes.²⁴ Prominent altcoins include Litecoin,²⁵ which has a faster hashing process than Bitcoin; Dogecoin, which started as a humorous creation not meant to be taken seriously; then became gradually more accepted; and Peercoin, which uses a hybrid approach to mining that uses an alternative to Bitcoin's proof-of-work system.²⁶

The second category, which we will call Anonymous Coins, used additional new cryptographic techniques or protocol to create greater anonymity than Bitcoin offers. This has either been in the form of new altcoins that allow for or enforce a level of anonymity in the protocol or various Bitcoin add-ons using a technique called CoinJoin; see Chapter Four's discussion on VC anonymity for more information about Anonymous Coins.

Most recently, the majority of new effort has been focused on a third category, so-called Appcoins, which use block chains for other purposes. While many Appcoins can be used as currencies and are useful for various types of financial transactions, they create and rely on a more complex infrastructure and do not differ greatly from other VCs in the aspects most relevant to this report.²⁷ This new category is interesting because it points to new technological applications of the block chain, though it may be a misnomer to term this category

17 as a currency due to its intended purposes.

²² A variety of hash functions and combinations of hash functions have been proposed, largely revolving around concern about centralization of mining power due to application-specific integrated circuit (ASIC)-based mining. Similarly, alternative schemes, such as proof-of-stake, or computing Cunningham chains in Primcoin, have been created. All of these have important pros and cons, but the details are not relevant for most of the following discussion.

²³ For a list of these currencies, see Alcoins, homepage, undated; see also Bitcoin Wiki, "Comparison of Cryptocurrencies," December 24, 2014.

²⁴ Litecoin, homepage, undated.

²⁵ Peercoin also uses a so-called proof-of-stake mining system; see Sunny King and Scott Nadal, "PPCoin: Peer-to-Peer Crypto-Currency with Proof-of-Stake," self-published paper, August 19, 2012.

²⁶ See Chapter Five for further discussion about the implications of VC technology.

17 Authority (De)centralization and Implications for Virtual Currency Design

Perhaps the most prominent design choice in a VC is how centralized its authority mechanism should be. The earliest VC designs, such as Chaum's, had centralized authority mechanisms: there is a central server that ensures that security properties, such as double spending and counterfeiting, do not occur. Drawbacks of such architectures are that they require at least some trust in the central authority (for example, that they do not simply ignore incoming transactions) and that they can be vulnerable to a single point of failure or present a single target for attack. For instance, the M-PESA system, a currency-transfer mechanism that relies only on text messages to conduct transfers in countries such as Kenya, is centralized at the cellular provider; all it would take to disrupt M-PESA is to degrade the cellular network of a particular country (or selected servers of the provider). It is worth noting that non-state actors such as the Islamic State of Iraq and the Levant (ISIL) are unlikely to care about how centralized a currency is from a fiscal policy perspective; however, vulnerability to cyber attack could be a significant concern.

Bitcoin and the vast majority of the second-generation VCs have decentralized authority mechanisms. There is no central server or service, and any user can and do contribute resources to the authority-mechanism process. Such decentralized structures inherently require more public information about users and transactions because each participating user in the authority mechanism must be able to have enough information to contribute meaningfully. In addition, consensus may take time because many users must agree on the best course of action (otherwise small groups of malicious users can break the security of the decentralized scheme). On the other hand, even if some users contributing to the decentralized authority are malicious, they still cannot impede correct behavior on the part of the overall decentralized system due to its consensus-verification system. It is this resilience, and lack of required trust, that has attracted many users to Bitcoin and other decentralized VCs.

There is a middle ground between the two alternatives: so-called semi-centralized VCs, where the authority mechanism is distributed among a restricted set of participants (e.g., ten total) and only when a sufficiently large fraction of them collude would any private information be revealed or would security be violated. This approach may be useful where there are a small number of high-security users who are trusted not to collude with one another; one example might be the central banks (or military units) of multiple countries that may not have completely trusting relationships with one another. The benefit of semi-centralized VCs is that they balance the trust and single-point-of-failure issues with the centralized model and the mass-dispersal issues with the decentralized model. To date, the existence of semi-centralized VCs is largely theoretical;²⁸ only Ripple may be said to have a fully semi-centralized authority mechanism, and Ripple is not designed to protect user privacy in a meaningful way.

²⁷ See, for instance, Kaitin El Defrawy and and Joshua Lampkins, "Founding Digital Currency on Secure Computation," CCS '16: Proceedings of ACM SIGSAC Conference on Computer and Communications Security, March 2014, pp. 1–14.

²⁸ The VC Dash (formerly Darkcoin) has a hybrid structure where anonymity is guaranteed by a semi-centralized architecture, but most other elements of the currency are governed by a decentralized architecture; see Dash, homepage, undated (a), and Dash, "Masternodes and Proof of Service," undated (b).

2

We have moved from the bio-power that Foucault exemplified by comparative anatomy to a society based on the governance of molecular *zoe* power of today. We have equally shifted from disciplinary to control societies, from the political economy of the Panopticon to the informatics of domination. (Haraway 1991, p. 97)

In the societies of control (...) what is important is no longer either a signature or a number, but a code: the code is a *password*. (Deleuze 1992, p. 5)

Blockchain technology is often strictly associated with *Bitcoin* and other types of cryptocurrencies. This is also where such technology by this stage has been put most into use (Swan 2015, p. 9; see also: de Filippi and Hassan 2016). Such discussions have often been accompanied by optimistic accounts on how cryptocurrencies may be a response—and way out—of the capital-based world-order in which we find ourselves (for an overview of some of these discussions, see e.g. Herian 2016a, b). However, blockchain technology is also a general means for much more improved decentralized connectivity between objects through encryption—and by this, as I will argue here, locked-up control over the digitalized worlds that we inhabit.

The rationale behind encryption technologies is to enact openings and closures between different elements through passwords. Successful decryption subsequently opens access between each side of the encryption chain. A basic form of an encryption technology is the regular lock, which produces a barrier between what is inside (e.g. a locker holding paper and books) and what is outside (e.g. a human). For the human to access the elements inside the locker a key needs to be used to unlock the lock. In comparison with a regular lock solution blockchain could be understood as a significantly more advanced lock (see e.g. Herian 2017, pp. 453–460). As it is a digital lock, it can also be added to everything that can be combined with a digital layer.

For this reason, it is unsurprising that blockchain as an encryption technology is now increasingly theorized as a technology that could be utilized to produce locked connections between matter as diverse as persons and persons, persons and things, as well as things and things. This development folds into the transformation of physical things to *smart* or *intelligent* things.¹ As, for example, the magazine *Forbes* writes, a combination of the development of the Internet of Things (IoT) and blockchain technology makes much sense in terms of improving the encryption needed in IoT. The reason for this is that a substantial part of the data which may be generated through IoT-applications, such as smart home devices, is of personal character. Such data needs to be shared with other machines and services in order to be useful as a smart application. Blockchain technology creates a way to make possible such

¹ Herian (2017, pp. 457–458). The division between persons and things is of course problematic in terms of digitalization, see e.g. my doctoral thesis in legal theory: Kall (2017a), and the recent special issue on traditions, myths, and utopias of personhood: Kall (2017a).

sharing in a more secure way as it produces a barrier which a possible malignant actor would need to bypass (Mar 2018).

And furthermore, this folds into a general move of commoditization of information as assets—and property—through digitalization.² As Tapscott and Tapscott argue, through blockchain technology:

physical assets can become digital assets. All documentation relating to a particular 'thing' can be digitized and carried on in the blockchain including patents, ownership, warranties, inspection certification, provenance, insurance, replacement dates, approvals, et cetera. (Tapscott and Tapscott 2016, p. 159)

Through these technologies then, we may soon see an increasing number of layers of digitalization put on 'physical assets' in order to make them both increasingly traceable and more tangible than they ever were without digital layers (Tapscott and Tapscott 2016, p. 159. Also c.f. Herian 2016a, b).

Through the development of such practices, one may furthermore argue that blockchain as a facilitator for the development of smart things—or even environments—appears to move further beyond the always abstract and highly fluent boundaries of what may be commoditized and controlled as property (see e.g. Esposito 2015, p. 1; Kall 2017a). Furthermore, it appears as if this movement of the concept of private property also may be understood as an intensification of how control is pursued through property. The reason for this is that blockchain enables both further digitalization as well as control over physical elements (cars, parcels, entire cities). In this essay, I will build upon new materialist theorists,³ to show how such understanding is significant to the form of capitalism in which blockchain is embedded and, furthermore, that this logic in itself dissolves the dominant understanding of property control and human personhood.

Intensification of the Societies of Control

Digitalization as a process makes possible new logics of domination depicted by both Donna Haraway and Gilles Deleuze as the introductory quotes to this article make visible. Haraway (1991) described the move towards an intensified focus on the treatment of information as a commodity, as a move away from the Foucauldian idea of biopolitics (as a way for the state to control and discipline its citizens) towards an 'informatics of domination'. In this stage, capitalist actors (apart from the state) pervasively control everything and everyone through seizure and control over 'information'.⁴ Deleuze also developed Foucault's idea of control in his famous

² See notably the early example on smart contracts and smart property as described by Szabo (1996).

³ On the scope of this terminology: Dolphijn and van der Tuin (2011), Coole and Frost (2010, p. 5). As argued by Anselmi-Pearson, Deleuze utilized this terminology for his theoretical endeavours: Anselmi-Pearson (2017).

⁴ Haraway (1991, p. 97), c.f. Hayles (1999) on how cybernetic narratives function to dematerialize elements that traditionally have been perceived as parts of the human body into information.

Post-script on the societies of control. In this text he identified an emerging societal shift where we move from *watchwords* to *passwords* (Haraway 1991, p. 97; Deleuze 1992, p. 5). This could subsequently be interpreted as a move where rules as societal trust—or distrust—are no longer produced through human communication, but rather are dependent on a material regime as a ‘password’, or a material lock. What both of these writings make clear, furthermore, is that power in a society infused by digitalization may be exercised and distributed on the basis of the actor that has control over the code/script of society.

Blockchain Law or Blockchain (Private) Property?

It has already been established in the introduction that blockchain as a technology is tightly connected with the potential of pursuing sophisticated encryption. Combining such insight into blockchain with Deleuze’s and Haraway’s theories about the advancements of the control society furthermore highlights that it is just such kind of practices that pushes society to a new level of control. This type of control implies, as pictured, a codification of control into the bodies⁵ which inhabit the society. By following such insight, blockchain in fact may function as a mode of (very efficient) law that makes possible or hinders certain enactments. In accordance with the framework of information control discussed above, such control encryption technologies may be understood as displacing or even replacing *law* as a means for capitalist control. This understanding of blockchain also connects to the insights by Lawrence Lessig, who argued that code already several decades ago was depicted as having the capacity to function as *law* (Lessig 1999). In light of blockchain technology, one could then even argue that law may be replaced—or displaced—by encryption code as more and more settings become embedded in code.

Primavera de Filippi and Saner Hassan have already pre-empted, and developed, this analogy by stating that what blockchain signifies is a move where law itself becomes code. They build this understanding on the perception that ‘law’ may be coded into products e.g. through smart contracts (Swan 2015, p. 9; see also: de Filippi and Hassan 2016). This implies that law, or control, which was generally perceived as something outside of both individual humanity and individual things instead may be designed into objects or even entire environments. This type of law embedded into products is a typical effect of automated or ‘smart’ objects, as the rules for how they communicate with each other are coded into the objects themselves. For such objects, the pace of the technological development makes it difficult to produce law in the common sense of the term to function as an external regulator of how the objects are to communicate. The technology-induced developments of law are however still understood as a fairly neutral (and unstoppable) development in which more and more elements will be connected to ledgers where data is being

stored and accessed in a more ‘secure’ way. It has even been suggested that blockchain technologies may function as a replacement of obviously inefficient laws to render personal data increasingly private as we move away from a Facebook/Google era, where information has become increasingly appropriated by large information technology companies. Strengthened privacy through technological solutions could certainly be welcomed in light of the fact that we are now seeing increased legislation as regards private data, not least in the EU setting.⁶ However, what such optimistic accounts of blockchain technologies (as a new type of automatized law) appear to dismiss, is the fact that one may also place the development of automatized code control into the general development of a continuous intensification of proprietary control. The reason for this is that blockchain, as a technology, offers the possibility to code property control into the property objects themselves. When this is done, there is no need to monitor one’s property/property rights as such assurance of property rights has become automated. Even though this may not seem to be an extension of property rights per se from a positivist perception of property (if the property right is held in a legitimate manner), the possibility to control something as property certainly becomes enforceable. Furthermore, the development of intensified proprietary control accelerated by digital technologies is no news to anyone who has worked with digitalization, digital contract law and/or intellectual property in the last decade or so. As Professor Margaret Jane Radin forcefully points out, digitalization implies both that information has become tangible and that contract, as a concept within the liberal legal order, has become integrated into the property objects that it governs (see e.g. Radin 2003, 2013).

The integration of the means of control into the property object itself may be identified not least through the now well-advanced discussions regarding Digital Rights Management (DRM), which was introduced to control the digitalization of content such as music, films and video games two decades ago. Such technologies locked the respective types of content to the medium to which it was bundled. In this way, a CD with music was paired with a technology that made it impossible (or rather, difficult) to transfer the music to one’s computer (and from there to the online world of sharing said music further). These solutions were also explicitly protected as new forms of property rights in copyright legislation.⁷ As de Filippi and Hassan write, the DRM in this manner came to replace textual/positive law as the means to control the distribution of content. Blockchain technologies may function in the same manner as a means to control property objects, as they may lock different objects in an ecosystem together to each other. The encryption that locks and unlocks objects to a chain makes for automated contracts (just like DRM) to displace positive law by technological means in order to facilitate transactions of different kinds (de Filippi and Hassan 2016). As blockchain technologies now are being utilized as a way to once again control layers of information as well as those

⁵ The body is here understood in the broadest sense as all type of matter in coherence with the theoretical frameworks developed by both Gilles Deleuze and Donna Haraway. See e.g. Kall (2017b) and Philippopoulos-Mihalopoulos (2015).

⁶ C.f. the protection of personal data and the EU directive from a posthumanist perspective in Kall (2017a).

⁷ See Schönlin (2008), also mentioned as a stage of development towards blockchain as law by de Filippi and Hassan (2016).

layers to which it attaches, this may therefore rather be understood as a variation of a development of control through, and beyond, property law that has already been continuing for decades.

A legal positivist solution to this development could be to call for new legislation or erected boundaries in relation to such developments. Such demand would however entirely ignore the fact that both law and property have been dissolved into a more fluid regime of control as anticipated by both Deleuze and Haraway about 25 years ago. This insight also needs to be read against the common idea that blockchain technologies decentralize power over information networks in a way that could lead to both a less capitalist value system as well as a truly democratic information network (see e.g. Nakamoto 2008). What is notably (dis)missed in such an idea is the fact that advanced encryption follows rather than ruptures the control logics suggested by Deleuze. Subsequently, this logic is utilized to displace authoritative functions within the societal system. As the system that this logic folds under can be described as the 'informatics of domination' following Haraway, this implies that it is capitalist logics, rather than non-hierarchical forms of resistance towards such forces, that will utilize blockchain to strengthen its basis of control. In this way, the logics will be utilized as a means to produce capital. This is not least visible in the way that property concepts are being remodelled to facilitate control over 'intangible' in digital settings. Furthermore, as also depicted by Deleuze, the development of blockchain technologies, as a kind of technology that decenters law or 'trust' in its previous sense, also implies a thorough production of passwords as a requirement for access between everyone and everything digitally 'enhanced'. What we now witness is that as digitalization unfolds, such entanglement between digital and physical elements will only increase.

Program: The Dissolution of Human Control Over Property

From a theoretical point of view, the understanding of property rights rests upon an idea of persons as separable from things.⁸ The idea and praxis of property as a means to divide and control societies is today diffused to a large degree worldwide. This holds true in specific to digitalized settings where the 'public' spheres are controlled through layers of intellectual property rights and contracts. Through digitalization processes, this distinction is being increasingly dissolved. The development cited here where 'smart' digital layers or even artificial intelligence turn both things and humans into *cyborgs* is of specific interest as regards to identifying this evolving regime of control (Haraway 1991, p. 180). As both N. Katherine Hayles and Rosi Braidotti argue, this implies that we now have turned *posthuman* (Hayles 1999; Braidotti 2013). Following both of these theorists, it is however important to note that this turning posthuman does not occur to everyone or everything, in the same

way (Braidotti 2013, p. 1). Yet, it is also those who have never been fully human who have most to gain from the turning posthuman, also, of private property. This turn will however not emerge automatically through the 'decentralization' of technological control enacted by blockchain technologies. To think so would be to deny that advanced capitalism continuously produces a 'perverse form' of the posthuman (Braidotti 2013, p. 7). It is already obvious that market actors will utilize blockchain technologies to code and control emerging posthuman spaces. Deleuze expresses this clearly in quoting Félix Guattari as having imagined:

a city where one could be able to leave one's apartment, one's street, one's neighborhood, thanks to one's (dividual) electronic card that raises a given barrier; but the card could just as easily be rejected on a given day or between certain hours; what counts is not the barrier but the computer that tracks each person's position—licit or illicit—and effects a universal modulation. (Deleuze 1992, p. 7)

As of today, such development is now being carried out full-scale. This holds true in more purely digital spheres as well as the emerging smart cities. More or less visible systems that build upon the enactment of passwords are integrated into supposedly control-free spheres. These systems are furthermore bundled with continuous evaluations of one's credibility as a citizen in spaces where digital and physical elements are utilized to keep some bodies in, and others out. The boundaries between property and personhood are in this manner controlled by actors which have direct access to every individual's movement in such a space. Through advanced encryption technologies and decentralization of responsibility, such control may furthermore easily dissolve into a more severe regime of control, which constantly escapes any counter-movement or alternative societal program. For this reason, the development of blockchain urges a reconsideration of the basis for which such technologies can be utilized. In short, it requires a reconsideration of the concept of, and reason for, the mode of proprietary control it enables.

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⁸ C. f. Espósito (2015). Several fundamental balancing-regimes in property law rest significantly on this assumption still, such as the more or less rigid boundary against commodification of human body parts. See e.g. Bhandari (2012).

Graglia v Mellon, BC v Property in 2018 ...

Level 5 - Disaggregated Rights

1 (20)

From levels 1 through 4 the rights in question will be ownership and occupancy, but once a blockchain becomes the registry, other possibilities present themselves. In level 5, rights can be disaggregated and discretely managed via a blockchain. Various rights associated with a property would be freely negotiated, using a blockchain system to track those transactions. Examples of other rights include, but are not limited to air, water, subsurface, mineral, grazing, and easements.

Level 6 - Fractional Rights

Fractional rights are when a specific right is shared or divided between multiple users. This is frequently brought up in discussions about blockchain and real estate, but would be more difficult in practice without level 5 integration in place. Fractionalization of rights allows for numerous scenarios. In addition to rights of ownership or occupancy, rights to revenues resulting from different uses of the property could also be fractionalized and traded.

Fractional ownership in this context could be defined as multiple parties sharing the rights and responsibilities of owning a real asset (i.e., a house, a condominium, or a commercial building) much like multi-investor leases.

Fractional occupancy could mean a number of things, depending on if the right is divided in terms of space, time, or both. Examples of fractional rights include rights to a room in a house, or a bed in a room, or a time slot for a bed in a room, or rights to occupy an apartment, water rights being shared by multiple companies, or other third parties sharing the water on a land with owners, etc.

Beyond dividing how a property is used, both the governance and investment aspects can be allocated via blockchain. Buyers will purchase shares in an asset, which translate to a stream of payments, assuming the asset is leased (investment), and also provides certain rights or decision-making abilities (governance). This is technically possible without blockchain and has recently happened --see the Australian example of Brickx.com-- but with a blockchain, the costs of allocating, recording, and trading these rights would be considerably lower.⁹¹ Therefore, we should expect various models for mining, trading, and discarding these shares. Blockchains may also facilitate the scaling of the Brickx.com model.

Level 7 - Peer-to-Peer Transactions

These exchanges can occur only after the adoption of a blockchain and the clarification of legal rights. Overall, until levels 1-6 materialize, it is difficult to imagine the possibility of genuine peer-to-peer transactions without the presence of intermediaries.

In the case of Brickx.com, the use of a blockchain to facilitate their model, instead of a centralized internal system, could offer a similar user experience but with faster clearing and lower fees. The real potential for this model becomes clear, however, when its potential is applied without an intermediary. For instance, if a homeowner desires capital, instead of securing a home equity line of credit (HELOC) from a bank, they could simply fractionalize the rights to rent their house and enter into a long term lease with themselves. The homeowner could then offer a fraction of the right to rental payments to any willing buyer via a smart contract. They would then be obliged to make payments to the owner of those rights (interest) until they paid off the initial cost (principal). Said differently, a level 7 registry with fractional rights would allow for a DIY HELOC or a crowd-sourced, peer-to-peer mortgage. In both cases it

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remains to be seen how these fractionated rights will be treated by the courts when failure to meet an obligation triggers a conflict.

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There are a number of well-known technical and legal obstacles to overcome in order for blockchain to be widely adopted in the real estate and land sectors. These include the lack of standard protocols for interoperability and the fact that the dominant public chains may perish, for a variety of reasons including regulation of the cryptocurrencies that power them. Transaction speeds must increase without compromising data security. If we foresee a world with numerous micro-transactions there has to be adequate throughput speed to maintain it. This will depend in part on consensus mechanisms. Proof of Work has been very successful in large public chains but there are concerns around speed and energy consumption. Ethereum's Proof of Stake mechanism remains unproven. More US States are moving to recognize smart contracts and blockchain records, but early bills are occasionally compromised by the inability of lawmakers to define those technologies with sufficient accuracy.

How will blockchain for land be regulated?

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In the foreword to this paper we discussed how concerns over the social impact of the centralization on the internet could help create norms favorable to the adoption of decentralized technologies like blockchain. But there are countervailing forces which we believe will lead government regulators to limit the decentralization of financial infrastructure. This would impact all assets traded with this infrastructure, though the impact on real property would depend on the degree to which blockchain increases liquidity.

A fully decentralized financial system would have troubling economic and security implications. For the West, and especially the United States, influence over the international financial system is an essential diplomatic and law enforcement tool, which can be used to sanction state rivals and disrupt the financing of hostile non-state actors, most importantly terrorist groups.⁹⁴ The fear that blockchain could undermine this status quo was first raised by the advent of cryptocurrencies, which bear mentioning here before focusing on other blockchain-based financial applications.

The US government's assessment of the potential terror financing and money laundering threat from cryptocurrencies is still evolving. A House bill was introduced in January 2018 "to establish an Independent Financial Technology Task Force, to provide rewards for information leading to convictions related to terrorist use of digital currencies, [and] to establish a FinTech Leadership in Innovation Fund to encourage the development of tools and programs to combat terrorist and illicit use of digital currencies."⁹⁵ However, recent assessments by the EU and the UK Treasury have concluded that the

⁹¹ Christopher Mellon and Michael Graglia, "Peering into the Future: How Dual-Frequency Satellite Receivers Will Democratize Land Surveying," *FPF Blog (blog)*, New America, March 23, 2017, <https://www.newamerica.org/international-security/dual-frequency-satellite-receivers-will-democratize-land-surveying/>, accessed March 9, 2018.

⁹² Kevin Mwanza and Henry Wilkins, "African startups bet on blockchain to nudge land fraud," *Reuters*, February 16, 2018, <https://www.reuters.com/article/africa-blockchain/african-startups-bet-on-blockchain-to-nudge-land-fraud/idUSKCN1G00YK>, accessed March 9, 2018.

⁹³ "Introducing the FOAM Protocol: The consensus driven map of the world," *FOAM (blog)*, September 22, 2017, <https://blog.foam.space/introducing-the-foam-protocol-2398d271e17>, accessed March 9, 2018.

⁹⁴ Keith Johnston and Elias Groll, "U.S. Sanctions Weapon Is Under Threat — But Not From Bitcoin," *Foreign Policy*, January 24, 2018, <http://foreignpolicy.com/2018/01/24/u-s-sanctions-weapon-under-threat-but-not-from-bitcoin-blockchain-licensing/>.

⁹⁵ Molly Jane Zuckerman, "New US Bill Seeks to Fight Terrorist Use of Cryptocurrencies," *Cometgraph*, January 17, 2018, <https://cometgraph.com/news/2018-01-17-seeks-to-fight-terrorist-use-of-cryptocurrencies>, accessed March 5, 2018.

threat of terrorist groups financing themselves via cryptocurrencies is not yet a serious one.⁹⁶ The June 2017 EU report, in particular, noted that terrorists still prefer fiat over digital currency.^{97,98} There are at least two good reasons that cryptocurrency has not been treated as a major threat. First, the dominant crypto blockchains are only pseudonymous, and there are tools which can reliably reveal the identities behind the public keys of malicious actors.⁹⁹ Second, the pool of funds cryptocurrencies represent is simply too small to be significant compared to the larger economy.¹⁰⁰ Of course if or when large amounts of land are tokenized, this may no longer be the case.

A more significant threat to the current international order would be the creation of a decentralized value transfer system that would allow states to avoid international sanctions.¹⁰¹ It is no accident that countries like Russia and Venezuela have been quick to demonstrate interest in state cryptocurrencies.¹⁰² Venezuela has been a particularly dramatic example. During the ongoing economic crisis, Venezuelan citizens have turned to Bitcoin during a period of hyperinflation, while the government has created an oil-backed cryptocurrency in an effort to circumvent US sanctions.¹⁰³

The economic incentives of increased efficiency and international liquidity are certainly great enough to ensure the continued development of blockchain-based value transfer systems, but these systems can be expected to combine principles of decentralized exchange with traditional know-your-customer and anti money-laundering features. A February 2018 report from the Council on Foreign Relations notes that “many of the largest U.S.-based [cryptocurrency] exchanges, including Coinbase and Gemini” already comply with these requirements, making it “challenging for criminal groups to convert their cryptocurrency into hard currency.”¹⁰⁴ It is also likely that multisignature wallets will be increasingly utilized,¹⁰⁵ as we have suggested is appropriate for land registries.

With respect to real estate, states will retain the power to regulate and tax land transactions, allowing elected officials to be responsive to the constituents who inhabit the land in question. Taxes may increase transaction costs, but these will be offset by efficiencies from disintermediation. The ability to regulate local land markets is needed to mitigate against unintended consequences such as asset prices

⁹⁶ Ibid; HM Treasury, *National Risk Assessment of Money Laundering and Terrorist Financing 2017* (London, 2017), 5.

⁹⁷ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551598/National_risk_assessment_of_money_laundering_and_terrorist_financing_2017.pdf, accessed February 27, 2018.

⁹⁸ Zuckerman, “New US Bill Seeks to Fight Terrorist Use of Cryptocurrencies.”

⁹⁹ There are several reasons for such proclivity. One is the lack of technological adoption, though this is likely due more to the availability of other funding sources than a lack of technical capability. It is certainly possible that this pattern will change. STEM-educated, technically proficient individuals—especially engineers—are statistically overrepresented in jihadist groups to a high degree. Some researchers posit a link between the concrete thinking of engineers and the moral rigidity of religious and political fanatics. See Diego Gambetta and Steffen Hertog, *Engineers of Jihad: The Curious Connection between Violent Extremism and Education* (Princeton: Princeton University Press, 2016).

¹⁰⁰ See “Eliphric,” <https://www.ellipric.co/>.

¹⁰¹ Julia Kollewe, “Bitcoin: UK and EU plan crackdown amid crime and tax evasion fears,” *Guardian*, December 4, 2017, <https://www.theguardian.com/technology/2017/dec/04/bitcoin-uk-eu-plan-cryptocurrency-crime-taxes-evasion-fears>.

¹⁰² Johnson and Groll, “U.S. Sanctions Weapon Is Under Threat—but Not From Bitcoin.”

¹⁰³ Nathaniel Popper, Olga Mestree, and Ana Vanessa Ferrero, “Russia and Venezuela’s Plan to Sidestep Sanctions: Virtual Currencies,” *New York Times*, January 3, 2018, <https://www.nytimes.com/2018/01/03/technology/russia-venezuela-virtual-currencies.html>.

¹⁰⁴ Rene Chan, “Big in Venezuela: Bitcoin Mining,” *Atlantic*, September 2017, <https://www.theatlantic.com/magazine/archive/2017/09/big-in-venezuela/534171/>.

¹⁰⁵ Amitk Panda, “Cryptocurrencies and National Security,” *Council on Foreign Relations*, February 28, 2018, <https://www.cfr.org/background/cryptocurrencies-and-national-security>.

¹⁰⁶ Kowelle, “Bitcoin.”

skyrocketing in response to external capital flows. High degrees of liquidity and unrestricted property investment—facilitated by a blockchain enabled registry—can drive up housing costs in areas favored by international investors. Foreign prepper investment from China, has created this dynamic in Australia. In 2015, legislation was introduced to limit such investment after middle-class Australians “complained about being priced out of the housing market” by wealthy Chinese investors.¹⁰⁶

The need to retain sovereign control of property markets is one of the main reasons we argue for hybrid chains in the prerequisites, the authorities need the ability to regulate the economy and enforce the law. Further, as blockchains become integrated into registries at higher levels, national laws, taxes, fees, and regulations will have to be integrated into smart contracts.

¹⁰⁶ Jamil Anderlini, “Surge in Chinese housebuying spurs global backlash,” *CNBC.com*, February 25, 2015, <http://www.cnbc.com/2015/02/25/surge-in-chinese-housebuying-spurs-global-backlash.html>, accessed February 27, 2018.

Chapter 8

Experiments in Algorithmic Governance: A history and ethnography of “The DAO,” a failed Decentralized Autonomous Organization

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This chapter describes an emerging form of algorithmic governance, using the case study of “The DAO,” a short-lived attempt to create a decentralized autonomous organization on the Ethereum blockchain platform. In June, 2016, The DAO launched and raised an unprecedented \$250m USD in investment. Within days of its launch, however, The DAO was exploited and drained of nearly 3.7m Ethereum tokens.

This study traces the rise and fall of this emerging technology, and details the governance structures that were promised and hoped for, and those that were actually observed in its discourses. Through 2016–2017, these discourses were collected from online discussions and subsequently analysed. Using computer-assisted, qualitative analysis and coding, I traced the discursive strategies of the developers and the community of investors, identifying: 1) questions of legal authority, 2) tensions in practical governance, and 3) admissions of the inherent complexity of bringing to life an algorithmic and experimental organizational model.

This chapter describes a short-lived experiment in organizational governance that attempted to utilize algorithmic authority through cryptocurrency and blockchain technologies to create a social and political world quite unlike anything we have seen before.

According to the visionaries behind the project, by encoding the rules of governance for organizations and governments in a set of “smart contracts” running on an immutable, decentralized, and potentially unstoppable and public blockchain, new forms of social interactions and order would emerge. This experiment was an example of a new form of organization, called a “Decentralized Autonomous Organization,” or DAO. The forms of sociality that would

also comprised of decentralized “mining” computers, but whereas the Bitcoin miners primarily authenticate transactions, the Ethereum miners authenticate and run executable code.

The very model of simplicity, a mere 900 or so lines of software source code, this design was given the placeholder name of “The DAO.” The DAO was intended to allow cryptocurrency “investors” to directly fund and manage new enterprises—all to be run on the Ethereum blockchain. Because The DAO was backed by Ethereum, complex business logic could be programmed, and once set in action, the organization would be virtually unstoppable.

The blockchain would ensure that all business transactions and organizational changes would be immutably recorded on a public ledger authenticated and controlled by a large, decentralized network of computers. Moreover, because the organizations spawned by The DAO were directly funded through digital token-holding “investors,” each organization

would be, in effect, directly managed by its investors, as per the investment stake of the individual (i.e., those investors who contributed more tokens would get a correspondingly larger number of votes on organizational decisions). No need for messy and inefficient human negotiation—so it seemed!

The DAO was launched on April 30, 2016, at 10:00am GMT/UTC (by several “anonymous” submissions associated with DAOhub, who executed the open source bytecode on the Ethereum blockchain), with a set funding or “creation” period of 28 days (A2be, 2016). As the funding period came to a close (concluding May 28, 2016), The DAO now live with the equivalent of about \$250m USD in funding, breaking all existing crowdfunding records. Some 10,000 to 20,000 (estimated) people invested in The DAO, contributing 11,994,260.98

Ethereum tokens (known as ether, or ETH), which amounted to about 14% of the total ETH supply.¹ However, shortly after the minimum two week “debating” period, on June 17, 2016, The DAO’s code was “exploited” by an unknown individual. This exploit used unintended behaviour of the code’s logic to rapidly drain the fund of millions of dollars’ worth of ETH tokens. Immediately, Stockit, the leaders of the Ethereum platform, numerous cryptocurrency exchanges, and other informal technical leaders stepped in to stem the bleeding—shutting down “exits” through the exchanges, and launching counter-attacks. It is at precisely this point that we see the vision of future governance structures break

down, and devolve into traditional models of sociality—using existing strong ties to negotiate and influence, argue and disagree—all with nary a line of code in sight. In the end, the whole project was disbanded, with an inglorious “hard fork” rolling back the ostensibly “immutable” ledger.

This chapter details the governance structures that were promised by the developers and community members involved in the making of The DAO, and in contrast, those that were observed in its discourses before, during, and after the “exploit.” With the term “governance,” I intend a broad scope: governance is the “conduct of conduct” through the plurality of (human and non-human) actors that are interdependent but lack the power or authority to

decide and enact solutions unilaterally and directly (Antona, 2016: 19), which enables a broad set of “governance options” as risks and solutions.

In the original vision of decentralized autonomous organizations, as proposed by Vitalik Buterin, founder and member of the Ethereum Foundation, a DAO is a pseudo-legal organization run by an assemblage of human and “robot” participants. The robotic participants are algorithmic rules that run on the distributed Ethereum blockchain, and automatically respond to inputs according to programmed rules. Inputs can be varied in type, including fully autonomous sensors (e.g., a digital thermometer), online inputs (e.g., a change in stock price), or “real-world,” external decisions by human agents.² Based on these inputs and the pre-programmed logic stored on a distributed blockchain, the idea is that a DAO would automatically initiate action in an irreversible way (all changes would be written into an immutable distributed ledger). Potential actions a DAO might take include distributing cryptocurrency (such as ETH, for “fuel” or payment), or making a computation and issuing an output, such as triggering software or electromechanical (or IoT) devices.

From the inception of Ethereum and its much lauded decentralized autonomous organization concept there had been very little concrete development of DAOs until The DAO was launched. The DAO was an attempt to build a funding platform, similar to Kickstarter, but one that specifically used decentralized autonomous organization (blockchain) technologies for its operation. Whereas Kickstarter raises funds from many individuals through their centralized administration, typically for the development of commercial products (often “rewarding” the funders through a pre-sale mechanism), The DAO sought to

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raise funds direct from peers (decentralized, peer-to-peer crowdfunding). This "funding" mechanism remains contentious, poorly-understood, and increasingly prevalent practice. Later, in conversation with Christoph Jentzsch, he described his vision of The DAO's economics as a very large joint bank account, not a "sale," or "security." Following The DAO, through 2016-2017, numerous "initial coin offerings" would be launched that continued to skate on legal thin ice with respect to securities and finance law, raising impressive amounts of investment from unvetted and typically amateur investors.

copy of The DAO: a Failed Decentralized Autonomous Organization,"
Blockchain and Global Governance (forthcoming).

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tokens would be used to directly fund and control "proposals" on The DAO platform. Anyone with a (refundable) minimum token deposit could create a proposal to be voted on by token holders. Investors voted by allocating DAO tokens for specific proposals.³ Since tokens would be valuable (comprised of exchange-convertible ETH cryptocurrency), "voting" for a proposal was conceptually the same as funding it, in much the same way that projects are funded on Kickstarter. Unlike Kickstarter, however, DAO voting members would have significant control over projects. Since proposals were expected to be as transparent as possible (ideally, with their operational logic programmed into the blockchain), DAO voting members would directly control an organization by voting for (i.e., funding) specific decisions. For example, voting members could decide—directly—if a new employee was hired or not by using their votes to approve or deny the decision (or even, in fact, use their tokens to directly pay the employee). The level of management granularity would be set by the decentralized autonomous organization contract that runs on the blockchain, and projects could choose to have the minutia of decisions voted on by members, or decide to have only major decisions go to vote. Those members holding the most tokens—majority stakeholders—would have greater influence over decisions.⁴

The DAO proposals

On May 28th, The DAO officially went "live" after an initial 28 day funding period. During this "creation phase," the community of investors discussed "proposals" for how The DAO funds might be used. The proposal with clearly the most community support was Stock.it's own: use The DAO funds to hire Stock.it to design and manufacture a "smart" lock system that would enable "sharing economy" members (such as Airbnb homeowners) to programmatically grant access to their homes to approved renters. Since The DAO was intended to fund the development of this smart lock system, to be built by Stock.it, The DAO token-holders would earn rent on each transaction that used the system. The proposal was enticing to many investors because it used many aspects of blockchain technology to accomplish its primary function, such as, payment and granular management of access that would function through smart contracts on the blockchain, in an open, immutable, and verifiable manner. That rent was being extracted on each use did not seem to bother many people interested in the idea of a "sharing" economy. That Stock.it developed a funding platform for the primary purpose of enticing investors to fund their own enterprise *was*, however, a concern for many in the community. Early on, foreseeing future problems, commentators on The DAO worried about potential conflicts of interest between Stock.it's development and control of The DAO and Stock.it's status as potential hired contractor. Although vastly less popular than Stock.it's proposal, a few other ideas for The DAO emerged, including one by a French company hoping to create a ride-sharing vehicle (Mobotiq), and a proposal for an online gaming system (Firsthood). Given my own interest in understanding the dynamics of distributed funding and governance platforms, I also began the process of setting up an organization that would use The DAO. My hope was that in creating an environmental charity using The DAO, along with fellow researchers (at University College Dublin and the University of California, Irvine), we would be able to study real-world activities through

participant observation. By participating in and observing The DAO community and its technology, we hoped to see how these new forms of economics and management were being used. Unfortunately, none of these ideas made it to the formal proposal stage prior to the exploit.

The Exploit

In the months leading up to the post-funding, launch date of The DAO, numerous community members expressed worry about the security and governance of The DAO. One community member called it an "experiment in responsibility," and, in general, it was becoming clear that Stock.it might not be the safe shepherd the community had hoped for (Ryan, 2016). The most pressing and vocal critique came from cryptocurrency researchers Dino Mark, Vlad Zamfir, and Ermin Ginc Sier, who released a whitepaper on May 26, 2016 (when The DAO was launched but in the static "funding" period), outlining eight possible security risks (Mark et al., 2016). Although these security risks were based on game theory issues, rather than actual code bugs, given the status of these researchers in the field, and the unexpected success of The DAO's funding stage, their call for a temporary "moratorium" was well supported in the community. Nonetheless, Stephen Tual, founder and COO of Stock.it (who had taken on a de facto corporate messaging role), assured the community that such concerns would be addressed, and that there was no need for panic.

However, during this time, Tual was also increasingly vocal that Stock.it did not "own" or "run" The DAO—a fact they had begun emphasizing as The DAO grew relatively large and wealthy—motivated to keep their role as hired contractor distinct from the ostensibly leaderless DAO framework. Because of the algorithmic governance structure, Tual reported to the community, the needed technical fixes (supplied for the most part by Stock.it) could not be implemented until a) The DAO token holders affirmatively voted for an upgrade (after a proposed two-week community review), and b) Ethereum miners approved and implemented the change.

Meanwhile, as the Stock.it team was preparing the version 1.1 update and trying to move it through the community governance process for upgrading, the "race to empty" attack was out in the open. This exploit would enable an attacker to utilize the "split" function to exit the DAO while repeatedly calling a function to withdraw funds before the balance could be updated. The attack had been

tested by a similar (but much smaller) DAO project called "MakerDAO," which confirmed that it was executable, and had alerted The DAO developers about the security risk. On June 12, just prior to his prepared statement about the launch of the version 1.1 update, Tual issued a statement about this security risk, insisting that "no funds were at risk" (a statement that, while technically true, he later regretted), and that the forthcoming 1.1 software update would address this exploit (2016c).

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On June 17, 2016, an unknown "attacker" launched a "race to empty" exploit that was similar to the one that had been previously identified, and began draining The DAO of funds (in the end, 3,689,577 ETH, or about 30% of the total). The first warning came from a Reddit community member, "Jedgerwatch," who wrote, "I think TheDAO is getting drained right now" (Jedgerwatch, 2016b). Within hours, Ethereum Foundation member George Hsiam roused key Ethereum developers and other pertinent members of the community to an internal Slack communication channel (some of whom were already well into a Friday night). The members confirmed the attack and started to strategize. Knowing that the attacker would want to convert the "stolen" funds into "traditional" currency, the assembled group contacted several individuals in charge at the major exchanges responsible for trading ETH, and strongly requested that these exchanges halt trading. Worried that shutting down trading would cause panic and reputational damage, and potentially suggest fiduciary malfeasance, some exchanges resisted such a drastic action, but with \$250m USD and an existential crisis for the entire Ethereum platform on the line, the major exchanges eventually relented. With nowhere to go, and counter-attacks in place, the attack relented and the funds were effectively "frozen" for the time being (due to the built-in security delay required for child DAOs and "splits" from The DAO). At this point, long-term strategies were discussed, blame was placed (the community excoriated Stock.it, and especially Tual), and a countdown clock for a solution was started.

Over the next month, Buterin publicly debated solutions (which ranged from immediate counter-attacks, to complicated "soft forks," to clean and severe "hard forks"), the founder and CTO of Stock.it Christoph Jentzsch publicly apologized, and The DAO funds continued to be attacked (and blocked through technical countermeasures). The value of ETH plummeted, and the community speculated that an unknown individual had shorted the price of ETH prior to the exploit and made millions in the

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aftermath, fueling the belief that the true purpose of the attack was to devalue ETH and make money by short selling (some of the evidence for this short sale, however, is circumspcct, as it may have been a mere coincidence). Moreover, debates over solutions ranged online, driven by ideologies that saw any kind of "hard fork" as tantamount to an existential deceit (a hard fork would conceptually, if not technically, erase the event from the collective and supposedly *immutable* ledger). Even more curiously, a letter purportedly written by the attacker circulated, arguing that since The DAO was defined by its code, the "exploit" was nothing more than a clever (and legal) loophole ("The Attacker", 2016).¹³⁶ The letter writer and a vocal minority in the community argued that "code is law," echoing Lawrence Lessig's (1999) influential slogan. Therefore, they argued, any effort to block the "attacker" would be morally wrong and against the very spirit of decentralized autonomous organizations.

Within the next few weeks, with the political clout of Buterin and the Ethereum Foundation behind the decision, a "hard fork" version of the Ethereum software was developed and released to miners. This hard fork created a special "withdraw-only" contract on the Ethereum blockchain and moved all tokens to it. A majority of miners implemented this software, and the blockchain ledger was updated to effectively erase The DAO. The DAO, and its political vision, was dead.

"Moderates" saw the hard fork as evidence of the flexibility and practicality of Ethereum and its leaders, while the more ideological saw the hard fork as censorship by a powerful cabal, or proof that blockchain technology was unable to live up to its idealistic promises. For the minority of miners who refused to update their Ethereum software—refusing the hard fork—they split from the mainline blockchain. This new blockchain—still susceptible to The DAO-style attacks—was dubbed "Ethereum Classic" and gained a somewhat significant following, even being actively traded on exchanges. Over time, the Ethereum community put The DAO experiment behind them, and talk of decentralized autonomous organizations—previously a guiding light for blockchain platforms—was thereafter tainted.

13 The DAO is an important artefact for attempting to understand emerging forms of algorithmic authority, working through practical modes of governance for autonomous and decentralized systems, and for understanding the ways that designing incentives and modelling action can fail. Its emergence and technical structure formally relates to ongoing discussions about the ethics of autonomous warfare.

automated and high-frequency finance, and big data. Despite the utopian rhetoric on the one hand, and the largely critical academic literature on the other, what remains unclear with these technologies is whether they constitute an extension of existing socio-technical apparatuses, or are a decisive break with the past. What is clear, The DAO proved, is that these technologies have significant potential for real impact and harm, and therefore ring early warning alarms for the critical investigation of modes of governance beyond those already designed.

After the exploit, The DAO was formally shuttered, but in the conflictual community response that ensued there lies an interesting coda to its broader narrative. When the hard fork was proposed as a "fix" to the exploit, a vocal minority opposed it. While it is not entirely clear who opposed the hard fork, in their opposition, many "miners" declined to accept the hard fork software and therefore continued to mine the old blockchain. In doing so, the incentives (and capabilities) of the miners became critically misaligned with the incentives of the majority of The DAO community. By mining the old blockchain, the miners forged a new cryptocurrency, later called "Ethereum Classic" or ETC. Ethereum Classic would itself become a strange investment vehicle that created economic "value" out of thin air (not unlike all cryptocurrencies), underpinned by nothing more than vague idealism and a dogged interest in financial returns.

Despite my cynicism, The DAO also introduced an interesting, relatively small-scale technology for experimenting with governance issues and new models of society. Indeed, perhaps this characterization can also be extended beyond matters of governance and beyond The DAO itself—should we see cryptocurrencies and blockchain technologies more broadly as apparatuses for socio-technical experimentation in society? That is, in the end, perhaps The DAO simply did not survive long enough to work out the kinks in a promising new kind of governance. Or, perhaps hype and exuberance got in the way of a good idea, whose time will come someday, which was first charted by these intrepid explorers?

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Three key themes of governance emerge from this discourse: 1) the shift of legal authority from existing, juridical authority to algorithmic authority; 2) the difficulty of designing and governing algorithmic systems, and especially immutable and decentralized ones; and 3) the challenging ethical terrain of experimentation with forms of distributed action through autonomous, decentralized systems.